

# CPC COOPERATIVE PATENT CLASSIFICATION

## G PHYSICS (NOTES omitted)

### INSTRUMENTS

#### G05 CONTROLLING; REGULATING (NOTES omitted)

#### G05B CONTROL OR REGULATING SYSTEMS IN GENERAL; FUNCTIONAL ELEMENTS OF SUCH SYSTEMS; MONITORING OR TESTING ARRANGEMENTS FOR SUCH SYSTEMS OR ELEMENTS (systems for controlling or regulating non-electric variables [G05D](#); systems for regulating electric or magnetic variables [G05E](#); control devices or systems insofar as characterised by mechanical features only [G05G](#))

##### NOTES

1. This subclass covers features of control systems or elements for regulating specific variables, which are clearly more generally applicable.
2. This subclass does not cover:
  - a. systems for controlling or regulating nonelectric variables in general, which are covered by subclass [G05D](#);
  - b. systems for regulating electric or magnetic variables in general, which are covered by subclass [G05E](#);
  - c. systems specially adapted for the control of particular machines or apparatus provided for in a single other subclass, which are classified in the relevant subclass for such machines or apparatus, provided that there is specific provision for control or regulation relevant to the special adaptation. Otherwise, classification is made in the most appropriate place in this subclass.
3. In this subclass, the following terms or expressions are used with the meanings indicated:
  - "automatic controller" means a system, circuit, or device in which a signal from the detecting element is compared with a signal representing the desired value and which operates in such a way as to reduce the deviation. The automatic controller generally does not include the sensitive element, i.e. that element which measures the value of the condition to be corrected, or the correcting element, i.e. that element which adjusts the condition to be corrected;
  - "electric" includes "electromechanical", "electrohydraulic" or "electropneumatic".
4. In this subclass, details of specific control systems are classified in the group relevant to the system, if not otherwise provided for.

<b>1/00</b>	<b>Comparing elements, i.e. elements for effecting comparison directly or indirectly between a desired value and existing or anticipated values</b>	6/05	. fluidic
1/01	. electric	<b>7/00</b>	<b>Arrangements for obtaining smooth engagement or disengagement of automatic control</b>
1/02	. . for comparing analogue signals ( <a href="#">circuits for comparing the phase or frequency of two mutually-independent oscillations H03D 13/00</a> )	7/02	. electric
1/022	. . . {using discharge tubes}	7/04	. fluidic
1/025	. . . {using inductance means}	<b>9/00</b>	<b>Safety arrangements (<a href="#">G05B 7/00</a> takes precedence; safety arrangements in programme-control systems <a href="#">G05B 19/048</a>, <a href="#">G05B 19/406</a>)</b>
1/027	. . . {using impedance bridges}	9/02	. electric
1/03	. . for comparing digital signals	9/03	. . with multiple-channel loop, i.e. redundant control systems
1/04	. . with sensing of the position of the pointer of a measuring instrument	9/05	. fluidic
1/06	. . . continuous sensing	<b>11/00</b>	<b>Automatic controllers (<a href="#">G05B 13/00</a> takes precedence)</b>
1/08	. . . stepwise sensing	11/01	. electric
1/11	. fluidic	11/011	. . {details of the correcting means}
<b>5/00</b>	<b>Anti-hunting arrangements</b>	11/012	. . {details of the transmission means}
5/01	. electric	11/013	. . . {using discharge tubes}
5/04	. fluidic	11/015	. . . {using rotating amplifiers}
<b>6/00</b>	<b>Internal feedback arrangements for obtaining particular characteristics, e.g. proportional, integral or differential</b>	11/016	. . . {using inductance means}
6/02	. electric	11/017	. . . {using photo-electric means}
		11/018	. . . {using thermal amplifiers}

- 11/06 . . in which the output signal represents a continuous function of the deviation from the desired value, i.e. continuous controllers ([G05B 11/26 takes precedence](#))
- 11/10 . . . the signal transmitted being dc
- 11/12 . . . the signal transmitted being modulated on an ac carrier
- 11/14 . . in which the output signal represents a discontinuous function of the deviation from the desired value, i.e. discontinuous controllers ([G05B 11/26 takes precedence](#))
- 11/16 . . . Two-step controllers, e.g. with on/off action
- 11/18 . . . Multi-step controllers
- 11/26 . . in which the output signal is a pulse-train
- 11/28 . . . using pulse-height modulation; using pulse-width modulation
- 11/30 . . . using pulse-frequency modulation
- 11/32 . . with inputs from more than one sensing element; with outputs to more than one correcting element
- 11/36 . . with provision for obtaining particular characteristics, e.g. proportional, integral, differential
- 11/38 . . . for obtaining a proportional characteristic
- 11/40 . . . for obtaining an integral characteristic
- 11/42 . . . for obtaining a characteristic which is both proportional and time-dependent, e.g. P. I., P. I. D.
- 11/44 . pneumatic only
- 11/46 . . without auxiliary power
- 11/48 . . with auxiliary power
- 11/50 . . . in which the output signal represents a continuous function of the deviation from the desired value, i.e. continuous controllers
- 11/52 . . . in which the output signal represents a discontinuous function of the deviation from the desired value, i.e. discontinuous controllers
- 11/54 . . . . Two-step controllers, e.g. with on/off action
- 11/56 . . . . Multi-step controllers
- 11/58 . . with inputs from more than one sensing element; with outputs to more than one correcting element
- 11/60 . hydraulic only
- 13/00 Adaptive control systems, i.e. systems automatically adjusting themselves to have a performance which is optimum according to some preassigned criterion ([G05B 19/00 takes precedence](#))**
- 13/02 . electric
- 13/0205 . . {not using a model or a simulator of the controlled system}
- 13/021 . . . {in which a variable is automatically adjusted to optimise the performance}
- 13/0215 . . . . {using trial and error method, including "peak-holding"}
- 13/022 . . . . {using a perturbation of the variable}
- 13/0225 . . . . . {being a periodic perturbation}
- 13/023 . . . . . {being a random or a self-induced perturbation}
- 13/0235 . . . . {using steepest descent or ascent method}
- 13/024 . . . {in which a parameter or coefficient is automatically adjusted to optimise the performance}
- 13/0245 . . . . {not using a perturbation signal}
- 13/025 . . . . {using a perturbation signal}
- 13/0255 . . . . {the criterion being a time-optimal performance criterion}
- 13/026 . . . . {using a predictor}
- 13/0265 . . . {the criterion being a learning criterion}
- 13/027 . . . . {using neural networks only}
- 13/0275 . . . . {using fuzzy logic only}
- 13/028 . . . . {using expert systems only}
- 13/0285 . . . . {using neural networks and fuzzy logic}
- 13/029 . . . . {using neural networks and expert systems}
- 13/0295 . . . . {using fuzzy logic and expert systems}
- 13/04 . . involving the use of models or simulators
- 13/041 . . . . {in which a variable is automatically adjusted to optimise the performance}
- 13/042 . . . . {in which a parameter or coefficient is automatically adjusted to optimise the performance}
- 13/044 . . . . . {not using a perturbation signal}
- 13/045 . . . . . {using a perturbation signal}
- 13/047 . . . . {the criterion being a time optimal performance criterion}
- 13/048 . . . . {using a predictor}
- 15/00 Systems controlled by a computer ([G05B 13/00](#), [G05B 19/00](#) take precedence; automatic controllers with particular characteristics [G05B 11/00](#))**
- 15/02 . electric
- 17/00 Systems involving the use of models or simulators of said systems ([G05B 13/00](#), [G05B 15/00](#), [G05B 19/00](#) take precedence)**
- 17/02 . electric
- 19/00 Programme-control systems**
- 19/02 . electric
- 19/04 . . Programme control other than numerical control, i.e. in sequence controllers or logic controllers ([G05B 19/418 takes precedence](#))
- 19/0405 . . . . {Programme-control specially adapted for machine tool control and not otherwise provided for}
- 19/041 . . . . {Function-oriented details}
- 19/0415 . . . . . {adapting phase duration according to measured parameters}
- 19/042 . . . . using digital processors ([G05B 19/05 takes precedence](#))
- 19/0421 . . . . . {Multiprocessor system}
- 19/0423 . . . . . {Input/output}
- 19/0425 . . . . . {Safety, monitoring}
- 19/0426 . . . . . {Programming the control sequence}
- 19/0428 . . . . . {Safety, monitoring ([G05B 19/0423 takes precedence](#))}
- 19/045 . . . . using logic state machines, consisting only of a memory or a programmable logic device containing the logic for the controlled machine and in which the state of its outputs is dependent on the state of its inputs or part of its own output states, e.g. binary decision controllers, finite state controllers
- 19/048 . . . . Monitoring; Safety
- 19/05 . . . . Programmable logic controllers, e.g. simulating logic interconnections of signals according to ladder diagrams or function charts
- 19/052 . . . . . {Linking several PLC's}
- 19/054 . . . . . {Input/output}
- 19/056 . . . . . {Programming the PLC}

- 19/058 . . . . {Safety, monitoring}
- 19/06 . . . using cams, discs, rods, drums or the like
- 19/063 . . . . {for sequential programme-control without delivering a reference value}
- 19/066 . . . . {for delivering "step function", a slope function or a continuous function}
- 19/07 . . . where the programme is defined in the fixed connection of electrical elements, e.g. potentiometers, counters, transistors
- 19/075 . . . . {for delivering a step function, a slope or a continuous function ([G05B 19/06](#) takes precedence)}
- 19/08 . . . using plugboards, cross-bar distributors, matrix switches, or the like
- 19/10 . . . using selector switches
- 19/102 . . . . {for input of programme steps, i.e. setting up sequence}
- 19/104 . . . . . {characterised by physical layout of switches; switches co-operating with display; use of switches in a special way}
- 19/106 . . . . . {for selecting a programme, variable or parameter}
- 19/108 . . . . . {characterised by physical layout of switches; switches co-operating with display; use of switches in a special way}
- 19/12 . . . using record carriers
- 19/122 . . . . {using cards, tapes or discs having conductive paths ([G05B 19/128](#) takes precedence)}
- 19/124 . . . . . {using tapes, cards or discs with optically sensed marks or codes ([G05B 19/128](#), [G05B 19/14](#) take precedence)}
- 19/126 . . . . . {using cards, tapes or discs having protuberances ([G05B 19/128](#) takes precedence)}
- 19/128 . . . . . {the workpiece itself serves as a record carrier, e.g. by its form, by marks or codes on it}
- 19/14 . . . . using punched cards or tapes {([G05B 19/128](#) takes precedence)}
- 19/16 . . . . using magnetic record carriers {([G05B 19/128](#) takes precedence)}
- 19/18 . . Numerical control [NC], i.e. automatically operating machines, in particular machine tools, e.g. in a manufacturing environment, so as to execute positioning, movement or co-ordinated operations by means of programme data in numerical form ([G05B 19/418](#) takes precedence)
- 19/182 . . . {characterised by the machine tool function, e.g. thread cutting, cam making, tool direction control ([G05B 19/21](#) - [G05B 19/40](#) take precedence)}
- 19/184 . . . . {Generation of cam-like surfaces}
- 19/186 . . . . {Generation of screw- or gearlike surfaces}
- 19/188 . . . {characterised by special applications and not provided for in the relevant subclasses, (e.g. making dies, filament winding)}
- 19/19 . . . characterised by positioning or contouring control systems, e.g. to control position from one programmed point to another or to control movement along a programmed continuous path
- NOTE**
- In this group, the measuring system for an axis is used to measure the displacement along that axis. This measurement is used as position-feedback in the servo-control system.
- 19/195 . . . . . {Controlling the position of several slides on one axis}
- 19/21 . . . . . using an incremental digital measuring device
- 19/23 . . . . . for point-to-point control
- 19/231 . . . . . . {the positional error is used to control continuously the servomotor according to its magnitude}
- 19/232 . . . . . . . {with speed feedback only}
- 19/234 . . . . . . . {with current or torque feedback only}
- 19/235 . . . . . . . {with force or acceleration feedback only}
- 19/237 . . . . . . . {with a combination of feedback covered by [G05B 19/232](#) - [G05B 19/235](#)}
- 19/238 . . . . . . . {the positional error is only used to control speed in steps according to distance left, or to give a stop signal when error reaches zero}
- 19/25 . . . . . for continuous-path control
- 19/251 . . . . . . {the positional error is used to control continuously the servomotor according to its magnitude}
- 19/253 . . . . . . . {with speed feedback only}
- 19/255 . . . . . . . {with current or torque feedback only}
- 19/256 . . . . . . . {with force or acceleration feedback only}
- 19/258 . . . . . . . {with a combination of feedback covered by [G05B 19/253](#) - [G05B 19/256](#)}
- 19/27 . . . . . using an absolute digital measuring device
- 19/29 . . . . . for point-to-point control
- 19/291 . . . . . . {the positional error is used to control continuously the servomotor according to its magnitude}
- 19/293 . . . . . . . {with speed feedback only}
- 19/295 . . . . . . . {with current or torque feedback only}
- 19/296 . . . . . . . {with force or acceleration feedback only}
- 19/298 . . . . . . . {with a combination of feedback covered by [G05B 19/293](#) - [G05B 19/296](#)}
- 19/31 . . . . . for continuous-path control
- 19/311 . . . . . . {the positional error is used to control continuously the servomotor according to its magnitude}
- 19/313 . . . . . . . {with speed feedback only}
- 19/315 . . . . . . . {with current or torque feedback only}

- 19/316 . . . . . {with force or acceleration feedback only}
- 19/318 . . . . . {with a combination of feedback covered by [G05B 19/313](#) - [G05B 19/316](#)}
- 19/33 . . . . . using an analogue measuring device
- 19/35 . . . . . for point-to-point control
- 19/351 . . . . . {the positional error is used to control continuously the servomotor according to its magnitude}
- 19/353 . . . . . {with speed feedback only}
- 19/355 . . . . . {with current or torque feedback only}
- 19/356 . . . . . {with force or acceleration feedback only}
- 19/358 . . . . . {with a combination of feedback covered by [G05B 19/353](#) - [G05B 19/356](#)}
- 19/37 . . . . . for continuous-path control
- 19/371 . . . . . {the positional error is used to control continuously the servomotor according to its magnitude}
- 19/373 . . . . . {with speed feedback only}
- 19/375 . . . . . {with current or torque feedback only}
- 19/376 . . . . . {with force or acceleration feedback only}
- 19/378 . . . . . {with a combination of feedback covered by [G05B 19/373](#) - [G05B 19/376](#)}
- 19/39 . . . . . using a combination of the means covered by at least two of the preceding groups [G05B 19/21](#), [G05B 19/27](#) and [G05B 19/33](#)
- 19/40 . . . . . Open loop systems, e.g. using stepping motor
- 19/401 . . . . . characterised by control arrangements for measuring, e.g. calibration and initialisation, measuring workpiece for machining purposes ([G05B 19/19](#) takes precedence)
- 19/4015 . . . . . {going to a reference at the beginning of machine cycle, e.g. for calibration}
- 19/402 . . . . . characterised by control arrangements for positioning, e.g. centring a tool relative to a hole in the workpiece, additional detection means to correct position ([G05B 19/19](#) takes precedence)
- 19/404 . . . . . characterised by control arrangements for compensation, e.g. for backlash, overshoot, tool offset, tool wear, temperature, machine construction errors, load, inertia ([G05B 19/19](#), [G05B 19/41](#) take precedence)
- 19/406 . . . . . characterised by monitoring or safety ([G05B 19/19](#) takes precedence)
- 19/4061 . . . . . Avoiding collision or forbidden zones
- 19/4062 . . . . . Monitoring servoloop, e.g. overload of servomotor, loss of feedback or reference
- 19/4063 . . . . . Monitoring general control system ([G05B 19/4062](#) takes precedence)
- 19/4065 . . . . . Monitoring tool breakage, life or condition
- 19/4067 . . . . . Restoring data or position after power failure or other interruption
- 19/4068 . . . . . Verifying part programme on screen, by drawing or other means
- 19/4069 . . . . . Simulating machining process on screen ([G05B 19/4068](#) takes precedence)
- 19/408 . . . . . characterised by data handling or data format, e.g. reading, buffering or conversion of data
- 19/4083 . . . . . {Adapting programme, configuration}
- 19/4086 . . . . . {Coordinate conversions; Other special calculations}
- 19/409 . . . . . characterised by using manual data input [MDI] or by using control panel, e.g. controlling functions with the panel; characterised by control panel details or by setting parameters ([G05B 19/408](#), [G05B 19/4093](#) take precedence)
- 19/4093 . . . . . characterised by part programming, e.g. entry of geometrical information as taken from a technical drawing, combining this with machining and material information to obtain control information, named part programme, for the NC machine
- 19/40931 . . . . . {concerning programming of geometry}
- 19/40932 . . . . . {Shape input}
- 19/40933 . . . . . {Selecting figure elements from a menu table}
- 19/40935 . . . . . {Selection of predetermined shapes and defining the dimensions with parameter input}
- 19/40936 . . . . . {Defining geometry with a high level language}
- 19/40937 . . . . . {concerning programming of machining or material parameters, pocket machining}
- 19/40938 . . . . . {Tool management}
- 19/4097 . . . . . characterised by using design data to control NC machines, e.g. CAD/CAM ([G05B 19/4093](#) takes precedence)
- 19/4099 . . . . . Surface or curve machining, making 3D objects, e.g. desktop manufacturing
- 19/41 . . . . . characterised by interpolation, e.g. the computation of intermediate points between programmed end points to define the path to be followed and the rate of travel along that path ([G05B 19/25](#), [G05B 19/31](#), [G05B 19/37](#), [G05B 19/39](#), [G05B 19/40](#) take precedence)
- 19/4103 . . . . . Digital interpolation
- 19/4105 . . . . . Analog interpolation
- 19/414 . . . . . Structure of the control system, e.g. common controller or multiprocessor systems, interface to servo, programmable interface controller
- 19/4141 . . . . . {characterised by a controller or microprocessor per axis}
- 19/4142 . . . . . {characterised by the use of a microprocessor ([G05B 19/4141](#) takes precedence)}
- 19/4144 . . . . . {characterised by using multiplexing for control system}
- 19/4145 . . . . . {characterised by using same processor to execute programmable controller and numerical controller function [CNC] and PC controlled NC [PCNC]}
- 19/4147 . . . . . {characterised by using a programmable interface controller [PIC]}
- 19/4148 . . . . . {characterised by using several processors for different functions, distributed (real-time) systems ([G05B 19/4141](#) takes precedence)}
- 19/4155 . . . . . characterised by programme execution, i.e. part programme or machine function execution, e.g. selection of a programme

- 19/416 . . . characterised by control of velocity, acceleration or deceleration ([G05B 19/19 takes precedence](#))
- 19/4163 . . . . {Adaptive control of feed or cutting velocity (without NC [B23Q 15/12](#))}
- 19/4166 . . . . {Controlling feed or in-feed ([G05B 19/4163 takes precedence](#))}
- 19/418 . . Total factory control, i.e. centrally controlling a plurality of machines, e.g. direct or distributed numerical control [DNC], flexible manufacturing systems [FMS], integrated manufacturing systems [IMS] or computer integrated manufacturing [CIM]
- 19/41805 . . . {characterised by assembly}
- 19/4181 . . . {characterised by direct numerical control [DNC]}
- 19/41815 . . . {characterised by the cooperation between machine tools, manipulators and conveyor or other workpiece supply system, workcell}
- 19/4182 . . . . {manipulators and conveyor only}
- 19/41825 . . . . {machine tools and manipulators only, machining centre}
- 19/4183 . . . {characterised by data acquisition, e.g. workpiece identification}
- 19/41835 . . . {characterised by programme execution}
- 19/4184 . . . {characterised by fault tolerance, reliability of production system}
- 19/41845 . . . {characterised by system universality, reconfigurability, modularity}
- 19/4185 . . . {characterised by the network communication}
- 19/41855 . . . . {by local area network [LAN], network structure}
- 19/4186 . . . . {by protocol, e.g. MAP, TOP}
- 19/41865 . . . {characterised by job scheduling, process planning, material flow}
- 19/4187 . . . . {by tool management}
- 19/41875 . . . {characterised by quality surveillance of production}
- 19/4188 . . . {characterised by CIM planning or realisation}
- 19/41885 . . . {characterised by modeling, simulation of the manufacturing system}
- 19/4189 . . . {characterised by the transport system}
- 19/41895 . . . . {using automatic guided vehicles [AGV] ([control of position or course of AGV's G05D 1/00](#))}
- 19/42 . . Recording and playback systems, i.e. in which the programme is recorded from a cycle of operations, e.g. the cycle of operations being manually controlled, after which this record is played back on the same machine
- 19/4202 . . . {preparation of the programme medium using a drawing, a model}
- 19/4205 . . . . {in which a drawing is traced or scanned and corresponding data recorded}
- 19/4207 . . . . {in which a model is traced or scanned and corresponding data recorded}
- 19/421 . . . Teaching successive positions by mechanical means, e.g. by mechanically-coupled handwheels to position tool head or end effector ([G05B 19/423 takes precedence](#))
- 19/423 . . . Teaching successive positions by walk-through, i.e. the tool head or end effector being grasped and guided directly, with or without servo-assistance, to follow a path
- 19/425 . . . Teaching successive positions by numerical control, i.e. commands being entered to control the positioning servo of the tool head or end effector
- 19/427 . . . Teaching successive positions by tracking the position of a joystick or handle to control the positioning servo of the tool head, master-slave control ([G05B 19/423 takes precedence](#))
- 19/43 . fluidic
- 19/44 . . pneumatic
- 19/46 . . hydraulic
- 21/00** **Systems involving sampling of the variable controlled** ([G05B 13/00](#) - [G05B 19/00 take precedence](#))
- 21/02 . electric
- 23/00** **Testing or monitoring of control systems or parts thereof (monitoring of programme-control systems [G05B 19/048](#), [G05B 19/406](#))**
- 23/02 . Electric testing or monitoring
- 23/0205 . . {by means of a monitoring system capable of detecting and responding to faults}
- 23/0208 . . . {characterized by the configuration of the monitoring system}
- 23/021 . . . . {adopting a different treatment of each operating region or a different mode of the monitored system, e.g. transient modes; different operating configurations of monitored system}
- 23/0213 . . . . {Modular or universal configuration of the monitoring system, e.g. monitoring system having modules that may be combined to build monitoring program; monitoring system that can be applied to legacy systems; adaptable monitoring system; using different communication protocols}
- 23/0216 . . . . {Human interface functionality, e.g. monitoring system providing help to the user in the selection of tests or in its configuration}
- 23/0218 . . . {characterised by the fault detection method dealing with either existing or incipient faults}
- 23/0221 . . . . {Preprocessing measurements, e.g. data collection rate adjustment; Standardization of measurements; Time series or signal analysis, e.g. frequency analysis or wavelets; Trustworthiness of measurements; Indexes therefor; Measurements using easily measured parameters to estimate parameters difficult to measure; Virtual sensor creation; De-noising; Sensor fusion; Unconventional preprocessing inherently present in specific fault detection methods like PCA-based methods}
- 23/0224 . . . . {Process history based detection method, e.g. whereby history implies the availability of large amounts of data}
- 23/0227 . . . . . {Qualitative history assessment, whereby the type of data acted upon, e.g. waveforms, images or patterns, is not relevant, e.g. rule based assessment; if-then decisions}
- 23/0229 . . . . . {knowledge based, e.g. expert systems; genetic algorithms}

- 23/0232 . . . . . {based on qualitative trend analysis, e.g. system evolution}
- 23/0235 . . . . . {based on a comparison with predetermined threshold or range, e.g. "classical methods", carried out during normal operation; threshold adaptation or choice; when or how to compare with the threshold}
- 23/0237 . . . . . {based on parallel systems, e.g. comparing signals produced at the same time by same type systems and detect faulty ones by noticing differences among their responses}
- 23/024 . . . . . {Quantitative history assessment, e.g. mathematical relationships between available data; Functions therefor; Principal component analysis [PCA]; Partial least square [PLS]; Statistical classifiers, e.g. Bayesian networks, linear regression or correlation analysis; Neural networks}
- 23/0243 . . . . . {model based detection method, e.g. first-principles knowledge model}
- 23/0245 . . . . . {based on a qualitative model, e.g. rule based; if-then decisions}
- 23/0248 . . . . . {Causal models, e.g. fault tree; digraphs; qualitative physics}
- 23/0251 . . . . . {Abstraction hierarchy, e.g. "complex systems", i.e. system is divided in subsystems, subsystems are monitored and results are combined to decide on status of whole system}
- 23/0254 . . . . . {based on a quantitative model, e.g. mathematical relationships between inputs and outputs; functions: observer, Kalman filter, residual calculation, Neural Networks}
- 23/0256 . . . . . {injecting test signals and analyzing monitored process response, e.g. injecting the test signal while interrupting the normal operation of the monitored system; superimposing the test signal onto a control signal during normal operation of the monitored system}
- 23/0259 . . . . . {characterized by the response to fault detection}
- 23/0262 . . . . . {Confirmation of fault detection, e.g. extra checks to confirm that a failure has indeed occurred}
- 23/0264 . . . . . {Control of logging system, e.g. decision on which data to store; time-stamping measurements}
- 23/0267 . . . . . {Fault communication, e.g. human machine interface [HMI]}
- 23/027 . . . . . {Alarm generation, e.g. communication protocol; Forms of alarm}
- 23/0272 . . . . . {Presentation of monitored results, e.g. selection of status reports to be displayed; Filtering information to the user}
- 23/0275 . . . . . {Fault isolation and identification, e.g. classify fault; estimate cause or root of failure}
- 23/0278 . . . . . {Qualitative, e.g. if-then rules; Fuzzy logic; Lookup tables; Symptomatic search; FMEA}
- 23/0281 . . . . . {Quantitative, e.g. mathematical distance; Clustering; Neural networks; Statistical analysis}
- 23/0283 . . . . . {Predictive maintenance, e.g. involving the monitoring of a system and, based on the monitoring results, taking decisions on the maintenance schedule of the monitored system; Estimating remaining useful life [RUL] (preventive maintenance, i.e. planning maintenance according to the available resources without monitoring the system G06Q 10/06)}
- 23/0286 . . . . . {Modifications to the monitored process, e.g. stopping operation or adapting control}
- 23/0289 . . . . . {Reconfiguration to prevent failure, e.g. usually as a reaction to incipient failure detection}
- 23/0291 . . . . . {Switching into safety or degraded mode, e.g. protection and supervision after failure}
- 23/0294 . . . . . {Optimizing process, e.g. process efficiency, product quality}
- 23/0297 . . . . . {Reconfiguration of monitoring system, e.g. use of virtual sensors; change monitoring method as a response to monitoring results}
- 24/00** **Open-loop automatic control systems not otherwise provided for**
- 24/02 . electric
- 24/04 . fluidic
- 99/00** **Subject matter not provided for in other groups of this subclass**
- 2219/00** **Program-control systems**
- 2219/10 . Plc systems
- 2219/11 . . Plc I-O input output
- 2219/1101 . . . Remote I-O
- 2219/1102 . . . Speed up I-O manipulation
- 2219/1103 . . . Special, intelligent I-O processor, also plc can only access via processor
- 2219/1104 . . . Display state of connection of I-O
- 2219/1105 . . . I-O
- 2219/1106 . . . Pneumatic, hydraulic output module connected to plc module
- 2219/1107 . . . Hardware expansion of function of plc, programmable, connected in output line
- 2219/1108 . . . Relay module
- 2219/1109 . . . Expansion, extension of I-O
- 2219/1110 . . . Verifying ram data correct, validity, reload faulty data with correct data
- 2219/1111 . . . I-o grouped on one board
- 2219/1112 . . . Bit addressing, handling
- 2219/1113 . . . Address setting
- 2219/1114 . . . Address by module name
- 2219/1115 . . . Avoid to give two different addresses to same I-O, no duplicate
- 2219/1116 . . . Position of module in loop, ring determines address of module
- 2219/1117 . . . Parallel input addressed as memory
- 2219/1118 . . . Peripherals have a key to determine kind of peripheral
- 2219/1119 . . . Key is 8-resistors connected to either 0-or-1 to form a byte key

- 2219/1121 . . . Read key multiplexed, 16-bit wide, connect some resistors to reversed potential
- 2219/1122 . . . Program address module after installation, connect programmer into module
- 2219/1123 . . . Poll and detect connected I-O addresses, not connected means high address
- 2219/1124 . . . Transfer address to module, decrement, send this as address for next module
- 2219/1125 . . . I-O addressing
- 2219/1126 . . . Conversion table between original defined module address and actual physical address
- 2219/1127 . . . Selector for I-O, multiplex for I-O
- 2219/1128 . . . Several networks linked to host computer
- 2219/1129 . . . Serial addressed modules on bus
- 2219/1131 . . . I-O connected to a bus
- 2219/1132 . . . High speed bus between plc and plc or programming device
- 2219/1133 . . . Sensor actuator, asi, bus, network
- 2219/1134 . . . Fieldbus
- 2219/1135 . . . Profibus
- 2219/1136 . . . Canbus
- 2219/1137 . . . Peer to peer communication
- 2219/1138 . . . Configuration of I-O
- 2219/1139 . . . By using software configurable circuit, integrated, pga between cpu and I-O
- 2219/1141 . . . Modify manually, using keyboard configuration of module
- 2219/1142 . . . Load in replacement I-O stored configuration
- 2219/1143 . . . Base configuration contains all I-O modules, deselect not present modules
- 2219/1144 . . . Program, program I-O module
- 2219/1145 . . . Normal scan of I-O and direct acces of some I-O independent from normal scan
- 2219/1146 . . . Scanning sequence as function of previous logic expression
- 2219/1147 . . . Variable rate of scan
- 2219/1148 . . . If I-O module cannot be scanned in time, report to controller
- 2219/1149 . . . I-o in groups, serviced according to critical inputs, tasks matched to I-O
- 2219/1151 . . . Fast scanning of I-O to put I-O status in image table
- 2219/1152 . . . I-O module delivers interrupt on event, store port and 10ms timestamp in buffer
- 2219/1153 . . . Scan only some I-O registers, use flags
- 2219/1154 . . . Reading repeatedly input state, try again
- 2219/1155 . . . Switching over from one input to another one
- 2219/1156 . . . Special latches release all simultaneously
- 2219/1157 . . . I-O used either as input or as output
- 2219/1158 . . . Control of output current
- 2219/1159 . . . Image table, memory
- 2219/1161 . . . Signal processing, detect or deliver analog signals
- 2219/1162 . . . Forcing I-O
- 2219/1163 . . . Multiplexer for analog signals
- 2219/1164 . . . Latch for output or input
- 2219/1165 . . . Disable I-O card by preventing current flow
- 2219/1166 . . . Create optimum data blocks for transmission
- 2219/1167 . . . Pulse wave output
- 2219/1168 . . . Peak amplitude for input, nul amplitude for activating output
- 2219/1169 . . . Activating output if input changes, transition input and output not yet on
- 2219/1171 . . . Detect only input variation, changing, transition state of variable
- 2219/1172 . . . Direct negation, inversion of inputsignal
- 2219/1173 . . . Activating output only if powersupply is sufficient
- 2219/1174 . . . Input activates directly output and *vice versa*
- 2219/1175 . . . Activating output repeatedly for guaranteed turning on of output
- 2219/1176 . . . I-O signal processing, adaption, conditioning, conversion of signal levels
- 2219/1177 . . . Insertion mistake
- 2219/1178 . . . Display states of I-O in time
- 2219/1179 . . . Safety, on error, fault, block, inhibit output
- 2219/1181 . . . Detection of I-O faults, shut down of I-O
- 2219/1182 . . . I-O isolation, optical
- 2219/1183 . . . On error shut off output by independent system, not normal I-O
- 2219/1184 . . . Test ability of input for on, off capability
- 2219/1185 . . . Feedback of output status to input module and compare with command
- 2219/1186 . . . Redundant inputs parallel, outputs series, load safe switch off, AND condition
- 2219/1187 . . . Test input value with stored limits, permissible range, plausibility
- 2219/1188 . . . Detection of inserted boards, inserting extra memory, availability of boards
- 2219/1189 . . . Duplicated I-O also triple
- 2219/1191 . . . I-O voter
- 2219/1192 . . . Output of interfaces parallel, for safe load switch on, OR condition
- 2219/1193 . . . I-O ram as buffer for signals and self test for I-O bus
- 2219/1194 . . . Send dummy, check data to I-O to check correct I-O connection
- 2219/1195 . . . Critical I-O monitored by safety module connected to plc, other I-Os by plc self
- 2219/1196 . . . Intelligent, smart I-O can function independently, monitoring limit values
- 2219/1197 . . . Each interface, module has simulation module which takes over control
- 2219/1198 . . . Activate output only if power of the output signal is sufficient
- 2219/1199 . . . Inserting or taking out of boards during power on, hot plug in
- 2219/12 . . . Plc mp multi processor system
- 2219/1201 . . . Each plc can act as master, flying master
- 2219/1202 . . . Modules with same hardware and software
- 2219/1203 . . . Expand logical expression over multiple controllers
- 2219/1204 . . . Multiprocessing, several plc's, distributed logic control
- 2219/1205 . . . Memory access for different processors, memory arbitration, mailbox
- 2219/1206 . . . All processors are loaded with same program, only part of program is loaded
- 2219/1207 . . . Download programcode to node, I-O and execute programcode
- 2219/1208 . . . Communication, exchange of control, I-O data between different plc,
- 2219/1209 . . . Exchange control, I-O data to other plc, individually, without host
- 2219/1211 . . . Exchange control, I-O data to other plc, using separate synchronizing,

- 2219/1212 . . . Exchange control data between plc's only when other plc's are inactive
- 2219/1213 . . . All plc send their input to a common image memory, output directly send out
- 2219/1214 . . . Real-time communication between plc, Ethernet for configuration, monitor
- 2219/1215 . . . Master slave system
- 2219/1216 . . . Interlock problem, avoid sending data to slave when slave processes data
- 2219/13 . . Plc programming
- 2219/13001 . . . Interrupt handling
- 2219/13002 . . . Transfer rom content to ram, load ram from non volatile memory
- 2219/13003 . . . Initial program load, host to controller
- 2219/13004 . . . Programming the plc
- 2219/13005 . . . Subroutine
- 2219/13006 . . . Prom burning
- 2219/13007 . . . Program hardwired logic, pld, fpga when out of machine, or inactive
- 2219/13008 . . . Quicker execution of jumps when repeating same kind of operation
- 2219/13009 . . . State machine instructions
- 2219/13011 . . . Batch control
- 2219/13012 . . . Using other programs, adapting program to machine, exchanging or rom
- 2219/13013 . . . Transferring ram to eprom see also prom burning
- 2219/13014 . . . Expanding functions of display by modular hardware
- 2219/13015 . . . Semi automatic, manual automatic
- 2219/13016 . . . Jump while output is disabled, or disabling output when running test instruction
- 2219/13017 . . . Macro instructions
- 2219/13018 . . . Conversion ladder diagram to decision system, machine code, language
- 2219/13019 . . . Translate program in order to be used on different plc
- 2219/13021 . . . Convert Petri net to ladder diagram
- 2219/13022 . . . Convert source program to intermediate program
- 2219/13023 . . . Convert natural language, graphic to coded states, input
- 2219/13024 . . . Convert digital logic of hardware circuit into plc software
- 2219/13025 . . . Convert batch recipe into plc program
- 2219/13026 . . . Convert ladder to event chaining, internal state for fpga or similar
- 2219/13027 . . . Convert time chart to relation vector to calculate plc I-O state as function of time
- 2219/13028 . . . Convert plc type program in pc type program for running in pc environment
- 2219/13029 . . . Enter values with incremental keys
- 2219/13031 . . . Use of touch screen
- 2219/13032 . . . Different menus on screen, softkeys
- 2219/13033 . . . Code wheel to enter data, push button to accept
- 2219/13034 . . . Operator interface derived from comment label in program
- 2219/13035 . . . Name, address duplication detection for program components, symbols
- 2219/13036 . . . Tracing, use of dummy ladder to collect signals together in one
- 2219/13037 . . . Tracing
- 2219/13038 . . . Comment, message data displayed with program instructions
- 2219/13039 . . . Print out of program, printer for program
- 2219/13041 . . . Display ladder or logic diagram, mnemonics, switch between two display
- 2219/13042 . . . Display logic diagram, LOP
- 2219/13043 . . . Display statement, instruction list, IL, BL, AWL
- 2219/13044 . . . Display as flow chart, SFC, FUP
- 2219/13045 . . . Additional data to restore ladder diagram from machine instructions
- 2219/13046 . . . Display status of edited program segments: inserted, deleted, replaced
- 2219/13047 . . . Display data on chart with comment, message about type of data
- 2219/13048 . . . Display of ladder, RLD, RLL, KOP
- 2219/13049 . . . Display progress of program, state, highlight, colour
- 2219/13051 . . . Display status of I-O in intelligible, easy to understand language
- 2219/13052 . . . Display of ladder diagram
- 2219/13053 . . . Edit by use of a ladder mask, raster, enter a symbol and select place in mask
- 2219/13054 . . . Enter a symbol and number of times symbol to be used in ladder diagram
- 2219/13055 . . . Place cursor, enter symbol, move cursor
- 2219/13056 . . . Edit conversion, jump table interactively
- 2219/13057 . . . Automatic search for unused, available address; assign to symbol
- 2219/13058 . . . One instruction of plc generates a whole independent sequence, relay
- 2219/13059 . . . If not able to execute instruction block, skip and execute next
- 2219/13061 . . . Selection between sequential and conditional program
- 2219/13062 . . . Booting
- 2219/13063 . . . Synchronization between modules
- 2219/13064 . . . Execute reverse sequence
- 2219/13065 . . . Tasks for executing several programs asynchronously
- 2219/13066 . . . Execute next step if state, control zone changes
- 2219/13067 . . . Use of variables, symbols in instructions, to indicate mechanisms, interfaces
- 2219/13068 . . . Program divided in operation blocks, groups, tasks each executed
- 2219/13069 . . . Execute bit operation during instruction fetch cycle for word operation
- 2219/13071 . . . Non time critical program by processor, time critical program by hardware
- 2219/13072 . . . Super scalar computing
- 2219/13073 . . . Several interacting programs, each for a separate machine, exchange of start, stop
- 2219/13074 . . . Result of bit operation can modify or stop instruction execution
- 2219/13075 . . . User program, then interlock program to override certain conditions
- 2219/13076 . . . Interpret in pc a ladder diagram, use of sequence engine
- 2219/13077 . . . Interlock conditions stored in tables
- 2219/13078 . . . Sequence operation and interlock set programs are separated
- 2219/13079 . . . Solving stored logic function if value is equal target value

- 2219/13081 . . . Select between initialisation and normal control instructions sequence plc
- 2219/13082 . . . Parallel execution of bit operations
- 2219/13083 . . . Jumps
- 2219/13084 . . . Rom or eeprom with conditional instructions
- 2219/13085 . . . Plc controls several machines in sequence
- 2219/13086 . . . Priority interrupt
- 2219/13087 . . . Separate interrupt controller for modules
- 2219/13088 . . . Analyzing only relevant rows of ladder diagram
- 2219/13089 . . . Skip part of expression evaluation if no influence on end result
- 2219/13091 . . . Use of precalculated and stored values to speed up calculations
- 2219/13092 . . . Speed up, evaluation of expressions between brackets
- 2219/13093 . . . Using functions like arithmetic timers in program
- 2219/13094 . . . Using a-d convertor as function
- 2219/13095 . . . Pid regulator
- 2219/13096 . . . Fuzzy control function
- 2219/13097 . . . Function is true macro program, not subroutine, conversion to machine
- 2219/13098 . . . Nc function to control axis, written in C or not
- 2219/13099 . . . Function block, OOP, various functions grouped, called by name as servo
- 2219/13101 . . . Function block instance, only one function block exists, several instances
- 2219/13102 . . . Function is a user written program, separate from rest
- 2219/13103 . . . Adaptive selftuning regulator
- 2219/13104 . . . Assembly, machine code, instruction list, AWL, IL, BL
- 2219/13105 . . . Two or more languages, ladder diagram or progression, basic program
- 2219/13106 . . . Natural language, use simple words like move, rotate,
- 2219/13107 . . . Logic symbols, plan LOP, functional block symbols FBS, functional programming FUP
- 2219/13108 . . . Flow diagram, sequential function chart with transitions and states SFC Grafcet
- 2219/13109 . . . Pld programmable logic device software for plc
- 2219/13111 . . . Expert system
- 2219/13112 . . . Petri net
- 2219/13113 . . . Read image of sequence ladder diagram, flow chart drawing, translate into code
- 2219/13114 . . . Use of relative addresses for program
- 2219/13115 . . . Optimize ladder diagram block by rearrangement of serial and parallel
- 2219/13116 . . . Machine code, instruction for processor
- 2219/13117 . . . Two languages, ladder diagram and machine code for processor
- 2219/13118 . . . Decompiler, translate machine code to hll, reverse processing, easy modification
- 2219/13119 . . . Compiler
- 2219/13121 . . . DDE direct data exchange, DLL dynamic library linking
- 2219/13122 . . . Flow chart program activates several ladder diagrams, each controls one machine
- 2219/13123 . . . C language
- 2219/13124 . . . Step language
- 2219/13125 . . . Use of virtual, logical connections
- 2219/13126 . . . Csl computer simulation language
- 2219/13127 . . . Hybrid sfc for description of sequence, ladder diagram for conditions, interlock
- 2219/13128 . . . Relay ladder diagram, RLL RLD KOP
- 2219/13129 . . . Automatic documentation of program
- 2219/13131 . . . Select out several languages: FBD, SFC, RLL or RLD
- 2219/13132 . . . Select out several languages: FBD and SFC
- 2219/13133 . . . Select control languages out of FB RLL or RLD, SFC, ST
- 2219/13134 . . . Two or more languages mixed, RLD, SFC, FBD, IL, ST, relay ladder, function block, sequential function, instruction list, structured text mixed to form logic control program
- 2219/13135 . . . Using audio and-or video playback
- 2219/13136 . . . Translate spreadsheet into code
- 2219/13137 . . . Interpreter considers hierarchy of plc in system structure for programming it
- 2219/13138 . . . High level language HLL, structured text ST, resembles pascal
- 2219/13139 . . . CAD, design plc system by inputting desired failure, fault behaviour
- 2219/13141 . . . Derive sequence program from design, cad data of machine
- 2219/13142 . . . Debugging, tracing
- 2219/13143 . . . Manual testing
- 2219/13144 . . . GUI graphical user interface, icon, function bloc editor, OI operator interface
- 2219/13145 . . . Graphical input of network of symbols, simulation on screen, translate to machine
- 2219/13146 . . . Process image blocks have a relation to software function blocks
- 2219/13147 . . . Program using time charts
- 2219/13148 . . . Object oriented programming
- 2219/13149 . . . Encapsulated actuator model with standardized interface: state, action, interlock
- 2219/13151 . . . Correction of program using grammatical error detection
- 2219/13152 . . . Modification of program
- 2219/13153 . . . Modification, change of program in real time
- 2219/13154 . . . Patching rom to correct program
- 2219/13155 . . . Inserting instructions in program
- 2219/13156 . . . IC-memory card
- 2219/13157 . . . Tape
- 2219/13158 . . . Non volatile memory, no battery
- 2219/13159 . . . Cassette
- 2219/13161 . . . Easily exchangeable rom, eeprom cassette, eeprom
- 2219/13162 . . . Core memory
- 2219/13163 . . . Light pen
- 2219/13164 . . . Remote and local programming unit, control panel
- 2219/13165 . . . Program plc by independent build in processor
- 2219/13166 . . . Program intelligent I-O separate from main plc
- 2219/13167 . . . Personal computer pc
- 2219/13168 . . . With contact pins
- 2219/13169 . . . Voice, oral, vocal, speech announcement
- 2219/13171 . . . Portable, detachable programming unit
- 2219/13172 . . . Remote programming from computer
- 2219/13173 . . . Selection out of all possible programs with switch
- 2219/13174 . . . Pc, computer connected to plc to simulate machine
- 2219/13175 . . . For each input corresponding delay time for output response

- 2219/13176 . . . Functionality of a complex controlled systems, composed of sub-systems
- 2219/13177 . . . Select next stimuli as function of input state of previous step, so useless stimuli skipped
- 2219/13178 . . . Reiterate simulation till minimum delay stimuli, original contact stat
- 2219/13179 . . . Reiterate simulation for different conditions or subsystems
- 2219/13181 . . . Selection of limited stimuli, inputs for simulation
- 2219/13182 . . . With petrinets
- 2219/13183 . . . Connect simulation card with overlay into control system, to learn programming
- 2219/13184 . . . Pc, computer connected to plc to simulate only part of machine
- 2219/13185 . . . Software function module for simulation
- 2219/13186 . . . Simulation, also of test inputs
- 2219/13187 . . . Checking validity of data
- 2219/13188 . . . Checking program data, parity, key
- 2219/13189 . . . On error, look in table for alternative allowed next instruction
- 2219/13191 . . . Inhibit next step if signature fails, response different from stored response
- 2219/13192 . . . Eeprom and software interlock, user cannot change ram data
- 2219/13193 . . . Examine needed I-O, detect connected I-O, execute program only if proper I-O
- 2219/13194 . . . Build in measurement processing time and input time, input time must be smaller
- 2219/13195 . . . Protected programs, running these programs
- 2219/13196 . . . Check if instruction for special module is valid for that module
- 2219/13197 . . . Host and remote version of ladder program, avoid different versions
- 2219/13198 . . . Safety, forbid dangerous instruction, instruction order while programming
- 2219/13199 . . . On error choose another program
- 2219/14 . . . Plc safety
- 2219/14001 . . . Detect direction, sign of change of signal
- 2219/14002 . . . Independent processor, coprocessor monitors plc
- 2219/14003 . . . Pc, personal computer monitors contact data of several plc's
- 2219/14004 . . . On error I-O control state is substituted by actual state to continue
- 2219/14005 . . . Alarm
- 2219/14006 . . . Safety, monitoring in general
- 2219/14007 . . . Plc as standalone for safety control of machine
- 2219/14008 . . . Pc monitors plc
- 2219/14009 . . . Manual override control, digital or analog, between plc and machine
- 2219/14011 . . . Explosion free control, intrinsically safe
- 2219/14012 . . . Safety integrity level, safety integrated systems, SIL, SIS
- 2219/14013 . . . IN, dual plc worker coworker, switch, OUT persistency
- 2219/14014 . . . Redundant processors and I-O
- 2219/14015 . . . Dual plc's, processors and dual I-O
- 2219/14016 . . . Triple plc's, processors and dual I-O, triple modular redundant
- 2219/14017 . . . Triple plc's, processors and triple I-O
- 2219/14018 . . . IN, plc and comparator, error detector, backup, standby plc, switch, update OUT
- 2219/14019 . . . Dual IN, crosscoupled relay, dual AND, dual OUT
- 2219/14021 . . . IN, direct link parallel to plc, AND, OUT
- 2219/14022 . . . Dual IN, dual plc with dual OUT comparator, dual AND, dual OUT
- 2219/14023 . . . IN, three plc and 2-out-of-3 processor voter, 2-out-of-3 output voter, OUT
- 2219/14024 . . . Dual IN, three plc with comparator, dual 2-out-of-3 output voter, dual OUT
- 2219/14025 . . . Dual IN, relay parallel to plc with comparator, dual AND, feedback OUT, dual OUT
- 2219/14026 . . . IN, relay, direct link parallel to plc, AND, OUT
- 2219/14027 . . . IN, plc and comparator, feedback OUT, OUT
- 2219/14028 . . . Dual IN, plc and comparator, feedback OUT, AND, OUT
- 2219/14029 . . . Dual IN, plc and comparator, feedback OUT, dual AND, OUT
- 2219/14031 . . . Dual plc, dual I-O, single actuator, crosscoupling IN and OUT
- 2219/14032 . . . Dual plc, dual I-O, crosscoupling analog IN of first plc to OUT of second plc
- 2219/14033 . . . Dual plc, dual I-O bus, dual I-O amplifier
- 2219/14034 . . . Quad system, dual worker coworker, output voter, switch
- 2219/14035 . . . Single analog I-O IN, dual signal processing, dual plc
- 2219/14036 . . . Detection of fault in processor
- 2219/14037 . . . Fault in I-O communication
- 2219/14038 . . . Fault in I-O racks, point level
- 2219/14039 . . . Fault in sensor, actuator
- 2219/14041 . . . Influence of execution of interrupts
- 2219/14042 . . . Process time
- 2219/14043 . . . Detection of abnormal temperature
- 2219/14044 . . . Operating time test for over or under conditions
- 2219/14045 . . . Parameter, over or under condition detection
- 2219/14046 . . . Current flow
- 2219/14047 . . . Open circuit, broken line, cable
- 2219/14048 . . . Short circuit
- 2219/14049 . . . Broken led, signalling device
- 2219/14051 . . . Correct polarity of supply
- 2219/14052 . . . Detect missing module
- 2219/14053 . . . Power failure, loss, abnormal battery
- 2219/14054 . . . Self test
- 2219/14055 . . . Make log, journal, history file of state changes
- 2219/14056 . . . Monitor only particular devices which are required for execution of process
- 2219/14057 . . . Compare response time, time interval with reference response time, interval
- 2219/14058 . . . Diagnostic, using expert, knowledge based system
- 2219/14059 . . . Selftest of voting, switching unit
- 2219/14061 . . . On-off-line diagnostic
- 2219/14062 . . . Diagnostic of dead state, machine does not function anymore
- 2219/14063 . . . Diagnostic of degrading performance
- 2219/14064 . . . Portable diagnostic unit, offline
- 2219/14065 . . . Checking step, diagnostic routine at end of each scan
- 2219/14066 . . . Look up table to determine particular fault conditions
- 2219/14067 . . . Log, history of key, input information before last fault occurred

- 2219/14068 . . . Compare operation time of each independent block, group with stored
- 2219/14069 . . . Dual watch dog, one for operating system, other for user program
- 2219/14071 . . . Test of equipment, system without using actual system
- 2219/14072 . . . Test of I-O scanner
- 2219/14073 . . . Real time modeling of plc behaviour, display pictogram of system
- 2219/14074 . . . Signature analysis, recorded states, zones are compared to actual
- 2219/14075 . . . Test of interface
- 2219/14076 . . . Test of sensor
- 2219/14077 . . . Detect difference in signal between identical channels, if plausible
- 2219/14078 . . . If fault in next cycle persists, declare channel faulty
- 2219/14079 . . . If signal out of range, use for next cycle previous detected signal
- 2219/14081 . . . Take average, mean of two valid signals of same input
- 2219/14082 . . . Sample input signal again to verify if signal is correct
- 2219/14083 . . . Derive diagnostic program from model needed for sequence program
- 2219/14084 . . . Remote diagnostic
- 2219/14085 . . . Memory testing
- 2219/14086 . . . Watch dog
- 2219/14087 . . . Selecting parameters or states to be displayed on panel, displaying states
- 2219/14088 . . . Display result of computation, calculation
- 2219/14089 . . . Display of control states on cards, by leds
- 2219/14091 . . . Message generation, composer from variables and states, zones
- 2219/14092 . . . Display menu and its code, sense code, compare with registered code
- 2219/14093 . . . Display matrix of relay, contact symbols, select and show time
- 2219/14094 . . . Display instruction with corresponding states, markers
- 2219/14095 . . . Library of pictures to display process, pictogram
- 2219/14096 . . . Voice, vocal, speech alarm
- 2219/14097 . . . Display of error messages
- 2219/14098 . . . Displaying instructions for monitoring state of machine
- 2219/14099 . . . What kind of fault, first fault latch indication
- 2219/14101 . . . Indication of status in a ready, off, running of fault state
- 2219/14102 . . . Fault stages, confinement, logical segregation of I-O, separate modules
- 2219/14103 . . . Detection on or off-line, latency from failure occurrence to fault recognition
- 2219/14104 . . . Fault masking, redundant module is selected, fault will not propagate
- 2219/14105 . . . Retry, reacquire input data and start fault sequence again
- 2219/14106 . . . Reconfiguration of components or graceful degradation, degrade
- 2219/14107 . . . Recovery, after detection or reconfiguration, effect an error eliminati
- 2219/14108 . . . Restart of processing
- 2219/14109 . . . Repair on or off-line
- 2219/14111 . . . Reintegration, after correction of fault, failed module reinserted
- 2219/14112 . . . Diagnostic, troubleshooting
- 2219/14113 . . . Fault tolerant objectives for equipment, controller
- 2219/14114 . . . Integrity, error detector, switch off controller, fail safe
- 2219/14115 . . . Rapid recovery after fault detection
- 2219/14116 . . . Safe, emergency shutdown, esd of system
- 2219/14117 . . . Emergency shut down of control processor, power down
- 2219/14118 . . . Interlock of control switches
- 2219/14119 . . . Inhibit remote control
- 2219/14121 . . . Dual hand control
- 2219/14122 . . . Prevent conflicting writing of data; use lock flags
- 2219/14123 . . . Majority voting, dynamic redundant, persistency and integrity
- 2219/14124 . . . Redundant network, client server nodes
- 2219/14125 . . . Redundant I-O racks, interfaces to points
- 2219/14126 . . . Redundant I-O points, two sensors, actuators for same point
- 2219/14127 . . . Redundant communication between processor and I-O
- 2219/14128 . . . Redundant I-O rack has spare slots, hot repair feature, spare blocks f
- 2219/14129 . . . Primary, worker and backup, coworker plc for testing I-O
- 2219/14131 . . . Workby plc, all plc function in parallel, synchronous data exchange
- 2219/14132 . . . Dual plc, each monitors other
- 2219/14133 . . . Each plc is different from others
- 2219/14134 . . . Each plc is programmed by different person
- 2219/14135 . . . Single plc, load between two I-O to plus and two I-O to ground
- 2219/14136 . . . Redundancy, masking redundancy, avoid failure but no fault detection
- 2219/14137 . . . Restart, power up of processor, outputs are off, disabled or hold last state
- 2219/14138 . . . Each independent operation block, group has own restart, home position
- 2219/14139 . . . On the fly software replacement in case of error
- 2219/14141 . . . Restart
- 2219/14142 . . . Low impedance bus
- 2219/14143 . . . Structure, low pass filter, debouncing input, output driver with ramp
- 2219/14144 . . . Galvanic isolation
- 2219/14145 . . . Serial feedback of several states of output
- 2219/15 . . . Plc structure of the system
- 2219/15001 . . . Local remote switch control
- 2219/15002 . . . Image table in I-O expansion module
- 2219/15003 . . . Interbus-s
- 2219/15004 . . . Identity kind of module, control unit connected
- 2219/15005 . . . Set switches defining control function
- 2219/15006 . . . Set configuration from master control station
- 2219/15007 . . . On reinsertion board, power up, program setting, configuration automatically set
- 2219/15008 . . . Identify connected I-O and store in address table
- 2219/15009 . . . Object oriented configuring, graphical display of plant
- 2219/15011 . . . Configuration of operating system
- 2219/15012 . . . Configuration software for networks

- 2219/15013 . . . Set configuration, address of connected module from fixed non volatile
- 2219/15014 . . . Configure priorities of different tasks
- 2219/15015 . . . Assign functions to group of complete or partial cells, modules
- 2219/15016 . . . Initialize amount of memory space needed in module
- 2219/15017 . . . Optical fiber
- 2219/15018 . . . Communication, serial data transmission, modem
- 2219/15019 . . . RS232 serial
- 2219/15021 . . . Convertor between plc and pc built into serial communication line
- 2219/15022 . . . Synchronus serial datatransmission
- 2219/15023 . . . Data packet, each module reads input stream and replaces with output
- 2219/15024 . . . RS422, balanced lines, xor, only one transmitter, receiver, RS485
- 2219/15025 . . . Before starting communication between modules, initialize modules
- 2219/15026 . . . Detection of data transmission faults
- 2219/15027 . . . RS485, MPI multipoint interface, multiple transmitters, receivers connected
- 2219/15028 . . . Controller and device have several formats and protocols, select common one
- 2219/15029 . . . I-O communicates with local bus at one end and with fieldbus at other end
- 2219/15031 . . . RS485 for service connection to module
- 2219/15032 . . . Exchange objects having I-O, configuration, status, parameters, functions attributes
- 2219/15033 . . . Exchange objects between cpu and intelligent I-O, stored in their memory
- 2219/15034 . . . Serial transmission using one line for data and one line for clock
- 2219/15035 . . . Select between simplex, only reading I-O data or duplex, also writing to interface
- 2219/15036 . . . Control words for interface itself and for connected I-O
- 2219/15037 . . . Fail safe communication
- 2219/15038 . . . Internet, tcp-ip, web server see under **S05B219-40**
- 2219/15039 . . . Display of reference, set value, of measured, feedback value
- 2219/15041 . . . Sense area of screen, compare if corresponds with correct area
- 2219/15042 . . . Synoptic display of process, mimic diagram
- 2219/15043 . . . Lcd, 7-segment displays ten different states
- 2219/15044 . . . Multiple lcd, alphanumerical display
- 2219/15045 . . . Portable display unit
- 2219/15046 . . . Low-high intensity display, flashing
- 2219/15047 . . . Colour display
- 2219/15048 . . . Microprocessor
- 2219/15049 . . . Timer, counter, clock-calendar, flip-flop as peripheral
- 2219/15051 . . . Dual port memory
- 2219/15052 . . . Communication processor, link interface
- 2219/15053 . . . Microcontroller
- 2219/15054 . . . LIFO for storing intermediate results
- 2219/15055 . . . FIFO
- 2219/15056 . . . DMA
- 2219/15057 . . . FPGA field programmable gate array
- 2219/15058 . . . Tristate interface
- 2219/15059 . . . Floating point coprocessor
- 2219/15061 . . . RISC processor for plc
- 2219/15062 . . . Battery backup
- 2219/15063 . . . Real time clock
- 2219/15064 . . . MMU, memory management unit
- 2219/15065 . . . Optimize program memory space
- 2219/15066 . . . Use of external memory
- 2219/15067 . . . Using a mixture of memories
- 2219/15068 . . . SBC single board computer, UCM universal control module
- 2219/15069 . . . Use of function modules with timer, counter, relay functions and I-O
- 2219/15071 . . . Circuit in module connected to bus over two contacts, closed in operat
- 2219/15072 . . . Modules in daisy chain, connected by parallel cable
- 2219/15073 . . . Interface card, module has own power supply independent from pc
- 2219/15074 . . . Modules on bus and direct connection between them for additional logic
- 2219/15075 . . . Each connected module has own power suppl
- 2219/15076 . . . Stackthrough modules, modules are stacked, no need for backplane
- 2219/15077 . . . Modular structure, memory tables hold data about type of connected apparatus and data format
- 2219/15078 . . . Modules, construction of system
- 2219/15079 . . . Multitasking, real time multitasking
- 2219/15081 . . . Period length ratio between application and communication task is settable
- 2219/15082 . . . Dos operating plc system
- 2219/15083 . . . Operating system, microsoft windows
- 2219/15084 . . . MSDOS
- 2219/15085 . . . Windows NT
- 2219/15086 . . . Windows-95
- 2219/15087 . . . Open control system
- 2219/15088 . . . Prestabilized power supply followed by another stabilized power supply
- 2219/15089 . . . Double, parallel power supply, double, two rails for power supply
- 2219/15091 . . . Power and data bus
- 2219/15092 . . . Power supply with extended range inputs
- 2219/15093 . . . For each module a power supply
- 2219/15094 . . . Clock for power converters also for microprocessor and I-O
- 2219/15095 . . . Power supply for input, output derived from microprocessor pin
- 2219/15096 . . . Cpu controls power supply on I-O modules
- 2219/15097 . . . Power supply
- 2219/15098 . . . Switching power on only when system needs control, stand by
- 2219/15099 . . . Bus arbitration
- 2219/15101 . . . Personal computer pc and plc, slot plc, same kernel
- 2219/15102 . . . Programmer simulates, behaves like a programming drum
- 2219/15103 . . . Microprogram stored in rom or ram
- 2219/15104 . . . Microprogram rom is externally attached
- 2219/15105 . . . Hardwired logic to accelerate, speed up execution of instructions
- 2219/15106 . . . High speed limited function sub plc together with slow speed general
- 2219/15107 . . . Linesolver, columnsolver

- 2219/15108 . . . Intelligent I-O is a plc itself, with limited interface
- 2219/15109 . . . Intelligent interface is much faster than main plc
- 2219/15111 . . . Intelligent interface behaves like a plc, by special communication pro
- 2219/15112 . . . Two cpu control plc, select cpu, video switch, with special key
- 2219/15113 . . . Common display, monitor for two controlling cpu
- 2219/15114 . . . Coprocessor connected to main via bus and separate channel
- 2219/15115 . . . Pc serves as plc, programming panel, monitoring panel
- 2219/15116 . . . Pc implements plc, in application program, plc instruction register
- 2219/15117 . . . Radio link, wireless
- 2219/15118 . . . Shared memory
- 2219/15119 . . . Backplane controller
- 2219/15121 . . . Plc build into application, like power invertor
- 2219/15122 . . . Less frequent used subroutines arranged at high addresses
- 2219/15123 . . . Plc with build in console, I-O and communication
- 2219/15124 . . . Plc integrated in plug, connector
- 2219/15125 . . . Multiple kernels
- 2219/15126 . . . Calculate duration of cycle
- 2219/15127 . . . Bit and word, byte oriented instructions, boolean and arithmetic operations
- 2219/15128 . . . Ternary logic instead of binary
- 2219/15129 . . . Separating address and databus
- 2219/15131 . . . Pipeline registers
- 2219/15132 . . . Bank switching
- 2219/15133 . . . Opto isolation, optical separation
- 2219/16 . . . Plc to applications
- 2219/161 . . . Nuclear plant
- 2219/162 . . . Transfer line
- 2219/163 . . . Domotique, domestic, home control, automation, smart, intelligent house
- 2219/20 . . . Pc systems
- 2219/21 . . . Pc I-O input output
- 2219/21001 . . . Analog input
- 2219/21002 . . . Neural classifier for inputs, groups inputs into classes
- 2219/21003 . . . Proximity switch as input
- 2219/21004 . . . Microprocessor plus electromechanical, cam control for output
- 2219/21005 . . . Several slave modules connected to same I-O of master, multiplexed by master
- 2219/21006 . . . Detect position switches, connect resistances, analog value gives position
- 2219/21007 . . . A processor to evaluate signals of detector only, I-O processor
- 2219/21008 . . . Read in analog values by microprocessor, potentiometer, resistor taps
- 2219/21009 . . . Display states of I-O
- 2219/21011 . . . Forcing I-O
- 2219/21012 . . . Configurable I-O
- 2219/21013 . . . Microcontroller and power output switches integrated on same chip
- 2219/21014 . . . Interface, module with relays
- 2219/21015 . . . Easy expansion, extension of I-O
- 2219/21016 . . . I-O has own power supply
- 2219/21017 . . . Use of stack memory between processor and machine
- 2219/21018 . . . Connect sensors to a concentrator, concentrators to bus
- 2219/21019 . . . Split, separate urgent from non urgent, interrupt from status inputs, store in two register
- 2219/21021 . . . Intelligent I-O, executes tasks independently from main cpu
- 2219/21022 . . . Telephone ring interface, detect ring sequence to control devices
- 2219/21023 . . . Midi interface
- 2219/21024 . . . Analog output
- 2219/21025 . . . To address single module, assign a group with only that single module
- 2219/21026 . . . Indirect addressing of I-O through a control register
- 2219/21027 . . . Address extension, module with several I-O, command has subaddress for each I-O
- 2219/21028 . . . Address of module determined by position
- 2219/21029 . . . Address of module determined by function of module
- 2219/21031 . . . Address of module determined by signature : type, value of measured, controlled data of module
- 2219/21032 . . . Controlled module in a ring, each module detects its own address
- 2219/21033 . . . Serial transfer address to each module, decrement, if zero module found
- 2219/21034 . . . Address I-O
- 2219/21035 . . . Identification with serial header
- 2219/21036 . . . Each connected module has own address and address of originator of message
- 2219/21037 . . . Serial time multiplex bus, programming each module with one delayed line TDM
- 2219/21038 . . . Special clock line, module counts clock until equal to its address
- 2219/21039 . . . Slaves, modules in daisy chain, each handles control data, transmits to next
- 2219/21041 . . . Detect length of packet of pulses to recognise address
- 2219/21042 . . . Address a group, a zone
- 2219/21043 . . . Device address and subdevice address and function address
- 2219/21044 . . . Modules with same address are each selected by different transmission speed
- 2219/21045 . . . Modules with same address are each selected by different modulation
- 2219/21046 . . . Address a single module out of a group
- 2219/21047 . . . Select module if address of module equals required address, compare addresses
- 2219/21048 . . . Compare fixed address of module to required address
- 2219/21049 . . . Poll and detect connected I-O modules, address terminator, address line high
- 2219/21051 . . . Modules able to communicate to other modules are connected to arbiter
- 2219/21052 . . . Modules having a common function are allocated ascending number to address
- 2219/21053 . . . Each unit, module has unique identification code, set during manufacturing, fMAC address
- 2219/21054 . . . Connector on bus has two rows of contacts, if one contact is connected, other not
- 2219/21055 . . . Number of halfwaves equals number of I-O, send block of halfwaves, synchro gap

- 2219/21056 . . . Decoding on module, module can be inserted anywhere, fixed address in bus connector
- 2219/21057 . . . Buslines connecting modules are offset by one line from module to module
- 2219/21058 . . . Find address by activating power and detect which address gives feedback
- 2219/21059 . . . I-O in address space
- 2219/21061 . . . Adapter bus connected to centronics
- 2219/21062 . . . Pc and I-O bus manager and network nodes linked to I-O clusters
- 2219/21063 . . . Bus, I-O connected to a bus
- 2219/21064 . . . Calibration: automatic of a-d convertor, store null and maximum in eeprom
- 2219/21065 . . . Module calibrates connected sensor
- 2219/21066 . . . Disconnect data line from module before, reconnect after configuration
- 2219/21067 . . . Set group of module by hardware for each module, no program protocol
- 2219/21068 . . . Configure input signals either as interrupt or status signals
- 2219/21069 . . . At start up check I-O and store addresses in secure device
- 2219/21071 . . . Configuration, each module has a settable address, code wheel, encoder
- 2219/21072 . . . Write, modify address into module by optical means, laser
- 2219/21073 . . . Each module has push button, trigger circuit to initialise address setting
- 2219/21074 . . . Master has keyboard to enter address of called slave
- 2219/21075 . . . Initialise each module random, count down, if zero master sets address
- 2219/21076 . . . Plug, connector with build in decoding, encoding for module
- 2219/21077 . . . Module address fixed, defined by fixed identification lines on motherboard
- 2219/21078 . . . Fixed address of slot on motherboard changed, using address convertor, decoder
- 2219/21079 . . . Allocate at start up also to each controlled device a code for the master
- 2219/21081 . . . At start up, check I-O configuration and store addresses in ram
- 2219/21082 . . . At start, send first address to all modules, manually trigger first module and so on
- 2219/21083 . . . At start up detect if connected devices are input or output devices
- 2219/21084 . . . Actuate module, seek response by counting up address, store address on response
- 2219/21085 . . . Define type of I-O, analog, digital, pulse
- 2219/21086 . . . Configuration menu program for I-O
- 2219/21087 . . . Define sensor type, resistance, thermocouple, thermistor, voltage, current
- 2219/21088 . . . Define name and address of I-O
- 2219/21089 . . . Detect configuration of I-O regularly
- 2219/21091 . . . First module initializes its address, then signals next to do same, serial
- 2219/21092 . . . At start up, autoconfigure module for proper I-O execution, bootstrap
- 2219/21093 . . . Module has a configuration part for own logic and one for application logic
- 2219/21094 . . . Different connectors for serial transmission as function of machine or connected sensor
- 2219/21095 . . . Screen, display connected directed to control system via optical fibre
- 2219/21096 . . . Connection of machine to pc via centronics, parallel port
- 2219/21097 . . . DMA
- 2219/21098 . . . Connect pc to machine, controller, module via serial port
- 2219/21099 . . . Two independent interfaces, one for pc, other for remote monitoring
- 2219/21101 . . . Connect I-O interface to joystick port
- 2219/21102 . . . Pc control of device over normal remote control connected between them
- 2219/21103 . . . Connect pc to machine, controller, module via PCMCIA
- 2219/21104 . . . Wire pc connector to output of controlled module, for printer, modem, other module
- 2219/21105 . . . Read in data only if value changes, transition to save processor time
- 2219/21106 . . . If specific I-O not updated in memory, priority access of I-O, data directly to microprocessor
- 2219/21107 . . . Change sensivity of detection if input value is very low
- 2219/21108 . . . Module, I-O module consisting of counters and comparators
- 2219/21109 . . . Field programmable gate array, fpga as I-O module
- 2219/21111 . . . Each module has a push button to bypass control and switch module on
- 2219/21112 . . . Each module has push button to turn module off
- 2219/21113 . . . Bus interface has multiplexer, control register, data shift register
- 2219/21114 . . . Universal input, AC or DC
- 2219/21115 . . . Same connector can represent either input or output
- 2219/21116 . . . Universal cabling; control interface between processor and devices
- 2219/21117 . . . Universal I-O, same pin is input or output, bidirectional
- 2219/21118 . . . Two sensors on same line, superpose pulsed digital on analog signal
- 2219/21119 . . . Circuit for signal adaption, voltage level shift, filter noise
- 2219/21121 . . . Output only enabled during a short period of positive going power supply
- 2219/21122 . . . Programmable signal discrimination, input can be used for several functions
- 2219/21123 . . . Impedance matching
- 2219/21124 . . . A-d conversion if input signal is analog, no a-d conversion if input signal is digital
- 2219/21125 . . . Digital value of analog signals depends on range between signal and threshold
- 2219/21126 . . . Signal processing, filter input
- 2219/21127 . . . Signal adaption I-O
- 2219/21128 . . . Change control signal, first max or min signal, then normal desired signal
- 2219/21129 . . . Low pass filter for input
- 2219/21131 . . . Sample two input values, one in positive wave, other in negative wave, average
- 2219/21132 . . . Window for signal
- 2219/21133 . . . Module to adapt connection of signals to general connector
- 2219/21134 . . . Signal adaption circuit build into connector
- 2219/21135 . . . On closing contact, clean contact with large current, then normal signal current

- 2219/21136 . . . Detection of zero crossing for command and maximum for reading value
- 2219/21137 . . . Analog to digital conversion, ADC, DAC
- 2219/21138 . . . Variable filtering as function of kind of sensor signal
- 2219/21139 . . . Input activates directly output and vice versa
- 2219/21141 . . . Latched I-O
- 2219/21142 . . . Read input signal when switching power supply is not switched
- 2219/21143 . . . Sample analog signal between superposed digital signal
- 2219/21144 . . . Link between input and output, output only activated if corresponding input on
- 2219/21145 . . . Fuse in case of overcurrent
- 2219/21146 . . . If real status is different from controlled status stop motor
- 2219/21147 . . . Time critical I-O shut off by I-O module, otherwise by processor
- 2219/21148 . . . Over current protection on clock line
- 2219/21149 . . . If read write error, keep last I-O status for next cycle
- 2219/21151 . . . Activate output only if power sufficient
- 2219/21152 . . . If output defect, switch it off
- 2219/21153 . . . In order to follow higher data input rate, shut off non essential peripherals
- 2219/21154 . . . Over current protection
- 2219/21155 . . . Over voltage protection
- 2219/21156 . . . Over temperature protection
- 2219/21157 . . . Broken, open line, cable, circuit, faulty connection
- 2219/21158 . . . Activate I-O only after system stabilises from start up
- 2219/21159 . . . If I-O defect, warning light, operator pushes button, cpu disconnects I-O
- 2219/21161 . . . Send dummy, check data to I-O to check correct I-O connection
- 2219/21162 . . . Detect short circuit of cable
- 2219/21163 . . . Test I-O if functional or safe value
- 2219/21164 . . . Resistors between transmitter and receiver, against disturbances
- 2219/21165 . . . Zenerdiodes for protection of output of transmitter, input of receiver
- 2219/21166 . . . Output state, over resistance, coupled back to input to monitor output
- 2219/21167 . . . Intelligent I-O monitors also local load, controlled object
- 2219/21168 . . . Couple, feedback each output to corresponding input to verify output
- 2219/21169 . . . Low voltage protection
- 2219/22 . . . Pc multi processor system
- 2219/2202 . . . Controller calculates a control parameter from values sent by other controllers
- 2219/2203 . . . Grid, array of controllers
- 2219/2204 . . . Use default values if communication with other controllers not available
- 2219/2205 . . . Multicore
- 2219/2206 . . . Microprocessor for display and parameter input, link to control microprocessor
- 2219/2207 . . . Microcontroller combined with state sequencer
- 2219/2208 . . . Each processor controls a different function of the machine
- 2219/2209 . . . Only one processor is permitted to execute a common function at a time
- 2219/2211 . . . Active controllers are allocated more time if request rate is low
- 2219/2212 . . . All processors are loaded with same program, only part of program is used
- 2219/2213 . . . Local processor uses data from own local store and data from other stations
- 2219/2214 . . . Multicontrollers, multimicrocomputers, multiprocessing
- 2219/2215 . . . Process directly process signals without interrupt or polling
- 2219/2216 . . . Define module independent and module specific element, interconnection, capability
- 2219/2217 . . . First cluster runs normal program, second cluster runs different program
- 2219/2218 . . . Join two clusters of processors together
- 2219/2219 . . . Processor starts application program only if it receives predetermined data
- 2219/2221 . . . Only common memory in host, master, no local memory in slave, local controller
- 2219/2222 . . . Use of priority levels for gaining access to resources
- 2219/2223 . . . Use a different frequency to address each processor
- 2219/2224 . . . Processor sends data to next, downstream processor
- 2219/2225 . . . Communication, CPU accesses own I-O and next CPU over dual port memory
- 2219/2226 . . . Processor accesses own I-O and I-O of all processors connected on his right
- 2219/2227 . . . Common memory as well as local memory
- 2219/2228 . . . Master detects and configures slaves
- 2219/2229 . . . Multiprocessing, change over from master slave to peer to peer, no master
- 2219/2231 . . . Master slave
- 2219/2232 . . . Master executes modified program on slave demand
- 2219/2233 . . . Each slave can control several other slaves
- 2219/2234 . . . Each slave can function in stand alone if master fails
- 2219/2235 . . . Each slave has library of states during which operation is permitted to start
- 2219/2236 . . . Master determines critical time when each of slaves must be controlled
- 2219/2237 . . . Selection of master or slave
- 2219/2238 . . . Several masters at same time
- 2219/2239 . . . Reallocate, reschedule execution of controlled functions if one processor fails
- 2219/2241 . . . Real time database, each processor stores in local memory used variables
- 2219/2242 . . . Program references to variable by absolute address, update of absolute address
- 2219/2243 . . . Detect incompatibilities between control devices
- 2219/23 . . . Pc programming
- 2219/23001 . . . Expansion of control words, code of standard language to increase functionality
- 2219/23002 . . . Petrinet
- 2219/23003 . . . Bumpless control transfer, map corresponding operation states to operation tables
- 2219/23004 . . . Build up program so that safety conditions are met, select most stable states
- 2219/23005 . . . Expert design system, uses modeling, simulation, to control design process
- 2219/23006 . . . Finite state modeling

- 2219/23007 . . . CAD to develop sequential control system, use data also to test
- 2219/23008 . . . Computer aided software engineering, program generation, case tools, CASE
- 2219/23009 . . . Automatic documentation of program
- 2219/23011 . . . Sequence control design using pc, cad of control system CADCS
- 2219/23012 . . . Derive sequence program from design, cad data of machine CADCS
- 2219/23013 . . . Build up program by selecting function modules as function of amount paid for it, charging, payment
- 2219/23014 . . . Conversion of ASCII scripting language to machine code
- 2219/23015 . . . Convert input signals to universal machine control signals represented by music
- 2219/23016 . . . Accelerate input, exponent as function of pressure, time, turning speed, keys for 10-to-1
- 2219/23017 . . . Page, scroll key
- 2219/23018 . . . Enter parameters by combinations of keys and duration of actuation of keys
- 2219/23019 . . . Joystick delivers reference function as function of speed of its movement, except about null
- 2219/23021 . . . Gesture programming, camera sees hand, displays it on screen, grasp buttons
- 2219/23022 . . . Production design metaphore, tool, operation like input system
- 2219/23023 . . . Control knobs, levers integrated into display, display parameters near knobs
- 2219/23024 . . . Delivers reference when in neutral position, otherwise delivers desired value
- 2219/23025 . . . Overlay, template for keys with different meaning
- 2219/23026 . . . Recognise user input pattern and present possible intended program
- 2219/23027 . . . Database with information on how to control or test different appliances
- 2219/23028 . . . Switch function of panel, detect this and execute other orders
- 2219/23029 . . . Up down, increment decrement keys, jog, sequentially show functions or values
- 2219/23031 . . . Simulate control panel to give remote instructions
- 2219/23032 . . . Input of data from second control unit if first fails
- 2219/23033 . . . Variable pressure on key gives input value
- 2219/23034 . . . Press once on key to raise signal, twice to lower signal
- 2219/23035 . . . Same knob, different functions, turn for pulses, push to enter value
- 2219/23036 . . . Same knob, different function, normal for parameter, value, pushed to enter value
- 2219/23037 . . . Touch key integrated in display
- 2219/23038 . . . Select function by amplitude of analog value, potentiometer, resistor taps
- 2219/23039 . . . Remote programmer
- 2219/23041 . . . Enter analog value
- 2219/23042 . . . Only increment key
- 2219/23043 . . . Remote and local control panel, programming unit, switch
- 2219/23044 . . . Transparent overlay with touch sensors, put over display panel, select function
- 2219/23045 . . . Function key changes function as function of program, associated pictogram
- 2219/23046 . . . Selection out of menu by function keys
- 2219/23047 . . . Operating, repair manual stored in memory
- 2219/23048 . . . Knob to select program serves also as indicator for progress of program
- 2219/23049 . . . Control panel serial, RS232 connected to controller
- 2219/23051 . . . Remote control, enter program remote, detachable programmer
- 2219/23052 . . . Matrix, plugboard like control panel with modules for display, switches
- 2219/23053 . . . Knob with tactile feedback, representing clicks, detents programmed
- 2219/23054 . . . Simulate response on entered parameters and display, quicker response
- 2219/23055 . . . Cursor keys to select cells of a spreadsheet with control parameter, enter value
- 2219/23056 . . . Foot pedal, control, operated
- 2219/23057 . . . Position of knob, pedal detected by encoder, addresses memory for functions
- 2219/23058 . . . Knob, pedal selects ranges, functions and controls in each range as function of position
- 2219/23059 . . . Configuration of pedal, knob with code card, adapt pedal to person
- 2219/23061 . . . Variable range of knob, pedal for each function, adapt to person
- 2219/23062 . . . Position of knob, pedal detected by bundle of optical fibres
- 2219/23063 . . . Double, two foot pedal
- 2219/23064 . . . Entry of function or parameter during manipulation of tool, operation
- 2219/23065 . . . Manual override of program
- 2219/23066 . . . Same knob starts two different functions
- 2219/23067 . . . Control, human or man machine interface, interactive, HMI, MMI
- 2219/23068 . . . Give instructions, messages to operator
- 2219/23069 . . . Illuminated, lighting up keys, build in led, display, show sequence data entry
- 2219/23071 . . . If up, down key is selected, linear display of values appears, pops up
- 2219/23072 . . . Telephone, dial as control panel
- 2219/23073 . . . Keyboard decoding by microprocessor
- 2219/23074 . . . Each control unit can control own associated load or as central control
- 2219/23075 . . . Control unit can switch load on off or can also go into program mode
- 2219/23076 . . . Pushbuttons to manually up or down control of motor also for entry of program
- 2219/23077 . . . Reconfigurable remote programmer, learn control signals for different devices
- 2219/23078 . . . Input a code representing a sequence of operations
- 2219/23079 . . . Local programmer can switch to remote to use same capabilities as remote
- 2219/23081 . . . MMI design, operator workplace design
- 2219/23082 . . . Enter parameters with two hands, dead man knob, switch, pedal
- 2219/23083 . . . Joystick with buttons for menu and function selection, scrolling, +sign and -sign
- 2219/23084 . . . Synoptic display of available, selectable control modules with their functions
- 2219/23085 . . . Several users can enter data simultaneously to same processor
- 2219/23086 . . . Menu is sequentially selected and read from cd disk and guides operator

- 2219/23087 . . . Programmable selector switch, can be programmed by connected apparatus
- 2219/23088 . . . Same switch to power control and to set references of several devices
- 2219/23089 . . . Key cap label rewritten, changed to indicate changed or alternate functions
- 2219/23091 . . . Multiple consoles, panels to issue concurrent commands to different groups I-O
- 2219/23092 . . . Soft up down keys, simulated on screen
- 2219/23093 . . . Input a code representing a device function
- 2219/23094 . . . Debounce key
- 2219/23095 . . . If knob pushed during power up, knob can be used afterwards as data input
- 2219/23096 . . . Use single button, knob to enter code number, equals number of pushes
- 2219/23097 . . . Messages to operator in mother tongue, selection out of different languages
- 2219/23098 . . . Manual control, via microprocessor instead of direct connection to actuators
- 2219/23099 . . . Switches on panel, connected to serial port
- 2219/23101 . . . Enter quality parameters to select control parameters
- 2219/23102 . . . Quality parameter is low energy consumption of machine
- 2219/23103 . . . Quality parameter is high production rate
- 2219/23104 . . . Change display of window to another as function of settable active display time of window
- 2219/23105 . . . Window, drop, pull down menus
- 2219/23106 . . . Cockpit metaphore, condensed representation, urgent things better shown
- 2219/23107 . . . Push on flashing alarm indicator, corresponding window pops up on whole screen
- 2219/23108 . . . Floorplan, room metaphore, dedicated windows, unchangeable but can be selectable
- 2219/23109 . . . Configuration of display device, operator panel
- 2219/23111 . . . Adapt control signal logarithmic
- 2219/23112 . . . Ramp, slope connection between two reference values
- 2219/23113 . . . Reread, retransmit several times data for valid data, redundant command
- 2219/23114 . . . Maintain parameter setting for a while to avoid changes due to noise
- 2219/23115 . . . Buffer
- 2219/23116 . . . Input signal can be sent simultaneously to several processors
- 2219/23117 . . . Lookup table, interpolation between points
- 2219/23118 . . . Column and line select in memory to access address data in second memory, tree
- 2219/23119 . . . Display state, variable only when needed, energy saving
- 2219/23121 . . . Display graphics with corresponding text
- 2219/23122 . . . Display on off time chart for different events
- 2219/23123 . . . Production report
- 2219/23124 . . . Notepad, message from other operator
- 2219/23125 . . . Switch display to show different things, test or normal state
- 2219/23126 . . . Display tree structure of whole system or relevant info after function selection
- 2219/23127 . . . Switch from one kind of display to other, selected by duration discrimination
- 2219/23128 . . . Switch from one kind of display to other when parameter is changed
- 2219/23129 . . . Animated display, changes as function of parameters
- 2219/23131 . . . Select on large display part of pictogram to show on display of used workstation
- 2219/23132 . . . Multifunction display
- 2219/23133 . . . Animated, rotating fan indicates speed, flashing bulb for intensity
- 2219/23134 . . . Display history of used, selected programs, their frequency
- 2219/23135 . . . Display to console, panel which sends parameters, commands
- 2219/23136 . . . Display all subsystems, select one and display screen corresponding to subsystem
- 2219/23137 . . . Display program step, instruction number
- 2219/23138 . . . Linear, bar display of variables
- 2219/23139 . . . Segment display
- 2219/23141 . . . Flat panel, thin film electro luminescent
- 2219/23142 . . . Colour display
- 2219/23143 . . . Adjustable display
- 2219/23144 . . . Kind of display, matrix like display, large surface
- 2219/23145 . . . Blinking, flickering display
- 2219/23146 . . . Programmable, reconfigurable via microprocessor or coding switches
- 2219/23147 . . . LCD liquid crystal display
- 2219/23148 . . . Helmet display, mounted on head of operator
- 2219/23149 . . . Dual, two displays
- 2219/23151 . . . Highlight
- 2219/23152 . . . Large and several smaller displays for each workstation, each own cursor on large display
- 2219/23153 . . . Controlled load, lightbulb, roller blind itself acts as display to acknowledge command
- 2219/23154 . . . Line of light diodes LED
- 2219/23155 . . . Display on screen reference value and sequence steps
- 2219/23156 . . . Show upper, lower value, position with upper, lower segment of 7-segment display
- 2219/23157 . . . Display process, synoptic, legend, pictogram, mimic
- 2219/23158 . . . Display of evaluated and selectable program
- 2219/23159 . . . Display plurality of parameters simultaneously
- 2219/23161 . . . Hand held terminal PDA displays machine control program when user is near that machine
- 2219/23162 . . . Display real time or time already elapsed or rest time for program
- 2219/23163 . . . Display enlarged, zoomed detail and small overall schematic, plan
- 2219/23164 . . . Display data on a scrolling line, ticker display
- 2219/23165 . . . Display of parameter plus permissible, allowable range
- 2219/23166 . . . Display program in fast, quick, speed mode
- 2219/23167 . . . Display of selected sequence, permissible sequence
- 2219/23168 . . . Display progress of program
- 2219/23169 . . . Operation field together with control parameters
- 2219/23171 . . . Display dynamic change of process, animation
- 2219/23172 . . . Different states with one LED, blinking, on and off or different colours
- 2219/23173 . . . Display modified program together with original program to see differences

- 2219/23174 . . . Display of parameter and several suggested values for that parameter
- 2219/23175 . . . What to display: program channels, running of program
- 2219/23176 . . . Display entered data for each controlled station
- 2219/23177 . . . Indicate all selected devices operating currently
- 2219/23178 . . . Display status of currently selected controlled devices
- 2219/23179 . . . Warning display if heavy energy consuming programsteps are selected
- 2219/23181 . . . Use of sound, acoustic, voice
- 2219/23182 . . . 3D display of controlled system
- 2219/23183 . . . Display effects of high level commands
- 2219/23184 . . . Display different states by using two leds, first blinks, then second, then both
- 2219/23185 . . . Setting of internal dipswitches, jumpers
- 2219/23186 . . . Visual display of workpiece with actions to execute on
- 2219/23187 . . . Display number of each program
- 2219/23188 . . . Software independent and dependent of hardware
- 2219/23189 . . . Information is code
- 2219/23191 . . . Command to control simultaneously several machines
- 2219/23192 . . . A limited number of programs to be used by plurality of machines, multiplex
- 2219/23193 . . . Memory stores lifetime, different settings, configurations of controlled device
- 2219/23194 . . . Check validity data by writing in sector control data and check data
- 2219/23195 . . . Memory stores available, allowable, possible options, variations, alternatives of program or modules
- 2219/23196 . . . From lookup table and real time clock, select actual daylight period
- 2219/23197 . . . Curve entered with pen on touchscreen
- 2219/23198 . . . Disk with segments connected to separate input of microprocessor, represents different values
- 2219/23199 . . . Reference value, setpoint for regulator
- 2219/23201 . . . Value is analog signal
- 2219/23202 . . . Curve, surface represents analog value, line, surface follower
- 2219/23203 . . . Curve represents analog value, tv scan
- 2219/23204 . . . Reference in coded form
- 2219/23205 . . . Reference together with sequence commands
- 2219/23206 . . . Set reference as function of position, for compensations
- 2219/23207 . . . Capacitive detection of line
- 2219/23208 . . . Potentiometer
- 2219/23209 . . . Linear potentiometers with multiple sliders
- 2219/23211 . . . Limit value to tolerances, ranges, plausibility
- 2219/23212 . . . Store entered data, program status, reread regularly, against data loss
- 2219/23213 . . . Check validity of entered data
- 2219/23214 . . . Checksum CRC
- 2219/23215 . . . Check data validity in ram, keep correct validity, compare rom ram
- 2219/23216 . . . Extend processing time by extending enable signal with special output signal
- 2219/23217 . . . Parallel processing
- 2219/23218 . . . Interrupt queued requests only at the end of each segment of each of requests
- 2219/23219 . . . Different tasks in different memory, called as function of priority of tasks
- 2219/23221 . . . Each event can have two sub events, device can be activated twice in cycle
- 2219/23222 . . . On off time tables, as function of angle, each linked to groups for device selection, pointer
- 2219/23223 . . . During each cycle, different on off sequences can be used
- 2219/23224 . . . Offset on off signals for different sections
- 2219/23225 . . . Program system from more than one source
- 2219/23226 . . . Table with data on how to execute the same function in different modules
- 2219/23227 . . . Environment conditions affect execution of program
- 2219/23228 . . . Program execution, if external programs exist, execute them instead of internal
- 2219/23229 . . . Execute first current program, then select new program
- 2219/23231 . . . Mark objects, execute sequence according to mark
- 2219/23232 . . . Execute program from added, expansion rom, memory
- 2219/23233 . . . Input state executes immediately corresponding block program
- 2219/23234 . . . In real time loop do one of the control modules and a safety module program
- 2219/23235 . . . Set address code in register to switch between program in ram and in eprom, flash
- 2219/23236 . . . Table lookup driven system
- 2219/23237 . . . Program execution by message passing
- 2219/23238 . . . TV microprocessor executes also home control, monitoring of appliances
- 2219/23239 . . . Execute other program during idle time of main program, or between interrupts
- 2219/23241 . . . Idle, during idle time of main program, a game can be played
- 2219/23242 . . . Synthesize time logic circuits
- 2219/23243 . . . Specification language
- 2219/23244 . . . Ascii script: one line is read each time, each letter controls a device
- 2219/23245 . . . Block, buffer the inputs when executing critical process, read them when finished, for a finite state machine
- 2219/23246 . . . Create control program by demonstrating behaviours using widget and inferencing them
- 2219/23247 . . . Widget have states, properties, events associated, demonstrate control behaviour
- 2219/23248 . . . Integrate function blocks from different machines; CORBA, RMI protocols
- 2219/23249 . . . Using audio and or video playback
- 2219/23251 . . . Use two or more different programming languages in same program
- 2219/23252 . . . High level language HLL, basic, control language
- 2219/23253 . . . Expert system
- 2219/23254 . . . Interactive programming, sentence on screen filled in by operator
- 2219/23255 . . . Object oriented programming, OOP
- 2219/23256 . . . Hybrid programming, part sequence, part continuous
- 2219/23257 . . . Grafcet
- 2219/23258 . . . GUI graphical user interface, icon, function bloc editor, labview
- 2219/23259 . . . Synchronous language

- 2219/23261 . . . Use control template library
- 2219/23262 . . . DDE direct data exchange, DLL dynamic library linking
- 2219/23263 . . . C++
- 2219/23264 . . . Assembly language, pass parameters by registers instead of stack
- 2219/23265 . . . Select device driver for actuator, sensor
- 2219/23266 . . . Compiler
- 2219/23267 . . . Program derived from sequence time diagram and stored in table
- 2219/23268 . . . Forth
- 2219/23269 . . . Program provides for communication protocol with device, equipment
- 2219/23271 . . . Decompiler, translate machine code to HLL, reverse processing, easy modification
- 2219/23272 . . . Natural language, use simple words like move, rotate
- 2219/23273 . . . Select, associate the real hardware to be used in the program
- 2219/23274 . . . Link graphical data for display automatically into program
- 2219/23275 . . . Use of parser
- 2219/23276 . . . Use of virtual, logical connections
- 2219/23277 . . . Use of separate interface software, main program calls functions from it
- 2219/23278 . . . Program by data flow
- 2219/23279 . . . Enter simple words: start motor, pc translates boolean equations into orders
- 2219/23281 . . . PEARL process experimental automation real time language
- 2219/23282 . . . Detect erroneous instructions in asic systems
- 2219/23283 . . . Debugging, breakpoint
- 2219/23284 . . . Eliminate redundant states in finite state machine
- 2219/23285 . . . Enable, disable hardware logic to implement finite state machines
- 2219/23286 . . . Graphical representation of finite machine states to help operator
- 2219/23287 . . . Executing sequential program concurrently with state machine instructions
- 2219/23288 . . . Adaptive states; learning transitions
- 2219/23289 . . . State logic control, finite state, tasks, machine, fsm
- 2219/23291 . . . Process, graphic programming of a process, text and images
- 2219/23292 . . . Use of model of process, divided in part models with IN, OUT and actuator
- 2219/23293 . . . Automated assembly of machine control software, reusable software components
- 2219/23294 . . . Whole program to first processor, transfer to next processor if not for 1st
- 2219/23295 . . . Load program and data for multiple processors
- 2219/23296 . . . Load, update new program without test program, save memory space
- 2219/23297 . . . Remote load of program with cellular, wireless, satellite connection
- 2219/23298 . . . Remote load of program, through internet
- 2219/23299 . . . Remote load of program, through fieldbus
- 2219/23301 . . . Load program from file system of a controller
- 2219/23302 . . . Load program in data blocks
- 2219/23303 . . . Load program, optical connection between programmer and eprom
- 2219/23304 . . . Download program from host
- 2219/23305 . . . Transfer program into prom with passwords
- 2219/23306 . . . Load program from host, remote load, non volatile card to volatile, ram
- 2219/23307 . . . Initial program loader, ipl, bootstrap loader
- 2219/23308 . . . Transfer program from ram to eprom, flash, card
- 2219/23309 . . . System boot only allowed after inputting user identification, password
- 2219/23311 . . . Load new program together with test program
- 2219/23312 . . . Load program from attached device to control that device
- 2219/23313 . . . Load program to initial configure machine, then erase and install userprogram
- 2219/23314 . . . Switch between initialisation, program, test, end of programming, erase mode
- 2219/23315 . . . Normal and emulated, pass through for disabled persons modes
- 2219/23316 . . . Standby, inactive, sleep or active, operation mode
- 2219/23317 . . . Safe mode, secure program, environment in case of error, intrusion
- 2219/23318 . . . Mode, two mode, directly from console or download from host
- 2219/23319 . . . Microprocessor control or manual control
- 2219/23321 . . . Switch between manual, automatic, inching or step by step mode, select mode
- 2219/23322 . . . Hand, manual or automatic
- 2219/23323 . . . Select between entry and execution of program
- 2219/23324 . . . Separate update program onboard
- 2219/23325 . . . Transfer modified data from ram to eprom, flash after system have run several cycles
- 2219/23326 . . . Clone, duplicate hardware functions of another device
- 2219/23327 . . . Modification of program in real time
- 2219/23328 . . . Modification program
- 2219/23329 . . . Modification, correction entered values
- 2219/23331 . . . Patch program during non execution, tables to load modified program
- 2219/23332 . . . Override stored parameters
- 2219/23333 . . . Modify program and store it
- 2219/23334 . . . Use of table with addresses for different modules, write new table if modified
- 2219/23335 . . . History, log of program modifications
- 2219/23336 . . . Identification of program, application, device to be controlled
- 2219/23337 . . . Modify if history of program coincides with history of modifying data
- 2219/23338 . . . Transfer modified program from ram to eprom, flash
- 2219/23339 . . . Update diskette, cassette initiates bootstrap program to load eeprom, flash
- 2219/23341 . . . Only new module in high level language, combine with existing modules
- 2219/23342 . . . Pluggable rom, smart card
- 2219/23343 . . . Earom, alterable eeprom, erasable
- 2219/23344 . . . Changeable memory, program
- 2219/23345 . . . Memory is eeprom
- 2219/23346 . . . Permeability of pin sets frequency of oscillator, record carrier
- 2219/23347 . . . Eprom
- 2219/23348 . . . Programmed parameter values in memory, rom, function selection and entry, no cpu

- 2219/23349 . . . Pluggable pin module, fits in corresponding female receptacle, coded plug
- 2219/23351 . . . Film
- 2219/23352 . . . Ram rom memory
- 2219/23353 . . . Endless tape, loop
- 2219/23354 . . . Hard disk
- 2219/23355 . . . Magnetic card
- 2219/23356 . . . Programmable, pluggable module, logic set up on front of module
- 2219/23357 . . . Gramophone record, disk
- 2219/23358 . . . Program card with integrated control panel, flexible circuit
- 2219/23359 . . . Screw like form of record carrier
- 2219/23361 . . . Ram card with write protection switch
- 2219/23362 . . . Floppy diskette
- 2219/23363 . . . Barcode
- 2219/23364 . . . Bubble memory
- 2219/23365 . . . Ferrite memory
- 2219/23366 . . . Temperature induced on tape, sensors read temperature as program data
- 2219/23367 . . . Card with picture of work to be done, together with selectable codes
- 2219/23368 . . . VRAM videoram
- 2219/23369 . . . Memory in controlled device is ram, rom
- 2219/23371 . . . Fixed and variable memory for parameters or user program
- 2219/23372 . . . XY matrix, switching controlled by pc
- 2219/23373 . . . Interactive guidance by voice message
- 2219/23374 . . . Set potentiometer automatically
- 2219/23375 . . . Function switch, knob with piezo, strain gauge
- 2219/23376 . . . Template for program, set values to template
- 2219/23377 . . . Touch screen, with representation of buttons, machine on screen
- 2219/23378 . . . Touch sensitive key
- 2219/23379 . . . Knob, delivering pulses, digipot, electronic potentiometer
- 2219/23381 . . . Balls with different properties circulate and form the sequence
- 2219/23382 . . . Knobs with build in illumination, legend
- 2219/23383 . . . Lightpen
- 2219/23384 . . . Tape, card with magnetic, luminescent, iron particles for sequence
- 2219/23385 . . . Programming pencil, touch probe
- 2219/23386 . . . Voice, vocal command or message
- 2219/23387 . . . Trackball
- 2219/23388 . . . Mixture of different means, joystick, keys, pedals, fader, potentiometer
- 2219/23389 . . . Modular program, each process has corresponding program module
- 2219/23391 . . . Each module can transfer data to I-O or other module and has parameter memory
- 2219/23392 . . . Change execution time ratio of several programs
- 2219/23393 . . . Set finish, end time and total program time to calculate, derive begin, start time
- 2219/23394 . . . Set time constant
- 2219/23395 . . . Set value of limit switches, high low value
- 2219/23396 . . . Enter start and end of selected program
- 2219/23397 . . . Set day, week
- 2219/23398 . . . Set start time and duration
- 2219/23399 . . . Adapt set parameter as function of measured conditions
- 2219/23401 . . . Programmer has connection with pc to enter parameters into system directly by pc
- 2219/23402 . . . Edit reference value on screen by lightpen
- 2219/23403 . . . Store edited program also in detachable programmer, can be used elsewhere
- 2219/23404 . . . If data error detected, switch automatically to program mode
- 2219/23405 . . . Change settings of events for a whole group of related events
- 2219/23406 . . . Programmer device, portable, handheld detachable programmer
- 2219/23407 . . . Program machine during execution of other program in real time
- 2219/23408 . . . Handheld programmer has cover to protect operator from environment
- 2219/23409 . . . Portable, detachable programmer has emulation for fixed control panel
- 2219/23411 . . . Voltage supply or allow, not inhibit signal to memory on connection of programmer
- 2219/23412 . . . Discriminate with id code the module to be programmed
- 2219/23413 . . . Remote programmer can only program a device if nearby, narrow beam communication
- 2219/23414 . . . Pc as detachable program, debug, monitor device for control system
- 2219/23415 . . . Program each station with specific data, all, global with general, common data
- 2219/23416 . . . Enter application program into I-O module, like motion program, servo program
- 2219/23417 . . . Read program from pluggable memory card
- 2219/23418 . . . Read tape, card forward, backward, in two directions
- 2219/23419 . . . Automatic passage of tape to reader
- 2219/23421 . . . Record program on tape, disk, memory
- 2219/23422 . . . Learn parameters by producing a small number of objects
- 2219/23423 . . . Record playback
- 2219/23424 . . . Select construction element from function library
- 2219/23425 . . . Selection of program, adaptive to process
- 2219/23426 . . . Layout of program choice around knob according to used intensity
- 2219/23427 . . . Selection out of several programs, parameters
- 2219/23428 . . . Select program from look up tables as function of detector states, pointer, index to program
- 2219/23429 . . . Selection as function of connected machine
- 2219/23431 . . . Change program on detection of deviations
- 2219/23432 . . . Select as function of different connected tools, each tool has its parameters
- 2219/23433 . . . Selection of program as function of connected keyboard, panel
- 2219/23434 . . . Select automatically preferred program data, ordered to most used program
- 2219/23435 . . . Select a program per zone to be controlled
- 2219/23436 . . . Select by dipperswitches on power on
- 2219/23437 . . . Each operator can select his own program, data entry
- 2219/23438 . . . Select application program as well as connected control device
- 2219/23439 . . . Select additional programfunctions by pushing two different keys
- 2219/23441 . . . Select between user program selection or service program selection

2219/23442	. . .	As function of colour or number code on object to be treated	2219/24008	. . .	Safety integrity level, safety integrated systems SIL SIS
2219/23443	. . .	Upon detected function changes of remote device, activate proper local program	2219/24009	. . .	If board, card is retrieved, then disconnect first power, then block machine
2219/23444	. . .	Select as function of surface property, characteristic of object handled by machine	2219/24011	. . .	Transmit warning, error message to all devices in a list
2219/23445	. . .	Real time simulation	2219/24012	. . .	Use camera of handheld device, head mounted display
2219/23446	. . .	HIL hardware in the loop, simulates equipment to which a control module is fixed	2219/24013	. . .	Unlatch all relays in common with microprocessor
2219/23447	. . .	Uses process simulator to develop, simulate faults, fault tree	2219/24014	. . .	Protection to extract, insert circuit board
2219/23448	. . .	Find optimum solution by simulating process with constraints on inputs	2219/24015	. . .	Monitoring
2219/23449	. . .	Use of an additional dedicated processor for emulating sensor output	2219/24016	. . .	Unlatch for reparation
2219/23451	. . .	Software in the loop, bypass function, execute new program parts on external device	2219/24017	. . .	Powering up, starting machine supervised by microprocessor
2219/23452	. . .	Simulate sequence on display to control program, test functions	2219/24018	. . .	Computer assisted repair, diagnostic
2219/23453	. . .	Pc simulates equipment and is connected to sequencer to test program	2219/24019	. . .	Computer assisted maintenance
2219/23454	. . .	Execute program in fast mode, real system has no time to respond	2219/24021	. . .	Separate processor for monitoring system
2219/23455	. . .	Determine capability of machine by simulating model of capability of its parts	2219/24022	. . .	Stop error message after a number of repeated error events
2219/23456	. . .	Model machine for simulation	2219/24023	. . .	Stop error message after permission operator, acknowledgement
2219/23457	. . .	Programmer magnetically attachable to machine	2219/24024	. . .	Safety, surveillance
2219/23458	. . .	Remote controller pluggable, attachable to pc	2219/24025	. . .	Remove board with system on power, hot plug in, swap, docking, life insertion
2219/23459	. . .	Keyboard attachable, pluggable into household apparatus	2219/24026	. . .	Latch, block unlatch, unblock
2219/23461	. . .	Module has coded cams darking optical detectors	2219/24027	. . .	Circuit, independent from microprocessor, detects contact switch to allow power to actuator
2219/23462	. . .	No local entry panel, only central remote programmer for all appliances	2219/24028	. . .	Explosion free control, intrinsically safe
2219/23463	. . .	Before controlling module execute monitoring of module and its resources	2219/24029	. . .	Alarm if wrong device, apparatus is connected to control module
2219/23464	. . .	Use signatures to know module is not corrupt, cfc, control flow checking	2219/24031	. . .	Fpga takes over control if emergency or programmed stop, to shut down sequence
2219/23465	. . .	Master processor blocks input of data to slaves	2219/24032	. . .	Power on reset, powering up
2219/23466	. . .	Block, latch entry keys once program launched	2219/24033	. . .	Failure, fault detection and isolation
2219/23467	. . .	Code and program on two objects to be assembled, compared for compatibility	2219/24034	. . .	Model checker, to verify and debug control software
2219/23468	. . .	Before switch to execution of second, non failsafe program, inhibit I-O for it	2219/24035	. . .	Superpose test signal on normal I-O lines, through transfo and rectifier
2219/23469	. . .	Execute alternatively a failsafe, proven program and a non failsafe program	2219/24036	. . .	Test signal generated by microprocessor, for all I-O tests
2219/23471	. . .	Interrupt after set time non failsafe program, switch to failsafe program	2219/24037	. . .	Switch on pin of microprocessor for test
2219/23472	. . .	Confirmation of user for the selection of a program setting	2219/24038	. . .	Several test signals stored in memory and used as input signals
2219/23473	. . .	Program stopped if consumed current to high	2219/24039	. . .	Test sequence time and sequence profile
2219/24	. . .	Pc safety	2219/24041	. . .	Pc as detachable debug, monitor device for control system
2219/24001	. . .	Maintenance, repair	2219/24042	. . .	Signature analysis, compare recorded with current data, if error then alarm
2219/24002	. . .	Clock failing, adaptive to clock	2219/24043	. . .	Test memory comparing with known stored valid memory states
2219/24003	. . .	Emergency stop	2219/24044	. . .	Second controller monitors diagnostics system of first controller
2219/24004	. . .	If control lever, joystick, handle is released, spring return to neutral	2219/24045	. . .	Test if memory card is inserted, present
2219/24005	. . .	Inhibit update control program if default values has been changed by program during processing	2219/24046	. . .	Test if controller has enough memory available
2219/24006	. . .	Code coverage memory:contains data about addressed addresses during program run	2219/24047	. . .	Count certain number of errors, faults before delivering alarm, stop
2219/24007	. . .	Backup data if microprocessor not responding	2219/24048	. . .	Remote test, monitoring, diagnostic
			2219/24049	. . .	Use of control bits
			2219/24051	. . .	Two test pins, one for input and one for output
			2219/24052	. . .	Set switch on for diagnostic
			2219/24053	. . .	Diagnostic of controlled machine

- 2219/24054 . . . Self diagnostic
- 2219/24055 . . . Trace, store a working, operation history
- 2219/24056 . . . Portable, detachable module to input test signals, read test results
- 2219/24057 . . . Set jumper on board to change user mode to diagnostic mode
- 2219/24058 . . . Remote testing, monitoring independent from normal control by pc
- 2219/24059 . . . Diagnostic programmed in state logic
- 2219/24061 . . . Simulator, generates input signals, shows output signals of logic
- 2219/24062 . . . During simulation, test inhibit output to actuators
- 2219/24063 . . . Select signals as function of priority, importance for diagnostic
- 2219/24064 . . . Sample rate variable as function of importance of alarm signals
- 2219/24065 . . . Real time diagnostics
- 2219/24066 . . . Monitor only devices essential to current process
- 2219/24067 . . . Processor stores variables, events and date in eeprom, for external monitor
- 2219/24068 . . . Find intermittent errors
- 2219/24069 . . . Diagnostic
- 2219/24071 . . . Online service documentation
- 2219/24072 . . . Detect faulty circuit, display on screen and replace it
- 2219/24073 . . . Avoid propagation of fault
- 2219/24074 . . . Probability of defect, seriousness or severity of defect, fault
- 2219/24075 . . . Predict control element state changes, event changes
- 2219/24076 . . . Markov model for safety analysis
- 2219/24077 . . . Module detects wear, changes of controlled device, statistical evaluation
- 2219/24078 . . . Debounce, correct periodicity of command
- 2219/24079 . . . Detect correct command wave form
- 2219/24081 . . . Detect valid sequence of commands
- 2219/24082 . . . Detect if driver, actuation circuit is correct
- 2219/24083 . . . Detect if actuators are correct, react
- 2219/24084 . . . Remote and local monitoring, local result to remote, remote takes action
- 2219/24085 . . . Analyze, trace fault signals according to tree, table
- 2219/24086 . . . Expert system, guidance operator, locate fault and indicate how to repair
- 2219/24087 . . . After correct repair, update fault tree
- 2219/24088 . . . Simulate process graphically using feedback from real, to prevent or repair
- 2219/24089 . . . Change colour of message after reading message
- 2219/24091 . . . Display indication out of order, alarm indication
- 2219/24092 . . . Warning display lights, lamps, leds on module
- 2219/24093 . . . Display, show place of error, fault
- 2219/24094 . . . Voice alarm
- 2219/24095 . . . Show timely order of errors
- 2219/24096 . . . Show number of error event
- 2219/24097 . . . Camera monitors controlled machine
- 2219/24098 . . . Scan and display states of all actuators if controller fails
- 2219/24099 . . . On error, send error over lightdiode to external pc, display
- 2219/24101 . . . Stop error message after a certain time
- 2219/24102 . . . Display status of controller
- 2219/24103 . . . Graphical display of proces as function of detected alarm signals
- 2219/24104 . . . Operator can select a graphical screen at his will as help diagnostic
- 2219/24105 . . . Perform an initial display process to check displays
- 2219/24106 . . . Display instructions, program statements together with monitored parameter value
- 2219/24107 . . . Display centrally detected user, function changes of remote device
- 2219/24108 . . . Correct fault so that microprocessor functions correctly, without reset
- 2219/24109 . . . Execute first diagnostic, service program before normal control program
- 2219/24111 . . . Inhibit control until control lever is first set to neutral position
- 2219/24112 . . . Delay software reset until critical operations are finished
- 2219/24113 . . . No transmission of errors to central during intervention of maintenance operator
- 2219/24114 . . . Continue program if crashed microprocessor, program module is not crucial
- 2219/24115 . . . Continue critical operation only if detector, operator input is satisfied
- 2219/24116 . . . Reprogram inserted module, reread parameters to enable operation machine
- 2219/24117 . . . If error detected, shut down
- 2219/24118 . . . Inhibit, disable control if program module not inserted or wrong module addressed
- 2219/24119 . . . Compare control states to allowed and forbidden combination of states
- 2219/24121 . . . On fault, detect bit pattern to indicate kind of fault and stop program
- 2219/24122 . . . Inhibit automatic control if in manual control
- 2219/24123 . . . Alarm filtering, level and direct precursor, required action, blocking condition
- 2219/24124 . . . Identification of program, if not assigned for machine, reject, stop
- 2219/24125 . . . Watchdog, check at timed intervals
- 2219/24126 . . . Program stopped if instruction not executed or if output module is missing
- 2219/24127 . . . Disable, inhibit control signal in I-O interface if alarm status set
- 2219/24128 . . . Command and intermediate error feedback used to verify correct execution
- 2219/24129 . . . means for safety such as resettable fuse, PPTC
- 2219/24131 . . . Noise rejection, shielding board, bus, lines
- 2219/24132 . . . Over voltage protection
- 2219/24133 . . . Ground each module and total system
- 2219/24134 . . . Use of high voltage 28-Volt logic level
- 2219/24135 . . . Use of infra red for optical limit switch against day light
- 2219/24136 . . . Monitor load state of battery
- 2219/24137 . . . Non volatile memory to store program on power loss
- 2219/24138 . . . Battery backup
- 2219/24139 . . . Recovery from power loss, failure
- 2219/24141 . . . Capacitor backup
- 2219/24142 . . . Program has a protected, independent part and a free programmable part

- 2219/24143 . . . Inhibit control if device does not answer a start signal within time interval
- 2219/24144 . . . Load new program, overwrite old program only if machine is halted
- 2219/24145 . . . Test for collision of actuated devices, articles, if interference inhibit entry
- 2219/24146 . . . Configure actuators to be switched off in case of emergency stop
- 2219/24147 . . . Program entry, inhibit manual control if in automatic mode
- 2219/24148 . . . Inhibit local control if in remote
- 2219/24149 . . . Inhibit program entry if an essential sensor of apparatus is missing, broken
- 2219/24151 . . . Inhibit programming if physical resources are missing, no gas for heating
- 2219/24152 . . . Normal and emergency program are integrated
- 2219/24153 . . . System controller can control independent from host
- 2219/24154 . . . Password with time limited access to system, protect protocol
- 2219/24155 . . . Load, enter program if device acknowledges received password, security signal
- 2219/24156 . . . Inhibit program entry, keyboard by entering sequence of certain keys
- 2219/24157 . . . Block, inhibit certain inputs by entering certain keycode
- 2219/24158 . . . Access only for service, hide, forbidden tamperfree keys, program
- 2219/24159 . . . Several levels of security, passwords
- 2219/24161 . . . Use of key, in key is stored access level
- 2219/24162 . . . Biometric sensor, fingerprint as user access password
- 2219/24163 . . . Authentication tag in configuration file
- 2219/24164 . . . Parts of program accesible only during execution, no access with programming tool
- 2219/24165 . . . Use codes to activate features of controller
- 2219/24166 . . . Permit from several operators to allow access
- 2219/24167 . . . Encryption, password, user access privileges
- 2219/24168 . . . Identify connected programmer to allow control, program entry
- 2219/24169 . . . Identification of last person who changed program
- 2219/24171 . . . Supervisor code to change passwords
- 2219/24172 . . . Use of second password, different from first
- 2219/24173 . . . One sensor, two I-O channels each for different processor
- 2219/24174 . . . One channel is used for communication while other is tested, in redundant I-O
- 2219/24175 . . . Redundant communication channel, if one fails use the other
- 2219/24176 . . . Central controller may override redundant controller
- 2219/24177 . . . State machine arbitrates which redundant controller is active
- 2219/24178 . . . Controlled device decides which redundant controller will be active
- 2219/24179 . . . Redundant storage of control parameters
- 2219/24181 . . . Fail silent nodes, replicated nodes grouped into fault tolerant units
- 2219/24182 . . . Redundancy
- 2219/24183 . . . If error, spare unit takes over, message to master, confirm new configuration
- 2219/24184 . . . Redundant I-O, software comparison of both channels
- 2219/24185 . . . After repair, update redundant system during non critical periods
- 2219/24186 . . . Redundant processors are synchronised
- 2219/24187 . . . Redundant processors run identical programs
- 2219/24188 . . . Redundant processors run different programs
- 2219/24189 . . . Redundant processors monitor same point, common parameters
- 2219/24191 . . . Redundant processors are different in structure
- 2219/24192 . . . Configurable redundancy
- 2219/24193 . . . Two transducers for same parameter
- 2219/24194 . . . One channel monitors correct programcode execution, other correct process state
- 2219/24195 . . . Compare data in channels at timed intervals, for equality
- 2219/24196 . . . Plausibility check in channels for correct sequence or result
- 2219/24197 . . . Dual analog output ports, second takes over if first fails
- 2219/24198 . . . Restart, reinitialize, boot system after fault detection, hanging up, stalling
- 2219/24199 . . . Recover from fault, malfunction, go to safe state, correct and set new sequence
- 2219/24201 . . . Inhibit restart program if start switch fails in normal run mode
- 2219/24202 . . . After failure and stop of program, special switch to restart
- 2219/24203 . . . Restart, recover from error only if detected states equal stored states
- 2219/24204 . . . Select restore procedure corresponding to matched abnormal condition, table
- 2219/24205 . . . Slow down processor activity if temperature rises above limit
- 2219/24206 . . . Identification by portable memory in a key
- 2219/24207 . . . If processor overloaded, reduce messages sent by other systems to it
- 2219/24208 . . . Go into safety mode if communications are interrupted
- 2219/24209 . . . Create film in case of error
- 2219/24211 . . . Override normal program, execute urgency program so machine operates safe
- 2219/24212 . . . Set off alarm state manually, acknowledge to restart normal control
- 2219/24213 . . . No shut down if after emergency detection, all control parameters are safe
- 2219/24214 . . . Detect if analog output signal is within range
- 2219/24215 . . . Scada supervisory control and data acquisition
- 2219/24216 . . . Supervision of system
- 2219/25 . . . Pc structure of the system
- 2219/25001 . . . CEBUS consumers electronics bus
- 2219/25002 . . . Interbus-S, output serial out, input serial in, as one shift register
- 2219/25003 . . . M3S bus with six lines, two power, two canbus, one to initialize, one as dead man switch
- 2219/25004 . . . Power and data bus
- 2219/25005 . . . Fluid bus for communication in process system with several fluidic control modules
- 2219/25006 . . . Interface connected to fieldbus
- 2219/25007 . . . UMS bus
- 2219/25008 . . . Different buses, protocols on same line, also dsl
- 2219/25009 . . . Profinet-I-O, producer-consumer mode

- 2219/25011 . . . Domotique, I-O bus, home automation, building automation
- 2219/25012 . . . Two different bus systems
- 2219/25013 . . . G64-bus
- 2219/25014 . . . Fieldbus general name of bus connected to machines, detectors, actuators
- 2219/25015 . . . Gpib-488, iee488, hp bus, parallel instrumentation bus
- 2219/25016 . . . Eiba bus, european installation bus association, ib installation bus
- 2219/25017 . . . ASI actuator sensor interface, bus, network
- 2219/25018 . . . Only actuator bus, network
- 2219/25019 . . . Parallel processors coupled to bus by configurable interface card
- 2219/25021 . . . Profibus
- 2219/25022 . . . LAN local area network for controllers
- 2219/25023 . . . Sercos serial real time communications system between servo and cpu
- 2219/25024 . . . Bitbus from intel
- 2219/25025 . . . Only sensor bus
- 2219/25026 . . . Lon local operating network, uses neuron chip with three microprocessors
- 2219/25027 . . . GSC general serial channel
- 2219/25028 . . . Power, data and clock bus
- 2219/25029 . . . Additional logic to mirror certain signals, permits node to adapt to bitrate
- 2219/25031 . . . TTCAN bus, time triggered can bus
- 2219/25032 . . . CAN, canbus, controller area network bus
- 2219/25033 . . . structure, control, synchronization, data, alarm, connect I-O line to interface
- 2219/25034 . . . Connect module to data, monitor, control lines, extra I-O and power to connector
- 2219/25035 . . . Star network
- 2219/25036 . . . Two clocks, high frequency for normal and low frequency for battery low, sleep
- 2219/25037 . . . Clock line and data line loop in a contrary sense, for data stability, settling
- 2219/25038 . . . During negative cycle of power supply, processor is set to active, else inactive
- 2219/25039 . . . Clock
- 2219/25041 . . . Select between several clock signals
- 2219/25042 . . . Clock derived from power supply
- 2219/25043 . . . Superposition time and other pulses
- 2219/25044 . . . Radio controlled clock
- 2219/25045 . . . Electronic cam, encoder for sequence control as function of position, programmable switch pls
- 2219/25046 . . . Real time clock to sample I-O states and store them in memory
- 2219/25047 . . . Common clock for redundant processors
- 2219/25048 . . . Master clock and several frequency dividers, for motion and sequence control
- 2219/25049 . . . Master processor gives timing information to slaves
- 2219/25051 . . . For serial communication a separate clock and data line
- 2219/25052 . . . VCO voltage controlled oscillator
- 2219/25053 . . . Frequency pulses as function of speed
- 2219/25054 . . . Calibration timer, compare 1st, number of pulses during calibration with second counter
- 2219/25055 . . . During calibration adapt vco, counter to deliver wanted frequency, pulses
- 2219/25056 . . . Automatic configuration of monitoring, control system as function of operator input, events
- 2219/25057 . . . Configuration stored in distributed database for real time use
- 2219/25058 . . . Job setup, use also library to select job setup
- 2219/25059 . . . Iterative configuration of identical modules, only config first one, copy to other
- 2219/25061 . . . Configuration stored in central database
- 2219/25062 . . . Detect physical location of field device
- 2219/25063 . . . Force node into an inactive state when required
- 2219/25064 . . . Update component configuration to optimize program execution
- 2219/25065 . . . Configure attributes of parameters
- 2219/25066 . . . Configuration stored in each unit
- 2219/25067 . . . Graphic configuration control system
- 2219/25068 . . . Check correct configuration of device
- 2219/25069 . . . Pseudo redundance, eliminate failing element and reconfigure system
- 2219/25071 . . . Synoptique display of system configuration, layout, evolution
- 2219/25072 . . . Initialise each module during start up
- 2219/25073 . . . Configuration of keys and related display, shown on keys
- 2219/25074 . . . Check system, change failing element, compare with stored configuration
- 2219/25075 . . . Select interconnection of a combination of processor links to form network
- 2219/25076 . . . Configure connected module only if allowed, registered module
- 2219/25077 . . . Each module can be programmed for number of input and output
- 2219/25078 . . . Store in ram a second program adapted to local conditions
- 2219/25079 . . . Function module makes bus termination, creates local bus on ok from central
- 2219/25081 . . . Clone, copy configuration from first device, in teach mode, to second identical device
- 2219/25082 . . . Display name of configuration, to recognise how device has been set, programmed
- 2219/25083 . . . For each subsystem a configuration
- 2219/25084 . . . Select configuration as function of operator
- 2219/25085 . . . Several function expansion units for master, main unit, universal system
- 2219/25086 . . . Assign functions to group of complete or partial cells, modules
- 2219/25087 . . . Selector switch to set function of each module
- 2219/25088 . . . Define scale value of analog signal, min and max value
- 2219/25089 . . . Define state of digital signal, open, closed, maintained, momentary
- 2219/25091 . . . Of alternative and parallel parts of program into synchronised tasks
- 2219/25092 . . . Customized control features, configuration
- 2219/25093 . . . During start, integration into machine, send module functionality to scheduler
- 2219/25094 . . . At start, I-O modules receive functionality and check with its own functionality
- 2219/25095 . . . Detect kind of display to configure display routine
- 2219/25096 . . . Detect addresses of connected I-O, modules
- 2219/25097 . . . Detect control panel connected, select corresponding program and parameters
- 2219/25098 . . . Detect connected sensors, set parameters, gain automatically

- 2219/25099 . . . Detect configuration I-O and select needed program
- 2219/25101 . . . Detect connected module, load corresponding parameters, variables into module
- 2219/25102 . . . Detect connected actuator, by code, select compensation non linearity
- 2219/25103 . . . Detect during start, number of modules, groups, sub groups
- 2219/25104 . . . Detect transfer of control module, use mean default values instead of normal
- 2219/25105 . . . By cable integrated in controlled machine, fixed
- 2219/25106 . . . Pluggable card, magnetic, smart with configuration data, pulled out after loading
- 2219/25107 . . . Pluggable card, magnetic or smart with configuration data, staying in device
- 2219/25108 . . . Dipswitches combined with bcd switch instead of multiple dipswitches
- 2219/25109 . . . Eeprom loaded from external device with configuration data
- 2219/25111 . . . Using broadcast message
- 2219/25112 . . . Using firmware stored in processor
- 2219/25113 . . . Strapping diodes
- 2219/25114 . . . Jumpers
- 2219/25115 . . . Card, board with configuration switches
- 2219/25116 . . . Pluggable, detachable cassette loads configuration
- 2219/25117 . . . Resistors, value, combination defines a digital value
- 2219/25118 . . . Matrix to connect sensor to corresponding actuator
- 2219/25119 . . . Dipswitches dipschalter
- 2219/25121 . . . What, which input or output to be connected to key or display
- 2219/25122 . . . Stop angle and status of different on off states
- 2219/25123 . . . Change controller pin configuration
- 2219/25124 . . . Configure attributes of parameters
- 2219/25125 . . . Relationship between different functions of a controller
- 2219/25126 . . . Synchronize communication based on internal clock of microprocessor
- 2219/25127 . . . Bus for analog and digital communication
- 2219/25128 . . . Transmission with higher frequency than the processing frequency
- 2219/25129 . . . Programming a multitasking, virtual sensor network shared by various users
- 2219/25131 . . . Collect several parameters and transmit in block to control microprocessor
- 2219/25132 . . . Superposition data signals on power lines for actuators
- 2219/25133 . . . Serial parallel conversion
- 2219/25134 . . . All interfaces load their data in shift register, then serial read out
- 2219/25135 . . . On data line multiplex data and control words
- 2219/25136 . . . Transmission with variable frequency, set by operator
- 2219/25137 . . . Optical window for communication
- 2219/25138 . . . Transmit data from rotating devices
- 2219/25139 . . . Use of separate buscouple interface
- 2219/25141 . . . Normal display led used also for communication purposes
- 2219/25142 . . . Lan between host and main controller, other network between main and sub controllers
- 2219/25143 . . . Buffer for communication between two cpu
- 2219/25144 . . . Between microcomputers, processors
- 2219/25145 . . . I-O communicates with local bus at one end and with fieldbus at other end
- 2219/25146 . . . Communication between main and expansion unit, only clock and data
- 2219/25147 . . . Before communication, check if optical fiber is correctly attached
- 2219/25148 . . . Before communication, check if I-O is powered
- 2219/25149 . . . Receiver detects communication error and requests emitter to retransmit data
- 2219/25151 . . . Check appropriate protocol voltage levels
- 2219/25152 . . . Parity detection
- 2219/25153 . . . Checking communication
- 2219/25154 . . . Detect error, repeat transmission on error, retransmit
- 2219/25155 . . . Encoded transmission against noise
- 2219/25156 . . . Full echo communication check, echo back
- 2219/25157 . . . Checksum CRC
- 2219/25158 . . . Watchdog
- 2219/25159 . . . Respond to signal if initialisation and address are received within set interval
- 2219/25161 . . . Only receiving station, read several times message, select correct one or reject
- 2219/25162 . . . Contention, if several transmitters avoid collision, by separate transmitter code
- 2219/25163 . . . Transmit twice, redundant, same data on different channels, check each channel
- 2219/25164 . . . Loopback
- 2219/25165 . . . Token ring network
- 2219/25166 . . . USB, firewire, ieee-1394
- 2219/25167 . . . Receive commands through mobile telephone
- 2219/25168 . . . Domotique, access through internet protocols
- 2219/25169 . . . Half duplex, repeater
- 2219/25171 . . . Serial, RS232
- 2219/25172 . . . Duplex
- 2219/25173 . . . SCSI
- 2219/25174 . . . Ethernet
- 2219/25175 . . . Modem, codec coder decoder
- 2219/25176 . . . RS485, differential data signals, xor
- 2219/25177 . . . Using fm frequency modulation, fsk, biphasic code
- 2219/25178 . . . Serial communication, data, also repeater
- 2219/25179 . . . Parallel
- 2219/25181 . . . Repeater
- 2219/25182 . . . Serial between host and modules, nodes, parallel in node to microcontroller
- 2219/25183 . . . Serial AND-OR parallel interface in one circuit
- 2219/25184 . . . Number of modules interfaces optimized in relation to applications with which to link
- 2219/25185 . . . Single serial line, virtual second line is earth
- 2219/25186 . . . Bluetooth
- 2219/25187 . . . Transmission of signals, medium, ultrasonic, radio
- 2219/25188 . . . Superposition high frequency data signal on power lines, current carrier
- 2219/25189 . . . Current mode sensor I-O, current loop, 40-mA loop instead of voltage
- 2219/25191 . . . Current loop
- 2219/25192 . . . Infrared
- 2219/25193 . . . Coaxial cable
- 2219/25194 . . . Twin core, twisted cable
- 2219/25195 . . . Multiwire cable, parallel

- 2219/25196 . . . Radio link, transponder
- 2219/25197 . . . Optical, glass fiber
- 2219/25198 . . . Brouter: transfers data from wireless to wired networks, router: wired to wired
- 2219/25199 . . . Router brouter broadcast configuration data periodically to update control units
- 2219/25201 . . . Program communication between remote I-O and controller via remote connection program object
- 2219/25202 . . . Internet, tcp-ip, web server : see under **S05B219-40**
- 2219/25203 . . . Keep correct order of messages sent, of messages sequence
- 2219/25204 . . . Translate between different communication protocols
- 2219/25205 . . . Encrypt communication
- 2219/25206 . . . Protocol: only devices with changed states communicate their states, event
- 2219/25207 . . . Only devices with changed states can receive control signals for actuator
- 2219/25208 . . . Control message, address and command portion
- 2219/25209 . . . Device status answer, response, acknowledge
- 2219/25211 . . . Broadcast mode, length message, command, address of originator and destination
- 2219/25212 . . . Master address node, node answers ready, master sends command, node executes it
- 2219/25213 . . . Synchronisation, address and data
- 2219/25214 . . . Wait, delay after message
- 2219/25215 . . . Time triggered protocol for fault tolerant real time application
- 2219/25216 . . . Packet switching
- 2219/25217 . . . Configure communication protocol, select between several
- 2219/25218 . . . Broadcast mode, originator, destinator address, command, check data
- 2219/25219 . . . Probe packet to determine best route for messages
- 2219/25221 . . . Identification of messages and their relative priority
- 2219/25222 . . . Mailbox, email, mail system
- 2219/25223 . . . Slave has registers to indicate master, acknowledge, transfer address, read write
- 2219/25224 . . . Fieldbus messages services fms
- 2219/25225 . . . Peripheral messages services pms, for sensor actuator
- 2219/25226 . . . Combine CSMA-CD and TDM time multiplexed for rapid status exchange
- 2219/25227 . . . Polling time is variable for each node, as function of time needed for each node
- 2219/25228 . . . Scheduling communication on bus
- 2219/25229 . . . Partition control software among distributed controllers
- 2219/25231 . . . Command, task has deadline, time limit to be executed
- 2219/25232 . . . DCS, distributed control system, decentralised control unit
- 2219/25233 . . . Avoid communication delay by sending command and event, if event present, execute command
- 2219/25234 . . . Direct communication between two modules instead of normal network
- 2219/25235 . . . Associate a sequence function to each control element, event signature
- 2219/25236 . . . Detail, detect presence of operator to wake up system
- 2219/25237 . . . Drive record carrier
- 2219/25238 . . . Personalize message
- 2219/25239 . . . Relay assisted triac, in series for safety
- 2219/25241 . . . Serial bus controller
- 2219/25242 . . . Relay
- 2219/25243 . . . Digital filter
- 2219/25244 . . . State matrix connected to controller
- 2219/25245 . . . Keyboard encoder chip used as sequence controller
- 2219/25246 . . . Habituation, rehabilitation and recovery chip, responds only to critical information
- 2219/25247 . . . Program drum and reverse drum driven by timer motor
- 2219/25248 . . . Microcontroller as time switch
- 2219/25249 . . . Counter, timer plus microprocessor for real time, jitter
- 2219/25251 . . . Real time clock
- 2219/25252 . . . Microprocessor
- 2219/25253 . . . Transputer
- 2219/25254 . . . DSP digital signal processor
- 2219/25255 . . . Neural network
- 2219/25256 . . . Module is timer with variable time delay
- 2219/25257 . . . Microcontroller
- 2219/25258 . . . ASIC
- 2219/25259 . . . Bus arbiter
- 2219/25261 . . . Hand calculator as time switch
- 2219/25262 . . . Oscillator to multiply pulses to counter
- 2219/25263 . . . Solid state simulating relay logic
- 2219/25264 . . . Synchronizer for pulses
- 2219/25265 . . . Flash memory
- 2219/25266 . . . Microcontroller combined with plc
- 2219/25267 . . . Shift register
- 2219/25268 . . . PLD programmable logic device
- 2219/25269 . . . Lifo
- 2219/25271 . . . Neuron controller, for lan
- 2219/25272 . . . Hall sensor, switch
- 2219/25273 . . . Fuzzy logic combined with delay element
- 2219/25274 . . . Communication processor, link interface
- 2219/25275 . . . Analog switch
- 2219/25276 . . . Fifo
- 2219/25277 . . . Tristate
- 2219/25278 . . . Timer plus microprocessor
- 2219/25279 . . . Switch on power, awake device from standby if detects action on device
- 2219/25281 . . . Detect usage of machine, adapt sleep mode timer
- 2219/25282 . . . Alternative energy for fieldbus devices
- 2219/25283 . . . Evaluate available energy prior to wireless transmitter-receiver activation
- 2219/25284 . . . Standby only for memory, prom
- 2219/25285 . . . Standby only for real time clock
- 2219/25286 . . . Switch on power, awake controlled machine from standby if command signal
- 2219/25287 . . . Power for display leds I-O only when case is open
- 2219/25288 . . . Detector to standby state if signal below certain level
- 2219/25289 . . . Energy saving, brown out, standby, sleep, powerdown modus for microcomputer

- 2219/25291 . . . Set module, component to sleep if no event or no other module needs it
- 2219/25292 . . . Standby for display, switch on if operator wants to use it
- 2219/25293 . . . Identify control parameters for several workpieces, control, both in parallel
- 2219/25294 . . . Part, workpiece, code, tool identification
- 2219/25295 . . . Identification has information on relationship with other controllers
- 2219/25296 . . . Identification module, type connected I-O, device
- 2219/25297 . . . Identify controlled element, valve, and read characteristics
- 2219/25298 . . . System identification
- 2219/25299 . . . Address memory with variable frequency
- 2219/25301 . . . Expansion of system, memory
- 2219/25302 . . . Program and data in separate memory
- 2219/25303 . . . Decode processor status bits to switch, select between memories
- 2219/25304 . . . Memory subdivided in separate blocks, high, low addressable with same address
- 2219/25305 . . . MMA, memory management, set ram and eprom part for flash memory, store state also
- 2219/25306 . . . Modules with hardwired logic
- 2219/25307 . . . Each module has file with all components in module and the available components
- 2219/25308 . . . Ecu, standard processor connects to asic connected to specific application
- 2219/25309 . . . Module in ring for power supply and ring for command signals
- 2219/25311 . . . Each module near controlled machine
- 2219/25312 . . . Pneumatic, hydraulic modules, controlled valves
- 2219/25313 . . . Clamp module on controlled system by magnet
- 2219/25314 . . . Modular structure, modules
- 2219/25315 . . . Module, sequence from module to module, structure
- 2219/25316 . . . Control unit and actuator in one unit, module
- 2219/25317 . . . Control unit, sensor and actuator in one unit, module
- 2219/25318 . . . Power supply module in common for all modules
- 2219/25319 . . . Standard connector between modules
- 2219/25321 . . . Connection modules by flexible printed circuit, printed cable, multiway, ribbon
- 2219/25322 . . . Stackthrough modules, modules are stacked, no need for backplane
- 2219/25323 . . . Intelligent modules
- 2219/25324 . . . Modules connected to serial bus
- 2219/25325 . . . Each connected module has own power supply
- 2219/25326 . . . Module with low maintenance connected to removable module with high maintenance
- 2219/25327 . . . Single channel module
- 2219/25328 . . . Module connected to parallel bus
- 2219/25329 . . . Each module, segment has only either a sensor or an actuator
- 2219/25331 . . . Module connected to canbus and to controlled device
- 2219/25332 . . . Module capability concerns allowable I-O and required sequence of operations
- 2219/25333 . . . Modules on bus and direct connection between them for additional logic functions
- 2219/25334 . . . Each module contains several channels, each with an input and an output
- 2219/25335 . . . Each module has connections to actuator, sensor and to a fieldbus for expansion
- 2219/25336 . . . Cascaded modules, one module connects to other, I-O, computing expansion
- 2219/25337 . . . Sbc single board computer, stand alone
- 2219/25338 . . . Microprocessor
- 2219/25339 . . . Supervisory plus control computer
- 2219/25341 . . . Single chip programmable controller
- 2219/25342 . . . Real time controller
- 2219/25343 . . . Real time multitasking
- 2219/25344 . . . In one cycle, application task is executed, if time is left, communication or user interface task is executed
- 2219/25345 . . . Linux, preemption, low-latency patches for real time linux
- 2219/25346 . . . Several operating systems in one device
- 2219/25347 . . . Multitasking machine control
- 2219/25348 . . . Windows expansion for real time control under windows
- 2219/25349 . . . Operating system, Microsoft Windows
- 2219/25351 . . . MSDOS
- 2219/25352 . . . Preemptive for critical tasks combined with non preemptive, selected by attribute
- 2219/25353 . . . Inductive coupling of power, transformer
- 2219/25354 . . . Power or secondary control signal derived from received signal
- 2219/25355 . . . Motor winding used as power transformer
- 2219/25356 . . . Inductive coupling of power and signal
- 2219/25357 . . . Regulation of energy coupling
- 2219/25358 . . . During detection of input, switch over to dc power
- 2219/25359 . . . Special power supply
- 2219/25361 . . . DC-DC convertor on board
- 2219/25362 . . . UPS, no break
- 2219/25363 . . . Dual power supply, for digital circuit and for analog signals
- 2219/25364 . . . For each module a powersupply
- 2219/25365 . . . Initialize parameters
- 2219/25366 . . . Detect code, kind connected machine, device before execution of program
- 2219/25367 . . . Control of periodic, synchronous and asynchronous, event driven tasks together
- 2219/25368 . . . Start group of motors, machines in sequence, power up, down sequence
- 2219/25369 . . . Control of states, real time
- 2219/25371 . . . Recharge apparatus with material, only when needed or during specific time
- 2219/25372 . . . Sequence command, next step if reference equals ramp signal level
- 2219/25373 . . . Detection position of program drum
- 2219/25374 . . . Home selection
- 2219/25375 . . . If error, execute subroutine for alternative command, no shut down
- 2219/25376 . . . Repeat part of program, kind of subroutine
- 2219/25377 . . . New sequence as function of deviation from predicted result, state
- 2219/25378 . . . Stop machine after execution of some instructions on tape, marked by code
- 2219/25379 . . . Operation on rotating table provided with a plurality of cases

- 2219/25381 . . . Restart program at predetermined position, crash recovery after power loss
- 2219/25382 . . . Skip sequences
- 2219/25383 . . . Jump
- 2219/25384 . . . Analog I-O to microprocessor to set switch moment for next step
- 2219/25385 . . . Control speed of conveyor as function of missing objects, to speed up
- 2219/25386 . . . Program execution as function of direction, forward or backward
- 2219/25387 . . . Control sequences so as to optimize energy use by controlled machine
- 2219/25388 . . . Race conditions
- 2219/25389 . . . Macro's, subroutines
- 2219/25391 . . . Start, stop sequence of different parts of machine, copier, textile, glass
- 2219/25392 . . . Convert control signal to deliver pulse modified in time and width
- 2219/25393 . . . Speed, delay, stand still of record carrier controlled, more commands possible
- 2219/25394 . . . Execute next step on feedback of result of previous step
- 2219/25395 . . . Clock dependant, select next cyclus, step as function of parameter
- 2219/25396 . . . Add pulses or stop pulses as function of changing clock, speed to compensate
- 2219/25397 . . . Compare real date with programmed date, if equal execute next command
- 2219/25398 . . . Sampling period is a product of integer number and scheduler interrupt period
- 2219/25399 . . . Variable, settable clock or cycle, phase duration
- 2219/25401 . . . Compensation of control signals as function of changing supply voltage
- 2219/25402 . . . Detect occurrence of signal by higher sampling when parameter value within range
- 2219/25403 . . . Compare real clock time with programmed time, if equal execute next command
- 2219/25404 . . . Command order is delayed as function of expected and real delay
- 2219/25405 . . . Command order is delayed, corrected as function of speed
- 2219/25406 . . . Delay as function of detected characteristics of controlled element
- 2219/25407 . . . Delay between operations
- 2219/25408 . . . Given order is latched for a certain delay in order to execute order surely
- 2219/25409 . . . Feedforward of control signal to compensate for delay in execution
- 2219/25411 . . . Priority interrupt
- 2219/25412 . . . Separate interrupt for, from each interface
- 2219/25413 . . . Interrupt, event, state change triggered
- 2219/25414 . . . Interrupt without saving register states
- 2219/25415 . . . Between processors using a single line and a switch
- 2219/25416 . . . Interrupt
- 2219/25417 . . . Identify capabilities necessary to produce article
- 2219/25418 . . . Enter description of capabilities of each module
- 2219/25419 . . . Scheduling
- 2219/25421 . . . Using resource data relative to each component, module of control system
- 2219/25422 . . . Aperiodic scheduling, executed only on certain condition
- 2219/25423 . . . Verification of controlled value by comparing with recorded value, signature
- 2219/25424 . . . Mixture of wall connectors, some with fixed address others no address
- 2219/25425 . . . Personal computer
- 2219/25426 . . . Microcontroller in smart card directly controls machine, runs control program
- 2219/25427 . . . Controller inside socket, wall connector, distributor, junction box
- 2219/25428 . . . Field device
- 2219/25429 . . . Microprocessor mounted near controlled machine, cheaper line connection
- 2219/25431 . . . Dual Port memory
- 2219/25432 . . . Multiplex
- 2219/25433 . . . Dataflow processor
- 2219/25434 . . . Microprocessor and control logic integrated on same circuit board
- 2219/25435 . . . Multiplex for analog signals
- 2219/25436 . . . Main board connected to bundle of analog input lines
- 2219/25437 . . . Main board coupled to bundle of digital and analog input lines
- 2219/25438 . . . Counter controls device, machine directly or via decoder
- 2219/25439 . . . Use of flexible printed circuit
- 2219/25441 . . . Piggy back mounting
- 2219/25442 . . . Europa card
- 2219/25443 . . . Connect pc card to industrial bus, additional timing and adapting logic
- 2219/25444 . . . Stick label over opening for card, to seal opening and indicate program status
- 2219/25445 . . . Electric wiring inside pneumatic, hydraulic path
- 2219/25446 . . . Serial port has power connected to pin for external device
- 2219/25447 . . . Detachable program unit can be replaced by supplementary display
- 2219/25448 . . . Control module is pluggable into wall connector
- 2219/25449 . . . Constructive details
- 2219/25451 . . . Connect module to bus using interface with adaptive logic
- 2219/25452 . . . Bootstrap logic and ram integrated in serial connector
- 2219/25453 . . . Encoder, control knob connected to same microprocessor pins as keyboard matrix
- 2219/25454 . . . Retrofitting
- 2219/25455 . . . Buscouple interface can be integrated in actuator
- 2219/25456 . . . Piggy back controller, old controller functions as before, new functions by new
- 2219/25457 . . . Replace old processor by more powerful processor on additional card
- 2219/25458 . . . Opto isolation, optical separation
- 2219/25459 . . . Reed relay separation
- 2219/25461 . . . Transformer separation
- 2219/25462 . . . Galvanic separation, galvanic isolation
- 2219/25463 . . . Optical separation for signals, transformer separation for power
- 2219/25464 . . . MBO motherboard, backplane special layout

- 2219/25465 . . . Output of one module connected to input next module by lines on motherboard
- 2219/25466 . . . Motherboard has data, address, power and module identification lines
- 2219/25467 . . . Detect if expansion board is connected
- 2219/25468 . . . Disconnect automatically high voltage supply when taking out a module
- 2219/25469 . . . Inserting or taking out circuit boards during power on
- 2219/25471 . . . Replace existing control system with new different system in real time
- 2219/25472 . . . Synchronise controllers, sensors, measurement with data bus
- 2219/25473 . . . Compensation variable cycle time, synchronized processes
- 2219/25474 . . . Synchronize microprocessor with process or I-O
- 2219/25475 . . . Sequence synchronized with machine axis, like knitting machine
- 2219/25476 . . . Synchronous state change by clock as function of allowed states to skip certain states
- 2219/25477 . . . Master waits for signal from slave, slave active thereafter, during limited time
- 2219/25478 . . . Synchronize several controllers using syncline
- 2219/25479 . . . Synchronize controllers using messages, add transmission time afterwards
- 2219/25481 . . . Broadcast to each controller an address of part of program to be used
- 2219/25482 . . . Synchronize several sequential processes, adjust
- 2219/25483 . . . Synchronize several controllers using messages over data bus
- 2219/25484 . . . Synchronize microprocessor and connected, controlled state machine
- 2219/26 . . . Pc applications
- 2219/2601 . . . Dispense machine glue, paste, flow
- 2219/2602 . . . Wafer processing
- 2219/2603 . . . Steering car
- 2219/2604 . . . Test of external equipment
- 2219/2605 . . . Wastewater treatment
- 2219/2606 . . . Tape transport, take up, rewind, play
- 2219/2607 . . . Infusion controller
- 2219/2608 . . . Hospital bed
- 2219/2609 . . . Process control
- 2219/2611 . . . Microprocessor driven caliper, to measure length distances
- 2219/2612 . . . Data acquisition interface
- 2219/2613 . . . Household appliance in general
- 2219/2614 . . . HVAC, heating, ventilation, climate control
- 2219/2615 . . . Audio, video, tv, consumer electronics device
- 2219/2616 . . . Earth moving, work machine
- 2219/2617 . . . Eye, ophthalmic, surgery system
- 2219/2618 . . . Lubrication, greasing
- 2219/2619 . . . Wind turbines
- 2219/2621 . . . Conveyor, transfert line
- 2219/2622 . . . Press
- 2219/2623 . . . Combustion motor
- 2219/2624 . . . Injection molding
- 2219/2625 . . . Sprinkler, irrigation, watering
- 2219/2626 . . . Sewing
- 2219/2627 . . . Grinding machine
- 2219/2628 . . . Door, window
- 2219/2629 . . . Assembly line
- 2219/2631 . . . Blasting, explosion
- 2219/2632 . . . Hemodialysis
- 2219/2633 . . . Washing, laundry
- 2219/2634 . . . Loom, weaving
- 2219/2635 . . . Glass forming
- 2219/2636 . . . Reproduction, image copying machine
- 2219/2637 . . . Vehicle, car, auto, wheelchair
- 2219/2638 . . . Airconditioning
- 2219/2639 . . . Energy management, use maximum of cheap power, keep peak load low
- 2219/2641 . . . Fork lift, material handling vehicle
- 2219/2642 . . . Domotique, domestic, home control, automation, smart house
- 2219/2643 . . . Oven, cooking
- 2219/2644 . . . Sterilizer
- 2219/2645 . . . Vending, distribute drinks
- 2219/2646 . . . Printing
- 2219/2647 . . . Dentist
- 2219/2648 . . . Central heating
- 2219/2649 . . . Burner
- 2219/2651 . . . Camera, photo
- 2219/2652 . . . Medical scanner
- 2219/2653 . . . Roller blind, shutter, sunshade
- 2219/2654 . . . Fridge, refrigerator
- 2219/2655 . . . Cd player
- 2219/2656 . . . Instrumentation
- 2219/2657 . . . Blood, urine analyzer
- 2219/2658 . . . Heat pump
- 2219/2659 . . . Elevator
- 2219/2661 . . . Milking robot
- 2219/2662 . . . Photocopier
- 2219/2663 . . . Tractor
- 2219/2664 . . . Audio light, animation, stage, theatre light
- 2219/2665 . . . Detonator, fuze
- 2219/2666 . . . Toy
- 2219/2667 . . . Crane
- 2219/2668 . . . Fuel cells
- 2219/2669 . . . Handling batches
- 2219/2671 . . . Mail processing system
- 2219/30 . . . Nc systems
- 2219/31 . . . From computer integrated manufacturing till monitoring
  - 2219/31001 . . . CIM, total factory control
  - 2219/31002 . . . Computer controlled agv conveys workpieces between buffer and cell
  - 2219/31003 . . . Supervise route, reserve route and allocate route to vehicle, avoid collision
  - 2219/31004 . . . Move vehicle to battery charge or maintenance area
  - 2219/31005 . . . Detect obstacles on path of vehicle
  - 2219/31006 . . . Monitoring of vehicle
  - 2219/31007 . . . Floor plan, map stored in on-board computer of vehicle
  - 2219/31008 . . . Cooperation mobile robots, carrying common pallet, object or pushing together
  - 2219/31009 . . . Connector between AGV and station
  - 2219/31011 . . . Communication network identical to transport network
  - 2219/31012 . . . Optimize number of vehicles
  - 2219/31013 . . . Second AGV with wafers already underway before processing first finished

- 2219/31014 . . . Synchronization between AGV movement and workpiece treatment chambers
- 2219/31015 . . . Host, model group and workstation computer deliver each proper control data
- 2219/31016 . . . General NC system executes tasks not present in specialised machine tools
- 2219/31017 . . . Architecture, host controls several CNC, each acting as a server to a pmc
- 2219/31018 . . . Virtual factory, modules in network, can be selected and combined at will
- 2219/31019 . . . Each station along transferline is independent
- 2219/31021 . . . Between lan and machine, communication adapter which serves also sensors
- 2219/31022 . . . Planner and coordinator, decision and direct control level
- 2219/31023 . . . Master production scheduler and microprocessor and schedule analysis and shop control
- 2219/31024 . . . Superior controller and internal, external resources controller modules
- 2219/31025 . . . PAC production activity controller
- 2219/31026 . . . Diagnostic controller coupled to field and to redundant process controllers
- 2219/31027 . . . Computer assisted manual assembly CAA, display operation, tool, result
- 2219/31028 . . . Selecting workpieces from one or more containers by robot with vision
- 2219/31029 . . . Program for assembly, show exploded article
- 2219/31031 . . . Assembly, manipulator cell
- 2219/31032 . . . Two workstations alternatively, one assembles, other is prepared for next
- 2219/31033 . . . Record on site dimensions of pipe, tube configuration, to install pipe
- 2219/31034 . . . Component identifier and location indicator corresponding to component
- 2219/31035 . . . Disable assembly if one of component compartments lacks
- 2219/31036 . . . Load component into corresponding compartment, bin, storage before assembly
- 2219/31037 . . . Compartment, bin, storage vessel sensor to verify correct bin is loaded
- 2219/31038 . . . Watchdog, timer to alert if operator does not executes operation within time
- 2219/31039 . . . Count assembled parts, change program during assembly if number reached
- 2219/31041 . . . Machine balancing, distribute articles evenly over machines
- 2219/31042 . . . Enter pallet configuration, geometry, number of parts
- 2219/31043 . . . Bin, storage identifier and workstation identifier
- 2219/31044 . . . Assembly of modular products, variant configurability
- 2219/31045 . . . Show bin, compartment and number of parts to be pick up
- 2219/31046 . . . Aid for assembly, show display on screen next workpiece, task, position to be assembled, executed
- 2219/31047 . . . Display image of finished workpiece on screen, show how, where to mount next part
- 2219/31048 . . . Project on workpiece, image of finished workpiece, info or a spot
- 2219/31049 . . . Minimize assembly time, by grouping part types into pallet groups
- 2219/31051 . . . Hybrid system, combine expert system with traveling salesman problem TSP
- 2219/31052 . . . Find feasible assembly sequences
- 2219/31053 . . . Planning, generate assembly plans
- 2219/31054 . . . Planning, layout of assembly system
- 2219/31055 . . . Interpretation of assembly design data
- 2219/31056 . . . Selection of assembly processes, preferred assembly sequences
- 2219/31057 . . . Selection of assembly equipment, system
- 2219/31058 . . . Determination of assembly tooling, fixture
- 2219/31059 . . . Selection of inspection devices
- 2219/31061 . . . Selection of assembly process parameters
- 2219/31062 . . . Calculation of assembly times
- 2219/31063 . . . Integrate assembly and task planning
- 2219/31064 . . . Minimal precedence constraint for components, link between components
- 2219/31065 . . . Disassembly evaluation
- 2219/31066 . . . Virtual assembly disassembly planning
- 2219/31067 . . . Assembly partitioning, find sub assembly removable without disturbing plan
- 2219/31068 . . . Relative positioning of assembled parts with small geometric deviations
- 2219/31069 . . . Cell controller, setup machine of cell during operation of other machines
- 2219/31071 . . . Prevent order interference, no order to machine not setup for that order
- 2219/31072 . . . Prevent batch breakup, no mix up of output of different machines
- 2219/31073 . . . Decide when to create or reconfigure a cell
- 2219/31074 . . . Decide which machines are to be used in a cell
- 2219/31075 . . . Modular cell elements
- 2219/31076 . . . Controller for cell, for robot motion, for supervision
- 2219/31077 . . . Laser cutting table and handling and gripping and attachment robot and layup table
- 2219/31078 . . . Several machines and several buffers, storages, conveyors, robots
- 2219/31079 . . . Two workstations and two manipulators working together or independent
- 2219/31081 . . . Detect position robot, agv relative to machine to start communication
- 2219/31082 . . . NDDS network data delivery service, producers and consumers model
- 2219/31083 . . . In server store virtual nodes for controlled machines, with states for map
- 2219/31084 . . . Part of module exchanges high level messages, other part proprietary messages
- 2219/31085 . . . Application scripts; in web server, not sent to client
- 2219/31086 . . . Communication of carriage, agv data, workpiece data at each station
- 2219/31087 . . . Transmission device between workcell and central control
- 2219/31088 . . . Network communication between supervisor and cell, machine group
- 2219/31089 . . . Direct communication between cooperating parts of a cell, not over server
- 2219/31091 . . . One client handled by several servers
- 2219/31092 . . . Network server for communication between plc's, using server
- 2219/31093 . . . Communication between sensors, actuators and gateway

- 2219/31094 . . . Data exchange between modules, cells, devices, processors
- 2219/31095 . . . Read write intelligent chip on workpiece, pallet, tool for data exchange
- 2219/31096 . . . Data carrier, communication by exchange of floppy disk
- 2219/31097 . . . Display travels with workpiece, package, order, special orders can be inserted
- 2219/31098 . . . Configuration editor for networking interconnection
- 2219/31099 . . . Configuration of transfer control between several subsystems
- 2219/31101 . . . Configuration file with format of relevant messages for different equipment
- 2219/31102 . . . Program network controller, connected devices
- 2219/31103 . . . Configure parameters of controlled devices
- 2219/31104 . . . Remote configuration of parameters of controlled devices
- 2219/31105 . . . Remote control of network controller
- 2219/31106 . . . Auto configuration, each module responsible for own configuration
- 2219/31107 . . . Start up of object manager module
- 2219/31108 . . . Can controller in full can, detects if message is for controller
- 2219/31109 . . . Can controller in basic can, microcontroller detects if message is for controller
- 2219/31111 . . . Can controller and microcontroller integrated
- 2219/31112 . . . Interface, SIOMS standard I-O for mechatronic systems, device drivers
- 2219/31113 . . . General, vendor independent display and control interface for sensor actuator
- 2219/31114 . . . Sensor on off switch level can be set and displayed by detachable module
- 2219/31115 . . . Network controller
- 2219/31116 . . . A-D interface between asi and fieldbus
- 2219/31117 . . . Each node has several, three channels, for control, for data, for addressing
- 2219/31118 . . . Universal interface between asi and fieldbus, for any fielddevice
- 2219/31119 . . . Fielddevice comprises also controller and pneumatic actuator and sensor
- 2219/31121 . . . Fielddevice, field controller, interface connected to fieldbus
- 2219/31122 . . . Bridge between networks
- 2219/31123 . . . Multi mode network controller, monitor, control, configuration, maintenance
- 2219/31124 . . . Interface between communication network and process control, store, exchange data
- 2219/31125 . . . Signal, sensor adapted interfaces build into fielddevice
- 2219/31126 . . . Transmitter coupled to fieldbus and to sensor, a-d conversion
- 2219/31127 . . . Repeater between two networks
- 2219/31128 . . . No repeater, split into several analog segments and common digital, can, expansion
- 2219/31129 . . . Universal interface for different fieldbus protocols
- 2219/31131 . . . Field device with gateway functions for communication with pc and other field devices
- 2219/31132 . . . FDT interfacing profibus field device drivers DTM with engineering tool
- 2219/31133 . . . Contactless connector, identify module wirelessly, short distance like less than twenty cm
- 2219/31134 . . . PCD profinet component description, field device description module
- 2219/31135 . . . Fieldbus
- 2219/31136 . . . Name of bus, canbus, controller area network
- 2219/31137 . . . Sercos serial real time communications system between servo and cpu
- 2219/31138 . . . Profibus process fieldbus
- 2219/31139 . . . Lon local operating network, using neuron chip
- 2219/31141 . . . Eiba european installation bus association
- 2219/31142 . . . Devicenet, can based net
- 2219/31143 . . . Sds smart distributed system, can based
- 2219/31144 . . . Interbus-S
- 2219/31145 . . . Ethernet
- 2219/31146 . . . Bati bus, for home habitation building automation
- 2219/31147 . . . Simatic S5-bus
- 2219/31148 . . . Imbus
- 2219/31149 . . . P-net
- 2219/31151 . . . Lan local area network
- 2219/31152 . . . Separate lan for sensors, detectors
- 2219/31153 . . . Serial bus for plug in modules, each connection has own supply
- 2219/31154 . . . Actuator sensor bus, asi, intelligent actuator, motor, sensor
- 2219/31155 . . . Ringbus
- 2219/31156 . . . Network structure, internet
- 2219/31157 . . . Star network, hub
- 2219/31158 . . . Wan wide area network
- 2219/31159 . . . Intranet
- 2219/31161 . . . Java programcode or similar active agents, programs, applets
- 2219/31162 . . . Wireless lan
- 2219/31163 . . . Neutral bus with intelligent coupler for all kind of fieldbuses
- 2219/31164 . . . Bus for analog and digital communication
- 2219/31165 . . . Control handover in wireless automation networks
- 2219/31166 . . . Access data by name, object, stored in list, database
- 2219/31167 . . . Object, data object as network variable
- 2219/31168 . . . Use of node, sensor, actuator and control object
- 2219/31169 . . . Object manager contains client, control and communication and start and planning server
- 2219/31171 . . . Each data object has corresponding identification for object manager, associative
- 2219/31172 . . . All object managers use same algorithm to search server
- 2219/31173 . . . Start different object manager as function of priority list
- 2219/31174 . . . Load, use different protocols, formats, emulators for different systems
- 2219/31175 . . . Message comprises identification of sender, receiver, command and parameter
- 2219/31176 . . . Universal, same protocol to control all kind of drives, dc, ac, step motor
- 2219/31177 . . . Protocol, sdhc serial data link control
- 2219/31178 . . . Hdhc high level data link control
- 2219/31179 . . . Master sends message with address of slave to all slaves, slave answers, interrupt
- 2219/31181 . . . Controller and device have several formats and protocols, select common one
- 2219/31182 . . . Address by pulse sequence, control by pulse width, module filters out own control

- 2219/31183 . . . Token ring
- 2219/31184 . . . Fip fieldbus instrumentation protocol
- 2219/31185 . . . Mapi message application interface for windows
- 2219/31186 . . . TCP-IP internet protocol
- 2219/31187 . . . Csma-cd csma-cd-w carrier sense multiple access collision detection wireless
- 2219/31188 . . . Combine csma-cd and tdm time multiplexed for rapid status exchange
- 2219/31189 . . . Time multiplex
- 2219/31191 . . . Shorten header, message can be sent with less bytes, short form PDU
- 2219/31192 . . . Token passing protocol, priority token passing
- 2219/31193 . . . Midi communication standard
- 2219/31194 . . . Multimedia integration into fieldbus
- 2219/31195 . . . WAP wireless application protocol, wireless web application
- 2219/31196 . . . SOAP, describes available services and how to call them remotely
- 2219/31197 . . . Near field communication nfc
- 2219/31198 . . . VPN virtual private networks
- 2219/31199 . . . UDP-IP
- 2219/31201 . . . Frequency shift keying modulation, fsk
- 2219/31202 . . . Semiconductor equipment communication standard SECS
- 2219/31203 . . . Purpose, identification of messages, programs, variables
- 2219/31204 . . . Blind node, executes control, data acquisition without having operator interfaces
- 2219/31205 . . . Remote transmission of measured values from site, local to host
- 2219/31206 . . . Exchange of parameters, data, programs between two station, station and central or host or remote
- 2219/31207 . . . Master sends global files to autonomous controllers, feedback of process status
- 2219/31208 . . . Server node to watch, store message, variable, data between lon, network
- 2219/31209 . . . Master actuator sensor interface has priority over host, build into host
- 2219/31211 . . . Communicate diagnostic data from intelligent field device controller to central
- 2219/31212 . . . Intelligent local node can handle emergency without communication over net
- 2219/31213 . . . Synchronization of servers in network
- 2219/31214 . . . Discontinuous communication controlled by server
- 2219/31215 . . . Upon modification of data in one database, automatic update of mirror databases
- 2219/31216 . . . Handshake between machine and agv; readiness to load, unload workpiece
- 2219/31217 . . . Merge, synchronize process data and network data for trend analysis
- 2219/31218 . . . Scheduling communication on bus
- 2219/31219 . . . Fixed deadline monotonic scheduling dm, set each message id to unique priority
- 2219/31221 . . . Non preemptive earliest deadline ed, message id contains deadline
- 2219/31222 . . . Mixed traffic scheduler, ed for high speed and dm for low speed messages
- 2219/31223 . . . Main controller with three levels of serial networks
- 2219/31224 . . . Supervisor, cell controllers in parallel bus, machine controllers in serial bus
- 2219/31225 . . . System structure, plc's and pc's communicate over lan
- 2219/31226 . . . Multitasking server connected to general network and to nc machines
- 2219/31227 . . . External network for proces data, internal network for transport, handling only
- 2219/31228 . . . Host, gateways and parallel backbone, multiprocessor computer node, fieldbus
- 2219/31229 . . . Supervisor, master, workstation controller, automation, machine control
- 2219/31231 . . . Lan and stations and fieldbus, each station controls own I-O
- 2219/31232 . . . Lan and station, each station has plc controlling own I-O over bus
- 2219/31233 . . . Map network and server in node and server controlled ethernet with machine nodes
- 2219/31234 . . . Host, router and backplane bus, communication with host or backplane
- 2219/31235 . . . St network, each module of first controls second similar network etc., tree
- 2219/31236 . . . Plc exclusive network connected to map
- 2219/31237 . . . Host and rs232, rs485 to network controller and rs232 to controlled devices
- 2219/31238 . . . First network connected by repeater to second, second connected by repeater to third
- 2219/31239 . . . Cache for server to fast support client
- 2219/31241 . . . Remote control by a proxy or echo server, internet - intranet
- 2219/31242 . . . Device priority levels on same bus, net, devices processes data of exactly lower priority device
- 2219/31243 . . . Add serial number to message from station to check missing messages in host
- 2219/31244 . . . Safety, reconnect network automatically if broken
- 2219/31245 . . . Redundant bus, interbus, with two masters
- 2219/31246 . . . Firewall
- 2219/31247 . . . Reconnect network if connection was broken
- 2219/31248 . . . Multiple data link layer masters, if one fails, other takes over
- 2219/31249 . . . Display name of communication line and number of errors detected and corrected
- 2219/31251 . . . Redundant access, wireless and hardware access to fielddevices
- 2219/31252 . . . Watchdog, client sends regulary message to server, server must answer
- 2219/31253 . . . Redundant object manager
- 2219/31254 . . . Request from client waits until corresponding server functions again
- 2219/31255 . . . Verify communication parameters, if wrong, refuse communication
- 2219/31256 . . . Object managers arranged in logical ring for monitoring purposes
- 2219/31257 . . . Redundant wireless links
- 2219/31258 . . . Compensate control in case of missing message
- 2219/31259 . . . Communication inhibited during certain process steps
- 2219/31261 . . . Coordination control
- 2219/31262 . . . Dcca dynamic coordinated concurrent activities
- 2219/31263 . . . Imbedded learning for planner, executor, monitor, controller and evaluator
- 2219/31264 . . . Control, autonomous self learn knowledge, rearrange task, reallocate resources

- 2219/31265 . . . Control process by combining history and real time data
- 2219/31266 . . . Convey, transport tool to workcenter, central tool storage
- 2219/31267 . . . Central tool storage, convey a whole tool drum, magazine to workcenter
- 2219/31268 . . . Central workpiece storage, convey workpiece, work pallet, holder to workcell
- 2219/31269 . . . Convey tool and workpiece to workcenter
- 2219/31271 . . . Priority workpiece pallet selected instead of routine workpiece pallet
- 2219/31272 . . . Avoid piling up, queue of workpieces, accommodate surges
- 2219/31273 . . . Buffer conveyor along main conveyor
- 2219/31274 . . . Convey products, move equipment according to production plan in memory
- 2219/31275 . . . Vehicle to convey workpieces is manually operable
- 2219/31276 . . . Transport a lot to stations, each with different types of manufacturing equipment
- 2219/31277 . . . Dispatching rules, shortest travel time or bidding based to reduce empty travel
- 2219/31278 . . . Store optimum number of workpiece, between max min, in bins, compartment, save travel time
- 2219/31279 . . . Prevent introduction of two pallets in same cell
- 2219/31281 . . . Calculate optimum path for conveying workpieces
- 2219/31282 . . . Data acquisition, BDE MDE
- 2219/31283 . . . Communication memory, storage, ram, eprom on workpiece or pallet
- 2219/31284 . . . Set begin and end of collection time for concerned machines, parameters
- 2219/31285 . . . Send required data to computer as function of specified condition
- 2219/31286 . . . Detect position of articles and equipment by receivers, identify objects by code
- 2219/31287 . . . Indicate output for data, screen or printer or database
- 2219/31288 . . . Archive collected data into history file
- 2219/31289 . . . Read card with operator and another card with process, product, work order info
- 2219/31291 . . . Store value detected signal and machine name and name of part of machine, mask
- 2219/31292 . . . Data in categories, each with a priority factor
- 2219/31293 . . . Enter size measurements, store in data base, analyze and identify in size data group
- 2219/31294 . . . Compare measurements from sensors to detect defective sensors
- 2219/31295 . . . Use integrated controller, processor during product, car assembly for ide, display, test
- 2219/31296 . . . Identification, pallet object data and program code for station
- 2219/31297 . . . Read only that ide information which is needed for specific operation
- 2219/31298 . . . Store on actual pallets also id of several other upstream, following pallets
- 2219/31299 . . . If workpiece rejected, write in id and erase operation code
- 2219/31301 . . . Restore lost id by using entry number of preceding, following pallet
- 2219/31302 . . . Verify id data and reread, rewrite or alarm on fault
- 2219/31303 . . . If workpiece transferred to other pallet, transfer also id
- 2219/31304 . . . Identification of workpiece and data for control, inspection, safety, calibration
- 2219/31305 . . . Robot arm identifies object during movement
- 2219/31306 . . . Read identification only if object is present
- 2219/31307 . . . Identification structure is partly a copy of operating structure
- 2219/31308 . . . Capture image asynchronously with processing of analysis, identification
- 2219/31309 . . . Identification workpiece and time limit for processing of workpiece
- 2219/31311 . . . Data are id, destination, number of pieces, alternative destination, process data
- 2219/31312 . . . Identify pallet, bag, box code
- 2219/31313 . . . Measure weight, dimension and contents of box, tray
- 2219/31314 . . . Store in workpiece detected defects
- 2219/31315 . . . Use of data by host, send work order to operator after pallet detection
- 2219/31316 . . . Output test result report after testing, inspection
- 2219/31317 . . . Outputs delivery ordersheet, relating to finished products, to packing cell
- 2219/31318 . . . Data analysis, using different formats like table, chart
- 2219/31319 . . . Use data groups as inventory control value, adapt inventory need to new data
- 2219/31321 . . . Print, output finished product documentation, manual using id of all workpieces assembled, processed
- 2219/31322 . . . Work still to be done on workpiece
- 2219/31323 . . . Database for CIM
- 2219/31324 . . . Distributed real time knowledge, database
- 2219/31325 . . . Machine selection support, use of database
- 2219/31326 . . . Database to manage communication networks
- 2219/31327 . . . Directory service for database
- 2219/31328 . . . Objects report their location to directory service
- 2219/31329 . . . Distributed, among several servers, directory service
- 2219/31331 . . . Select manufacturing information by entering product number
- 2219/31332 . . . Back order management with back order, part maker delivery, production databases
- 2219/31333 . . . Database to backup and restore factory controllers
- 2219/31334 . . . Database with devices, configuration, of plant
- 2219/31335 . . . Database of address of devices registers in different networks, mapping
- 2219/31336 . . . Store machines performance; use it to control future machining
- 2219/31337 . . . Failure information database
- 2219/31338 . . . Design, flexible manufacturing cell design
- 2219/31339 . . . From parameters, build processes, select control elements and their connection
- 2219/31341 . . . Design of factory information system
- 2219/31342 . . . Design of process control system
- 2219/31343 . . . Design of factory, manufacturing system control
- 2219/31344 . . . Element, file server
- 2219/31345 . . . Map backbone bus
- 2219/31346 . . . Network manager

2219/31347 . . .	Communication adaptors between network and each machine	2219/31388 . . .	Just in time JIT, kanban is box to control flow of workpiece
2219/31348 . . .	Gateway	2219/31389 . . .	Pull type, client order decides manufacturing
2219/31349 . . .	Server node as operator panel, with display for lon	2219/31391 . . .	Administration tasks and factory control tasks
2219/31351 . . .	Expert system to select best suited machining centre	2219/31392 . . .	Lims laboratory information and management system
2219/31352 . . .	Expert system integrates knowledges to control workshop	2219/31393 . . .	Object oriented engineering data management
2219/31353 . . .	Expert system to design cellular manufacturing systems	2219/31394 . . .	Field management, low level, instruments and controllers acting in real time
2219/31354 . . .	Hybrid expert, knowledge based system combined with ann	2219/31395 . . .	Process management, specification, process and production data, middle level
2219/31355 . . .	Fault, if one station defect, stop it, other stations take over	2219/31396 . . .	Business management, production, document, asset, regulatory management, high level
2219/31356 . . .	Automatic fault detection and isolation	2219/31397 . . .	Instrument information management, subset of process management
2219/31357 . . .	Observer based fault detection, use model	2219/31398 . . .	Simultaneous, concurrent engineering
2219/31358 . . .	Markov model	2219/31399 . . .	Station corrects nc program, sends back modified program to program generator
2219/31359 . . .	Object oriented model for fault, quality control	2219/31401 . . .	Keep notebook for keeping track of process, can be executed to make product
2219/31361 . . .	Verify if right controllers are connected to carrier, conveyor controller	2219/31402 . . .	Keep log book, for activities of a station, equipment
2219/31362 . . .	Verify correct configuration of system	2219/31403 . . .	EDI electronic data exchange
2219/31363 . . .	Action, if one station defect, execute special program for other stations	2219/31404 . . .	Computer assisted complaint management, customer complaint
2219/31364 . . .	If one station defect, return other stations to original programmed modes	2219/31405 . . .	EDM electronic data management
2219/31365 . . .	Send message to most appropriate operator as function of kind of error	2219/31406 . . .	Data management, shop management, memory management
2219/31366 . . .	Operate faulty tool in degraded mode	2219/31407 . . .	Machining, work, process finish time estimation, calculation
2219/31367 . . .	MMS manufacturing message specification, rs511, iso9506	2219/31408 . . .	Cost calculation of use of certain machine types
2219/31368 . . .	MAP manufacturing automation protocol	2219/31409 . . .	Calculation approach time
2219/31369 . . .	Translation, conversion of protocol between two layers, networks	2219/31411 . . .	Down time, loss time estimation, calculation
2219/31371 . . .	VMD virtual manufacturing device for robot task control, cell	2219/31412 . . .	Calculate machining time, update as function of load, speed
2219/31372 . . .	Mes manufacturing execution system	2219/31413 . . .	Estimate capacity of plant
2219/31373 . . .	Vou virtual operative organisational unit, extension of vmd	2219/31414 . . .	Calculate amount of production energy, waste and toxic release
2219/31374 . . .	FAL fieldbus application layer, application service elements ase and application relations ar	2219/31415 . . .	Cost calculation in real time for a product manufactured
2219/31375 . . .	LAS link active scheduler, distribute bandwidth between processing nodes	2219/31416 . . .	Calculate effect of different actuators on optimal path sequence
2219/31376 . . .	MFL material flow	2219/31417 . . .	Calculate capacity by back propagating capacity, constraint from last to first module
2219/31377 . . .	From stored machine groups and relation machine workpiece, send workpiece to idle	2219/31418 . . .	NC program management, support, storage, distribution, version, update
2219/31378 . . .	Queue control	2219/31419 . . .	Select file from a list, directory
2219/31379 . . .	Master monitors controllers, updates production progress, allocates resources	2219/31421 . . .	File with parameters for station and identification of station
2219/31381 . . .	Matrix cluster, machines in cell according to parts, row is part, column is machines	2219/31422 . . .	Upload, download programs, parameters from, to station to, from server
2219/31382 . . .	Find shortest way, route	2219/31423 . . .	After cap, send resulting programs to different nc machines
2219/31383 . . .	Compare ratio of running work with optimum, decrease number of idle machines	2219/31424 . . .	Print label of finished part, with info, history, attach to part, docket
2219/31384 . . .	Produce construction sequence, make parts, store, assemble equipment, ship	2219/31425 . . .	Plan availability of operator for cell as function of time and operation calendar
2219/31385 . . .	Determine rate of MFL out of each process within each workstation	2219/31426 . . .	Real time database management for production control
2219/31386 . . .	Determine size of batch of material for each process to meet mfl rate	2219/31427 . . .	Production, CAPM computer aided production management
2219/31387 . . .	If resources, material, pieces under tolerance level, renew them until upper level	2219/31428 . . .	Production management for lot production and for individual components of lot

- 2219/31429 . . . Predict end of job execution, schedule new job beforehand
- 2219/31431 . . . Identify and classify excess raw material; reuse
- 2219/31432 . . . Keep track of conveyed workpiece, batch, tool, conditions of stations, cells
- 2219/31433 . . . Diagnostic unit per zone of manufacturing
- 2219/31434 . . . Zone supervisor, collects error signals from, and diagnoses different zone
- 2219/31435 . . . Paging support with display board, status monitoring and report compiling
- 2219/31436 . . . Host monitors plc, control processor without interrupting its program
- 2219/31437 . . . Monitoring, global and local alarms
- 2219/31438 . . . Priority, queue of alarms
- 2219/31439 . . . Alarms can be warning, alert or fault
- 2219/31441 . . . Simocode, overload protection, detection of trips, life time connected to fieldbus
- 2219/31442 . . . Detect if operation on object has been executed correctly in each station
- 2219/31443 . . . Keep track of nc program, recipe program
- 2219/31444 . . . Compare actual manufacturing sequence with simulated sequence, correct actual
- 2219/31445 . . . Detect changed working conditions, to correct machine load, balance
- 2219/31446 . . . Detect if workpiece, object present
- 2219/31447 . . . Process error event detection and continuous process image detection, storage
- 2219/31448 . . . Display at central computer, slave displays for each machine unit
- 2219/31449 . . . Monitor workflow, to optimize business, industrial processes
- 2219/31451 . . . Petrinet for monitoring process
- 2219/31452 . . . Send a warning message that an event has to be monitored before the event occurs
- 2219/31453 . . . Repeat sending warnings to operator until certain event is monitored
- 2219/31454 . . . Keep track of vehicles
- 2219/31455 . . . Monitor process status
- 2219/31456 . . . Product progress, taking into account products on vehicle
- 2219/31457 . . . Factory remote control, monitoring through internet
- 2219/31458 . . . Test workpiece during transport
- 2219/31459 . . . Library with metrology plan for different type of workpieces
- 2219/31461 . . . Use risk analysis to identify process parts that should be specially monitored
- 2219/31462 . . . Add time stamp to alarm message
- 2219/31463 . . . Status of whole system calculated from status of its components
- 2219/31464 . . . Select between different models corresponding to diff process control configurations
- 2219/31465 . . . Determine which variables of the system to be monitored
- 2219/31466 . . . Display position of different workpieces, tools in system
- 2219/31467 . . . Display of operating conditions of machines, workcells, selected programs
- 2219/31468 . . . Display jig, pallet number, status and clamp jig number
- 2219/31469 . . . Graphical display of process as function of detected alarm signals
- 2219/31471 . . . Operator can select a graphical screen at his will as help diagnostic
- 2219/31472 . . . Graphical display of process
- 2219/31473 . . . Fisheye view, sharp detailed view of main subject, rest much smaller, navigate
- 2219/31474 . . . Icon display for quick access of detailed information
- 2219/31475 . . . Zoom or pan display for flexible access to information
- 2219/31476 . . . Display of several transactions, sub-displays for other transactions
- 2219/31477 . . . Display correlated data so as to represent the degree of correlation
- 2219/31478 . . . Display all processes together or select only one
- 2219/31479 . . . Operator select part of process he wants to see, video image is displayed
- 2219/31481 . . . Safety monitoring system, redundant display, print systems for process data
- 2219/31482 . . . Verify working state of printers, displays, switch over if defect
- 2219/31483 . . . Verify monitored data if valid or not by comparing with reference value
- 2219/31484 . . . Operator confirms data if verified data is correct, otherwise amends data
- 2219/31485 . . . Verify and update all related data in relational database
- 2219/32 . . . Operator till task planning
- 2219/32001 . . . Computer assisted machining, signals guide operator to manual machine object
- 2219/32002 . . . Operator interface, manual control at cell, if host fails or priority
- 2219/32003 . . . Manual control at central control to control workcell, select pallet
- 2219/32004 . . . Graphical, textual instructions, sheet for operator to resume process
- 2219/32005 . . . Graphical, text operator instructions synchronous with product distribution
- 2219/32006 . . . Operator addresses machines to give commands or retrieve data
- 2219/32007 . . . Operator is assisted by expert system for advice and delegation of tasks
- 2219/32008 . . . Operator changes schedule, workload in allowed range by graphical interface
- 2219/32009 . . . Optimal task allocation between operator and machine
- 2219/32011 . . . Operator adapts manufacturing as function of sensed values
- 2219/32012 . . . Operator must signify his continued attendance at the workstation
- 2219/32013 . . . Operator marks processes, scheduler detects marks, releases control to operator
- 2219/32014 . . . Augmented reality assists operator in maintenance, repair, programming, assembly, use of head mounted display with 2-D 3-D display and voice feedback, voice and gesture command
- 2219/32015 . . . Optimize, process management, optimize production line
- 2219/32016 . . . Minimize setup time of machines
- 2219/32017 . . . Adapt real process as function of changing simulation model, changing for better results
- 2219/32018 . . . Adapt process as function of results of quality measuring until maximum quality

- 2219/32019 . . . Dynamic reconfiguration to maintain optimal design, fabrication, assembly
- 2219/32021 . . . Energy management, balance and limit power to tools
- 2219/32022 . . . Ordering, remote ordering, enter article and operations needed, create jobfile
- 2219/32023 . . . Print label, instructions for operator and job code for machining parameters
- 2219/32024 . . . Remote ordering, electronic selection article and fitting to form of client
- 2219/32025 . . . Automatic marking of article
- 2219/32026 . . . Order code follows article through all operations
- 2219/32027 . . . Order, plan, execute, confirm end order, if unfeasible execute exception operation
- 2219/32028 . . . Electronic catalog, to select material, resources, make lists with prices
- 2219/32029 . . . Enter also delivery location, transport means, kind of truck
- 2219/32031 . . . Use item and structure information
- 2219/32032 . . . Salesman creates order, system answers back with price, estimated date
- 2219/32033 . . . Send article design, needed material, packaging and shipping info to manufacturer
- 2219/32034 . . . Electronic market, network broker
- 2219/32035 . . . Compose, configure article and order
- 2219/32036 . . . Enter data, values for custom made articles
- 2219/32037 . . . Order picking
- 2219/32038 . . . Client can develop programs, parts on remote server located by manufacturer
- 2219/32039 . . . Send also testing program
- 2219/32041 . . . Combine orders from different customers
- 2219/32042 . . . Halting, initiating or resuming production of a product on order
- 2219/32043 . . . Program, information flow
- 2219/32044 . . . Shift workpiece and agv, carriage data in memory on advance to next station
- 2219/32045 . . . Each machine knows sequence of pallets, each pallet knows sequence of operations
- 2219/32046 . . . On detection workpiece code load program for workpiece from central
- 2219/32047 . . . Workcell end instruction selects next workpiece with related program
- 2219/32048 . . . Wait state between two successive machining steps
- 2219/32049 . . . Store program data, manufacturing history on workpiece, shifts to next
- 2219/32051 . . . Central control, modify program slave computers as function of production demand from host
- 2219/32052 . . . Lookup table, identify job to be executed by master or slave
- 2219/32053 . . . Adjust work parameter as function of other cell
- 2219/32054 . . . Send request for object carry out to other cell
- 2219/32055 . . . Identify workpiece, read status centrally, machine, adapt status centrally
- 2219/32056 . . . Balance load of workstations by grouping tasks
- 2219/32057 . . . Control cell as function of correlation between stored and detected machine state
- 2219/32058 . . . Execute program as function of deviation from predicted state, result
- 2219/32059 . . . Send code, data for workpiece to each workstation to be used, update data
- 2219/32061 . . . Central controls modules grouped according to function
- 2219/32062 . . . Set machines to new lot work, send them operation schedule, nc and handling data
- 2219/32063 . . . Adapt speed of tool as function of deviation from target rate of workpieces
- 2219/32064 . . . Production change over
- 2219/32065 . . . Synchronise set points of processes
- 2219/32066 . . . Central stores operation code in id and in concerned station
- 2219/32067 . . . Change combinations of operation codes in station, id for flexibility
- 2219/32068 . . . Execution at station only permitted if operation code of station and id equal
- 2219/32069 . . . Use of multiple id to prepare program for station before pallet in station
- 2219/32071 . . . Adaptive fuzzy controller, tunes itself as function of machine parameter variation
- 2219/32072 . . . Distributed fuzzy controllers
- 2219/32073 . . . If inspection needed, stop machining, execute separate inspection program
- 2219/32074 . . . History of operation of each machine
- 2219/32075 . . . Predict workpiece measurements from measurements of previous workpieces
- 2219/32076 . . . Adjust feedback from previous processes as function of elapsed time
- 2219/32077 . . . Batch control system
- 2219/32078 . . . Calculate process end time, form batch of workpieces and transport to process
- 2219/32079 . . . Use of common resources
- 2219/32081 . . . Sub batch, machine, assemble only part of the whole batch
- 2219/32082 . . . Planing, material requiring planning MRP, request
- 2219/32083 . . . Alternative, variant operation planning, revision specification of product
- 2219/32084 . . . Planning of configuration of product, based on components
- 2219/32085 . . . Layout of factory, facility, cell, production system planning
- 2219/32086 . . . Integrate process planning and job shop scheduling
- 2219/32087 . . . Decentral planning, each plant involved takes part of global
- 2219/32088 . . . Master production planning, highest level
- 2219/32089 . . . Action and material and technology combined to manufacture product
- 2219/32091 . . . Algorithm, genetic algorithm, evolution strategy
- 2219/32092 . . . Heuristic algorithm, accept feasible solution and attempt to improve it
- 2219/32093 . . . Search, adaptive, after each iteration some search directions are forbidden
- 2219/32094 . . . Dedicated language for batch processing, enter number of workpieces
- 2219/32095 . . . Text, menu driven editor for batch programming, phase sequence, parameters
- 2219/32096 . . . Batch, recipe configuration for flexible batch control
- 2219/32097 . . . Recipe programming for flexible batch
- 2219/32098 . . . Batch programming using oop
- 2219/32099 . . . CAPP computer aided machining and process planning

- 2219/32101 . . . CASE based process planning, using older, known case
- 2219/32102 . . . Select machine type
- 2219/32103 . . . Select size of tool
- 2219/32104 . . . Data extraction from geometric models for process planning
- 2219/32105 . . . Calculate machining axis, best feasible orientation for machining
- 2219/32106 . . . Calculate machining volumes for turning operations
- 2219/32107 . . . Operative process planning
- 2219/32108 . . . From order, production time divide into special and normal operations
- 2219/32109 . . . Divide process into machining methods
- 2219/32111 . . . PPS production planning system
- 2219/32112 . . . PPS and MS Office integrated
- 2219/32113 . . . Machine load and characteristic curves
- 2219/32114 . . . Part type selection, for simultaneous processing
- 2219/32115 . . . Machine grouping, each machine in each group performs same operations
- 2219/32116 . . . Production ratio, proportion in which selected part types will be produced
- 2219/32117 . . . Resource allocation, of number of pallets, fixtures of each type to part type
- 2219/32118 . . . Loading, allocates operations and tools to selected part type
- 2219/32119 . . . Order handling and manufacturing module and offline monitoring
- 2219/32121 . . . Read identification of pallet, conveyor and enter data for manufacturing
- 2219/32122 . . . Documentation of programmable electronic system
- 2219/32123 . . . Use of ms windows for automation, connected to mms manufacturing message system
- 2219/32124 . . . Program hybrid system, part sequence, part continuous
- 2219/32125 . . . Maple manufacturing application programming environment
- 2219/32126 . . . Hyperlink, access to program modules and to hardware modules in www, web server, browser
- 2219/32127 . . . Read identification of part and generate automatically manufacturing conditions
- 2219/32128 . . . Gui graphical user interface
- 2219/32129 . . . Select program for specified machine from library, file server
- 2219/32131 . . . Use job graph
- 2219/32132 . . . SFC shop floor control, to develop and build control system for factory
- 2219/32133 . . . Commands from program of other controller cause recompilation of local program
- 2219/32134 . . . Dynamic generation of web pages from program code
- 2219/32135 . . . APC advanced process control applications
- 2219/32136 . . . Web service oriented architecture for manufacturing and automation
- 2219/32137 . . . Configure, connect, combine different program modules
- 2219/32138 . . . Select hardware, devices at workstation, needed for, to be used at cell, node
- 2219/32139 . . . Select at workstation control parameters for cell, node
- 2219/32141 . . . Define type of I-O, analog, digital, pulse
- 2219/32142 . . . Define device, module description using xml format file
- 2219/32143 . . . Use css style sheets as control parameters
- 2219/32144 . . . Define device description using dd files
- 2219/32145 . . . Manual, enter identification, name workpiece and teach manufacturing data
- 2219/32146 . . . Display parts, manufacturing conditions to enter conditions for selected part
- 2219/32147 . . . Edit taught data to change operation parameters of workstations
- 2219/32148 . . . Enter correction data at a station, also transmitted to all downstream stations
- 2219/32149 . . . Display working condition data, real measured data and tolerance
- 2219/32151 . . . Prepare teach data by selecting data from two tables as function of type of work
- 2219/32152 . . . Inhibit further editing of entered parameters
- 2219/32153 . . . Exchange data between user, cad, caq, nc, capp
- 2219/32154 . . . Object, attribute for geometry, technology, function oop
- 2219/32155 . . . Editor and library for objects
- 2219/32156 . . . Each defined object has corresponding set of geometrical macros
- 2219/32157 . . . Create a new object by combining existing objects
- 2219/32158 . . . Object groups, for object replication, naming, messaging and retrieving
- 2219/32159 . . . Each hardware unit together with its software forms one object
- 2219/32161 . . . Object oriented control, programming
- 2219/32162 . . . Tasks or control icons are linked to form a job
- 2219/32163 . . . Indicate synchronisation tags on icons of tasks
- 2219/32164 . . . Petrinet and procedural language combined
- 2219/32165 . . . Petrinet
- 2219/32166 . . . Convert petrinet to sequence program for cell and to control program for machine
- 2219/32167 . . . Convert petrinet to ladder diagram
- 2219/32168 . . . Generation and analysis of synthesis rules for petrinet
- 2219/32169 . . . Stochastic pn, spn
- 2219/32171 . . . Transform, convert operator goals and information into petri nets
- 2219/32172 . . . Control petri net together with modeling petri net, cascaded
- 2219/32173 . . . Table, memory table with identification code for all parts to be used
- 2219/32174 . . . Memory table parts classification and working, manufacturing conditions
- 2219/32175 . . . Table with correlation between part codes and part classification
- 2219/32176 . . . Correspondance between manufacturing part list and design part list
- 2219/32177 . . . Computer assisted quality surveyance, caq
- 2219/32178 . . . Normal and correction transferline, transfer workpiece if fault
- 2219/32179 . . . Quality control, monitor production tool with multiple sensors
- 2219/32181 . . . Monitor production, assembly apparatus with multiple sensors
- 2219/32182 . . . If state of tool, product deviates from standard, adjust system, feedback
- 2219/32183 . . . Test cell

- 2219/32184 . . . Compare time, quality, state of operators with threshold value
- 2219/32185 . . . Calculate entropy, disorder
- 2219/32186 . . . Teaching inspection data, pictures and criteria and apply them for inspection
- 2219/32187 . . . Correlation between controlling parameters for influence on quality parameters
- 2219/32188 . . . Teaching relation between controlling parameters and quality parameters
- 2219/32189 . . . Compare between original solid model and measured manufactured object
- 2219/32191 . . . Real time statistical process monitoring
- 2219/32192 . . . After inspection create correction table with position, correction data
- 2219/32193 . . . Ann, neural base quality management
- 2219/32194 . . . Quality prediction
- 2219/32195 . . . Feedforward quality control
- 2219/32196 . . . Store audit, history of inspection, control and workpiece data into database
- 2219/32197 . . . Inspection at different locations, stages of manufacturing
- 2219/32198 . . . Feedforward inspection data for calibration, manufacturing next stage
- 2219/32199 . . . If number of errors grow, augment sampling rate for testing
- 2219/32201 . . . Build statistical model of past normal proces, compare with actual process
- 2219/32202 . . . Integration and cooperation between processes
- 2219/32203 . . . Effect of material constituents, components on product manufactured
- 2219/32204 . . . Performance assurance; assure certain level of non-defective products
- 2219/32205 . . . Use model error adapted to type of workpiece
- 2219/32206 . . . Selection from a lot of workpieces to be inspected
- 2219/32207 . . . Action upon failure value, send warning, caution message to terminal
- 2219/32208 . . . Rearrange production line
- 2219/32209 . . . Stop production line
- 2219/32211 . . . Outputs new workorders to operators
- 2219/32212 . . . If parameter out of tolerance reject product
- 2219/32213 . . . If parameter out of tolerance during limited time, accept product on condition
- 2219/32214 . . . Display on screen what fault and which tool and what order to repair fault
- 2219/32215 . . . If detected shape not correct, simulate new machine, tool and adapt path
- 2219/32216 . . . If machining not optimized, simulate new parameters and correct machining
- 2219/32217 . . . Finish defect surfaces on workpiece
- 2219/32218 . . . Sort workpieces as function of quality data
- 2219/32219 . . . Slow down production after failure
- 2219/32221 . . . Correlation between defect and measured parameters to find origin of defect
- 2219/32222 . . . Fault, defect detection of origin of fault, defect of product
- 2219/32223 . . . Fixture failure diagnosis, measure assembly, derive influence of fixture on error
- 2219/32224 . . . Identify parameters with highest probability of failure
- 2219/32225 . . . Randomize workpiece treatment order within lot to improve lot-to-lot comparisons
- 2219/32226 . . . Computer assisted repair, maintenance of system components
- 2219/32227 . . . On error detected by zone supervisor, maintenance of particular zone
- 2219/32228 . . . Repair, rework of manufactured article
- 2219/32229 . . . Repair fault product by replacing fault parts
- 2219/32231 . . . Inspection and correction, repair station in one unit, correction data in memory
- 2219/32232 . . . Inspection and correction, repair station are separate, transmit correction data
- 2219/32233 . . . Scheduling repair
- 2219/32234 . . . Maintenance planning
- 2219/32235 . . . Sharing of data between process control and maintenance management computers
- 2219/32236 . . . Automatic order of parts needed for maintenance schedule
- 2219/32237 . . . Repair and rework of defect, out of tolerance parts, reschedule
- 2219/32238 . . . Scheduler triggers generation of nc program for actual selected machine
- 2219/32239 . . . Avoid deadlock, lockup
- 2219/32241 . . . Resource editor
- 2219/32242 . . . Reschedule without propagation of interruptions to other cells
- 2219/32243 . . . Rerouting parts
- 2219/32244 . . . By using graphical display of array and selecting elements, rearrange them
- 2219/32245 . . . Reentrant scheduling, workpiece can return to same machine
- 2219/32246 . . . Virtual reality based interface scheduler
- 2219/32247 . . . Real time scheduler
- 2219/32248 . . . Create schedule from elementary operations from database
- 2219/32249 . . . Repair, rework of defect, out of tolerance part in next station by reconfiguring it
- 2219/32251 . . . Normal and special order production lines for different types of workpiece
- 2219/32252 . . . Scheduling production, machining, job shop
- 2219/32253 . . . As a function of, change of machine operation
- 2219/32254 . . . Work sequence, alternative sequence
- 2219/32255 . . . Required time for work temperature control
- 2219/32256 . . . Due dates, pieces must be ready, priority of dates, deadline
- 2219/32257 . . . Tool replacement minimization
- 2219/32258 . . . Resource, machine assignment preferences, actual and anticipated load
- 2219/32259 . . . Flexibility, polyvalent machine, large buffers, permutation operations, alternative
- 2219/32261 . . . Rearrange production line as function of operator rating
- 2219/32262 . . . Work manhours, number of operators and work place
- 2219/32263 . . . Afo products, their components to be manufactured, lot selective
- 2219/32264 . . . Setup time
- 2219/32265 . . . Waiting, queue time, buffer
- 2219/32266 . . . Priority orders
- 2219/32267 . . . Dynamic throughput maximization
- 2219/32268 . . . Available parts, available materials
- 2219/32269 . . . Decision, of job release, select job to be launched next in shop
- 2219/32271 . . . Decision of job dispatching, select job to process next on each machine

- 2219/32272 . . . Decision of next visiting machine selection, where job is to go
- 2219/32273 . . . Decision of job pulling, select job to put in input buffer of next machine if conflicts
- 2219/32274 . . . Event is triggered when first unit of first lot enters or last unit leaves processing
- 2219/32275 . . . Job, recipe cascading: no delay, next job is started immediately when first is finished
- 2219/32276 . . . For tool feeding schedule
- 2219/32277 . . . Agy schedule integrated into cell schedule
- 2219/32278 . . . Schedule of overhead material handlers, robot gantry
- 2219/32279 . . . Operator scheduling for load, unload, walk and wait in a cell with plural machines
- 2219/32281 . . . Single machine scheduling, one machine, several jobs
- 2219/32282 . . . For a quick and slow production line
- 2219/32283 . . . Machine scheduling, several machines, several jobs
- 2219/32284 . . . Job shop, two, more operations may not occupy same machine simultaneously
- 2219/32285 . . . Multi manipulator assembly cell
- 2219/32286 . . . Monitoring items connected to certain different entities, activities
- 2219/32287 . . . Medical, chemical, biological laboratory
- 2219/32288 . . . Create daily or weekly production matrix
- 2219/32289 . . . Determine number of components, start of their production, allocate processor
- 2219/32291 . . . Task sequence optimization
- 2219/32292 . . . Large, medium and fine schedule, with feedback from fine to large
- 2219/32293 . . . Minimize work in progress, system at maximum productivity
- 2219/32294 . . . Maximize throughput of cell
- 2219/32295 . . . Production start time from order and production specification, satisfaction degree
- 2219/32296 . . . If error search in a repair library, trained by operator, to correct schedule
- 2219/32297 . . . Adaptive scheduling, feedback of actual process progress to adapt schedule
- 2219/32298 . . . Designate at least two group of articles, first with priority, reschedule second
- 2219/32299 . . . Divide job shop into number of workcenters
- 2219/32301 . . . Simulate production, process stages, determine optimum scheduling rules
- 2219/32302 . . . Each pallet has working plan, information and machine selection data
- 2219/32303 . . . Convert program to fit rescheduled machine
- 2219/32304 . . . Minimize flow time, tact, shortest processing, machining time
- 2219/32305 . . . Fastest interrupt time, change jobs dynamically to fastest machine
- 2219/32306 . . . Rules to make scheduling decisions
- 2219/32307 . . . Last buffer first serve, lifo
- 2219/32308 . . . Shortest, narrowest non full queue
- 2219/32309 . . . Shortest remaining capacity
- 2219/32311 . . . Shortest queue next
- 2219/32312 . . . Largest imminent operation time
- 2219/32313 . . . Shortest remaining processing time
- 2219/32314 . . . Largest remaining processing time
- 2219/32315 . . . Machine with least work
- 2219/32316 . . . First buffer first serve, fifo
- 2219/32317 . . . Smallest ratio for imminent processing time divided by total processing time
- 2219/32318 . . . Smallest value of product of imminent processing time with total processing time
- 2219/32319 . . . Shortest imminent operation time, part of machining time
- 2219/32321 . . . Largest processing, machining time
- 2219/32322 . . . Machines with least frequency of errors
- 2219/32323 . . . Determine lot priority as function of sum of queue and processing time
- 2219/32324 . . . Quality data determines optimum machine sequence selection, queuing rules
- 2219/32325 . . . Object oriented scheduling, use machine, part, tool object and coordinator
- 2219/32326 . . . Local scheduler, each machine own scheduler, independent from defective machines
- 2219/32327 . . . Structure, fuzzy logic expert system scheduler
- 2219/32328 . . . Dynamic scheduling, resource allocation, multi agent negotiation
- 2219/32329 . . . Real time learning scheduler, uses ANN, fuzzy
- 2219/32331 . . . Network of coordinating planning systems for each cell, factory
- 2219/32332 . . . Expert scheduler
- 2219/32333 . . . Use of genetic algorithm
- 2219/32334 . . . Use of reinforcement learning, agent acts, receives reward
- 2219/32335 . . . Use of ann, neural network
- 2219/32336 . . . Normal, special order lines share some common machines, part of production line
- 2219/32337 . . . Simulation, statechart SC
- 2219/32338 . . . Use new conditions for model, check, calculate if model meets objectives
- 2219/32339 . . . Object oriented modeling, design, analysis, implementation, simulation language
- 2219/32341 . . . Grafcet model, graph based simulation
- 2219/32342 . . . Real time simulation
- 2219/32343 . . . Derive control behaviour, decisions from simulation, behaviour modelling
- 2219/32344 . . . Modular verification of real time systems
- 2219/32345 . . . Of interconnection of cells, subsystems, distributed simulation
- 2219/32346 . . . Using acd, activity cycle diagram
- 2219/32347 . . . Knowledge based simulation engine, use answers from user, database
- 2219/32348 . . . Process reengineering, rethink manufacturing process, continuous improve
- 2219/32349 . . . Simulate effect of stoppages of production facilities, operate as function of simulation
- 2219/32351 . . . Visual, graphical animation of process
- 2219/32352 . . . Modular modeling, decompose large system in smaller systems to simulate
- 2219/32353 . . . Use elementary control task, finite state machine and loop, inhibit, synchronisation connections
- 2219/32354 . . . Divide, analyse process into subprocesses, until elementary unit operations
- 2219/32355 . . . Simulate control process using virtual bus
- 2219/32356 . . . For diagnostics
- 2219/32357 . . . Simulation of material handling, flexible conveyor system fcs
- 2219/32358 . . . Strain, stress of manual work, operator strain
- 2219/32359 . . . Modeling, simulating assembly operations
- 2219/32361 . . . Master production scheduling

- 2219/32362 . . . Bulk manufacturing, handling dry or fluid products
- 2219/32363 . . . Batch job routing in operation overlapping
- 2219/32364 . . . Simulate batch processing
- 2219/32365 . . . For resource planning
- 2219/32366 . . . Line performance evaluation
- 2219/32367 . . . Parallel experimentation machines
- 2219/32368 . . . Quality control
- 2219/32369 . . . Cape-mode computer aided plant enterprise modeling environment for plant life cycle modelisation & management
- 2219/32371 . . . Predict failure time by analysing history fault logs of same machines in databases
- 2219/32372 . . . Petrinet, coloured, inhibitor arc, timed, object token Petrinet
- 2219/32373 . . . Timed petrinet, timed event graph
- 2219/32374 . . . Display of petrinet, graph editing
- 2219/32375 . . . Petrinet synthesis tool
- 2219/32376 . . . Coloured petrinet
- 2219/32377 . . . Cbnp controlled batches petrinet, model influence control part on physical part
- 2219/32378 . . . Fuzzy timed petrinet
- 2219/32379 . . . Object oriented petrinets
- 2219/32381 . . . Continuous petrinet, contrary of timed petrinet
- 2219/32382 . . . Hybrid petrinet, comprises continuous and timed petrinet
- 2219/32383 . . . Controlled speed continuous petrinet, considers delays in execution and transport time
- 2219/32384 . . . Fuzzy petrinet fpn
- 2219/32385 . . . What is simulated, manufacturing process and compare results with real process
- 2219/32386 . . . Arm accurate robot motion time model, needed in scheduling
- 2219/32387 . . . Effects of highspeed hardware operations on throughput, use scheduler
- 2219/32388 . . . Autonomous flexible system, cells and agv autonomous
- 2219/32389 . . . Reception, assembly, testing, management workorder, schedule, history, file, packing
- 2219/32391 . . . Machining center, pallet stocker, setup station, conveyor, control unit
- 2219/32392 . . . Warehouse and loading, unloading station and shop and machining centers and in out buffer
- 2219/32393 . . . Host and central distribution control between storage and cells
- 2219/32394 . . . Fractal manufacturing system with autonomous agents: observer, analyser, organiser, resolver, reporter
- 2219/32395 . . . Manufacturing structure is flow shop, mass production
- 2219/32396 . . . Job shop, batch production system
- 2219/32397 . . . Machining cells
- 2219/32398 . . . Operator controls setting, changing of setting, of different machines
- 2219/32399 . . . Select lan by switching bus connected to several lan
- 2219/32401 . . . Select displays by switching bus connected to several displays
- 2219/32402 . . . Select one lan to be connected to one display by central control
- 2219/32403 . . . Supervisory control, monitor and control system, by operator or automatic
- 2219/32404 . . . Scada supervisory control and data acquisition
- 2219/32405 . . . Hybrid supervisor control, des supervisor and diagnostic and alternate strategy route
- 2219/32406 . . . Distributed scada
- 2219/32407 . . . Real time processing of data
- 2219/32408 . . . Case based diagnosis to assist decision maker, operator
- 2219/32409 . . . Adaptive agent for diagnostic, helps operator to describe new cases
- 2219/32411 . . . Derive control data from displayed element, logic for it and feedback data
- 2219/32412 . . . One engineering, workstation can supervise several processes
- 2219/32413 . . . Pc generates control strategy, download in plc to monitor and react to events
- 2219/32414 . . . Workstation has two displays, for process control and for general applications
- 2219/32415 . . . Select tools in next workcell during transport workpiece
- 2219/32416 . . . Tool information for program to use and needed timing, adapt timing
- 2219/32417 . . . Minimize number of tools, only a specific machine can process certain operations
- 2219/32418 . . . Machine workload balance, same tools for pool of machines for same operations
- 2219/32419 . . . All tools available, each part can fully be processed on a single machine
- 2219/32421 . . . Tool management incorporated in kernel of nc control
- 2219/32422 . . . Tool management and database management
- 2219/32423 . . . Task planning
- 2219/32424 . . . Task flow editing
- 2219/33 . . . Director till display
- 2219/33001 . . . Director is the nc controller, computer
- 2219/33002 . . . Artificial intelligence AI, expert, knowledge, rule based system KBS
- 2219/33003 . . . Algorithm, hashing algorithm
- 2219/33004 . . . Manual control of manipulator, machine
- 2219/33005 . . . Manually but assisted by using sensors
- 2219/33006 . . . Ama allocation manual automatic work between machine, manipulator and man
- 2219/33007 . . . Automatically control, manually limited, operator can override control
- 2219/33008 . . . Operate manually only in defined, limited zone area
- 2219/33009 . . . ART adaptive resonance theory, place input patterns in clusters during learning
- 2219/33011 . . . Link between hidden and input layer is sigmoid, and between output is linear
- 2219/33012 . . . Kohonen network, single layer with neurodes, associated with codebook vector
- 2219/33013 . . . Higher order multilayer artificial neural network ANN, input terms has square, cubic terms of input, output
- 2219/33014 . . . BAM bidirectional associative memory artificial neural network
- 2219/33015 . . . Time delay artificial neural network
- 2219/33016 . . . Pi sigma network, summing in hidden layers, product in output layer
- 2219/33017 . . . Local linear nested network, coarse at root, split up and build tree
- 2219/33018 . . . Adaline network, n inputs with n weights, sum, one output
- 2219/33019 . . . Lapart, two art with lateral priming connection between output and vigilance nodes

- 2219/33021 . . . Connect plural macrocircuits, neural network modules in a larger network
- 2219/33022 . . . One network for learned signal values, one network for unknown signal values
- 2219/33023 . . . Ann with single, only one output
- 2219/33024 . . . RAM artificial neural network, several lookup tables addressed by input section, output summed
- 2219/33025 . . . Recurrent artificial neural network
- 2219/33026 . . . Wavelet artificial neural network, wavelet orthogonal decomposition for artificial neural network approximation
- 2219/33027 . . . Artificial neural network controller
- 2219/33028 . . . Function, rbf radial basis function network, gaussian network
- 2219/33029 . . . ANNS artificial neural network with sigmoid function
- 2219/33031 . . . Spline membership function
- 2219/33032 . . . Learn by changing input weights as function of position error
- 2219/33033 . . . Identification neural controller copies weight to system neural controller
- 2219/33034 . . . Online learning, training
- 2219/33035 . . . Slow learning combined with fast learning artificial neural network, two time scale ann
- 2219/33036 . . . Error back propagation
- 2219/33037 . . . Learn parameters of network offline, not while controlling system
- 2219/33038 . . . Real time online learning, training, dynamic network
- 2219/33039 . . . Learn for different measurement types, create for each a neural net
- 2219/33041 . . . Structure optimization and learning of artificial neural network by genetic algorithm
- 2219/33042 . . . Non linear filtering, recursive least squares
- 2219/33043 . . . Extended kalman filter
- 2219/33044 . . . Supervised learning with second artificial neural network
- 2219/33045 . . . Selforganizing network
- 2219/33046 . . . Forward propagation error
- 2219/33047 . . . Dynamic node creation, increase internal nodes if error too large
- 2219/33048 . . . By using kd tree data structure and delaunay linear interpolation, triangulation
- 2219/33049 . . . Cooperative coaching, each controller has own minimum, switch to lowest
- 2219/33051 . . . BBC behavior based control, stand alone module, cognitive, independent agent
- 2219/33052 . . . Subsumption architecture, behavioral modules in layers, override older ones
- 2219/33053 . . . Modular hardware, software, easy modification, expansion, generic, oop
- 2219/33054 . . . Control agent, an active logical entity that can control logical objects
- 2219/33055 . . . Holon, agent executes task and cooperates with other, distributed control
- 2219/33056 . . . Reinforcement learning, agent acts, receives reward, emotion, action selective
- 2219/33057 . . . If no module available to execute task, adapt module and execute task
- 2219/33058 . . . Low level element designed for reliability, not for speed, only small task
- 2219/33059 . . . High level competence, system action module sam, configuration and task modules
- 2219/33061 . . . Behaviour fusion, each layer can influence other by suppression or amplification
- 2219/33062 . . . Self repair
- 2219/33063 . . . Generic coordination, master agent to data manager agent to tasks to active agent
- 2219/33064 . . . Manufacturing planning and control agent and domain blackboards
- 2219/33065 . . . Ontogenetic learning, agent learns and adapt its own behaviour
- 2219/33066 . . . Phylogenetic learning, group agents learn and adapts their behaviour
- 2219/33067 . . . HCP help based cooperation protocol, when to ask or give help from or to agent
- 2219/33068 . . . CCP coordination cooperation protocol, make optimal decisions with other agents
- 2219/33069 . . . Immune algorithm, agent distinguishes self and foreign, lymphocyte, antibody agent
- 2219/33071 . . . Self sufficient, agent responsible for own energy, tools
- 2219/33072 . . . Two layer agent for execution of tasks and for communication, coordination
- 2219/33073 . . . Ion control agent has communication, database, suggestion, decision, action, detect
- 2219/33074 . . . Calculation loop, first one slow changing value, then several quick varying values
- 2219/33075 . . . Calculate only necessary, critical values, to speed up calculation
- 2219/33076 . . . Optimize time by parallel execution of independent blocks by two processors
- 2219/33077 . . . Calculation iterative, recursive
- 2219/33078 . . . Error table, interpolate between two stored values to correct error
- 2219/33079 . . . Table with functional, weighting coefficients, function
- 2219/33081 . . . Parallel computing, pipeline
- 2219/33082 . . . Data parallelism, one administrative process and many worker process
- 2219/33083 . . . Clock for microprocessor synchronized with pulses from encoder
- 2219/33084 . . . Clock for microprocessor synchronized with multiplexer
- 2219/33085 . . . Real time calendar clock
- 2219/33086 . . . Interrupt frequency as function of rating of servomotor or desired control frequency
- 2219/33087 . . . Two clock, clock for software counter and calender clock, synchronized
- 2219/33088 . . . Clock
- 2219/33089 . . . Two clock, one for sequence control, one for motion control, pulses
- 2219/33091 . . . Two clock, one for controller and one for calibration
- 2219/33092 . . . Using several selectable and settable dividers
- 2219/33093 . . . Real time clock interface between serial I-O and processor
- 2219/33094 . . . Send clock from pc board, via extension bus to PLL circuit on nc boards, to servo
- 2219/33095 . . . External clock delivers interrupts for real time execution of programs
- 2219/33096 . . . Use clock to control main spindle rotational speed
- 2219/33097 . . . Variable ticks, align clocks, to synchronise cycles with other machine, robot
- 2219/33098 . . . Several nc machines, dnc, cnc

- 2219/33099 . . . Computer numerical control [CNC]; Software control [SWC]
- 2219/33101 . . . Dnc, direct numerical control
- 2219/33102 . . . Dnc and cnc combined
- 2219/33103 . . . Object manager handles objects having own procedures, messages oop
- 2219/33104 . . . Tasks, functions are distributed over different cpu
- 2219/33105 . . . Identification of type of connected module, motor, panel
- 2219/33106 . . . Configure I-O by using logical and physical address
- 2219/33107 . . . Designate each actuator by a name and corresponding operations
- 2219/33108 . . . Exchange of type of controller is easy, before operation, adapt control to type
- 2219/33109 . . . Select out of plurality of alternative control parameters
- 2219/33111 . . . Graphic configuration control, connect pictures, objects to each other
- 2219/33112 . . . Configuration software for network
- 2219/33113 . . . Initialise each drive during start, load data to drive and image to controller
- 2219/33114 . . . Configure motion controller to drive any kind of motor type connected
- 2219/33115 . . . Group functions
- 2219/33116 . . . Configuration of motion control
- 2219/33117 . . . Define function by user programmable basic operations
- 2219/33118 . . . Identify bus, interface select automatic adaption for bus, interface
- 2219/33119 . . . Servo parameters in memory, configuration of control parameters
- 2219/33121 . . . Host loads program from attached module to control that module
- 2219/33122 . . . Adapt nc control to type of machine, read machine and measuring parameters
- 2219/33123 . . . Identify kind of transducer, encoder used
- 2219/33124 . . . Configuration of different kind of tool magazines, tool changers and buffers
- 2219/33125 . . . System configuration, reconfiguration, customization, automatic
- 2219/33126 . . . Identification of address connected module, processor
- 2219/33127 . . . Display each control parameter by name and its value
- 2219/33128 . . . Different spindles, axis controlled by configured paths, channel
- 2219/33129 . . . Group spindles, axis into motion groups, nc channel structure
- 2219/33131 . . . Synthesize programmable axis, to simulate a non existing, virtual axis
- 2219/33132 . . . Configured function disabled if concerned axis not referenced
- 2219/33133 . . . For each action define function for compensation, enter parameters
- 2219/33134 . . . Enter parameters for relationship between axis
- 2219/33135 . . . Data compression before sending data to allow control of more axis, spindles
- 2219/33136 . . . Com: communication, inter processor communication, either local or network
- 2219/33137 . . . Time left during polling used for other communication, priority for polling
- 2219/33138 . . . Control program and communication are totally separated
- 2219/33139 . . . Design of industrial communication system with expert system
- 2219/33141 . . . Communication system software module independent from medium, protocol, address
- 2219/33142 . . . Address switches on each controller, peripheral are set by operator
- 2219/33143 . . . Position of module in ring, loop determines address of module
- 2219/33144 . . . Module clock, synchronised by controller message, to send message in time slice
- 2219/33145 . . . Count clock pulses to determine address of node, module
- 2219/33146 . . . Each node occupies in address space a length equal to number of bits to be exchanged
- 2219/33147 . . . Address peripheral, controller
- 2219/33148 . . . CLS client server architecture, client consumes, server provides services
- 2219/33149 . . . Publisher subscriber, publisher, master broadcasts data to slaves, subscriber
- 2219/33151 . . . Distributed client server
- 2219/33152 . . . Server has organisation, tree data to access user data, client sends also both
- 2219/33153 . . . AR application relationship, cooperation through logical links
- 2219/33154 . . . Data exchange between processors of different axis of same or different cnc
- 2219/33155 . . . Communication between motor current controller and position controller
- 2219/33156 . . . Communication between two processors over shared, dualport ram
- 2219/33157 . . . Between processor and sensor, encoder
- 2219/33158 . . . Remote procedure call to each other
- 2219/33159 . . . Communication between acyclic and cyclic, loop programs
- 2219/33161 . . . Data exchange between controller and processors
- 2219/33162 . . . Two bus, high speed and low speed bus, linked or not
- 2219/33163 . . . Multichannel master bus
- 2219/33164 . . . Bus timing adjustment by buffer with controller
- 2219/33165 . . . Gpsc gppl general purpose serial channel, link
- 2219/33166 . . . Rs485 bus to control several modules, motors
- 2219/33167 . . . Bus arbitration, switch computer to different memory
- 2219/33168 . . . Two bus, master bus and local servo bus
- 2219/33169 . . . Name of bus, vme-bus
- 2219/33171 . . . Stdbus
- 2219/33172 . . . Multibus
- 2219/33173 . . . Bitbus
- 2219/33174 . . . Sds smart distributed system, honeywell
- 2219/33175 . . . Isa bus
- 2219/33176 . . . Rs485, mpi multipoint, multidrop interface
- 2219/33177 . . . Interface, scsi, parallel
- 2219/33178 . . . Centronics
- 2219/33179 . . . Pcmcia
- 2219/33181 . . . Isdn
- 2219/33182 . . . Uart, serial datatransmission, modem
- 2219/33183 . . . IEEE-488, hp interface, instrumentation
- 2219/33184 . . . Rs232c to rs485 converter
- 2219/33185 . . . Rs232c switch box, break out box, to connect different devices

- 2219/33186 . . . Circuit for signal adaption, voltage level shift, filter noise
- 2219/33187 . . . Serial transmission rs232c, rs422, rs485 communication link
- 2219/33188 . . . Twisted pair
- 2219/33189 . . . Optical, glass fiber
- 2219/33191 . . . Data exchange combined with inductively coupled power supply
- 2219/33192 . . . Radio link, wireless
- 2219/33193 . . . Inductive transmission of measured values
- 2219/33194 . . . Data and power supplied over optical fiber
- 2219/33195 . . . Wave guide, also used as rails for movable station
- 2219/33196 . . . Data and power each on a different line to all peripheral, bus
- 2219/33197 . . . Current loop 4-20-mA milliampere
- 2219/33198 . . . Laser, light link, infrared
- 2219/33199 . . . Transponder
- 2219/33201 . . . Twisted pair combined with optical fiber for critical emc zones
- 2219/33202 . . . Single serial line, virtual second line is earth
- 2219/33203 . . . Wireless transmission of power and data, inductively, rotary transformer
- 2219/33204 . . . Optocoupler, galvanic separation, isolation
- 2219/33205 . . . Coax or optical fiber or twisted pair
- 2219/33206 . . . Ultrasonic
- 2219/33207 . . . Physical means, radio, infra red, ultrasonic, inductive link
- 2219/33208 . . . Superposition of control signals on supply lines
- 2219/33209 . . . Protocol, mailbox, email, mail system
- 2219/33211 . . . Polling
- 2219/33212 . . . Processor for communication with, evaluation of signals form detector to pc
- 2219/33213 . . . Communication cpu to synchronize axis between different machines
- 2219/33214 . . . Bus between different axis controllers and cpu
- 2219/33215 . . . Synchronization pulses on bus for axis controllers
- 2219/33216 . . . Operational, real time for system, and service for configuration is non real time
- 2219/33217 . . . Continuity communication controlled by client
- 2219/33218 . . . Motor encoders, resolvers on common bus with drives, servo controllers
- 2219/33219 . . . Drives, servo units, main control on internal net, lan, ethernet, tcp-ip, wireless
- 2219/33221 . . . Drives, servo units, sensors, motors, on local network, ethernet, tcp-ip, wireless
- 2219/33222 . . . High speed serial link combined with medium speed serial link
- 2219/33223 . . . Serial ring, loop pam programmable axis manager
- 2219/33224 . . . Several serial channels, each provided with d-a to terminals of servomotor
- 2219/33225 . . . Interface nc machine to data server
- 2219/33226 . . . Daisy chain
- 2219/33227 . . . Safety, echo back to verify correctness message
- 2219/33228 . . . Detection of line failure, breakage of transmission, failure of receiver
- 2219/33229 . . . Differential amplifier, xor to cancel noise, balanced rs422
- 2219/33231 . . . Decoupling, to avoid noise, crosstalk between wires of bus
- 2219/33232 . . . Detect, respond to lost message
- 2219/33233 . . . If servo data corrupt, use previous value, no repeat
- 2219/33234 . . . Detect bad data transfer
- 2219/33235 . . . Redundant communication channels, processors and signal processing hardware
- 2219/33236 . . . Add check data to message to check faulty communication
- 2219/33237 . . . Detect short circuit of bus
- 2219/33238 . . . Switch from differential to single line communication if short between two wires
- 2219/33239 . . . Switch off, stop, halt transmission on detection of fault
- 2219/33241 . . . Compare results from two masters on two busses, if not equal shut down machines
- 2219/33242 . . . Watchdog for datacommunication, on error switch off supply to bus modules
- 2219/33243 . . . Detect quality of received data, message
- 2219/33244 . . . Packet information exchange
- 2219/33245 . . . Autosend, send information from cad station automatically to peripheral
- 2219/33246 . . . Timing of transmission data to peripheral
- 2219/33247 . . . Synchronize transfer, take over, change of parameters and reference values
- 2219/33248 . . . Time window for each controller or controlled function
- 2219/33249 . . . Compress, pack data before transmission
- 2219/33251 . . . Schedule periodic and aperiodic traffic, real time, time critical
- 2219/33252 . . . Real time synchronous transmission, model
- 2219/33253 . . . Correction data transmission errors, protection against noise, twisted pair
- 2219/33254 . . . Serial position feedback, serial to parallel conversion and reverse
- 2219/33255 . . . Transfer of data parallel
- 2219/33256 . . . Resolver to digital conversion
- 2219/33257 . . . Conversion of designed 3-D tolerance, allowance to real coordinates of machine heads, spindles
- 2219/33258 . . . Common coordinate conversion for multiple heads, spindles
- 2219/33259 . . . Conversion of measuring robot coordinates to workpiece coordinates
- 2219/33261 . . . Conversion of detected pulses to voltage, frequency to voltage convertor
- 2219/33262 . . . Current to voltage conversion
- 2219/33263 . . . Conversion, transformation of coordinates, cartesian or polar
- 2219/33264 . . . Conversion of angle between links to linear displacement of actuator
- 2219/33265 . . . Conversion of voltage, resistance to pulses
- 2219/33266 . . . Pulse to frequency conversion, frequency to pulse
- 2219/33267 . . . Pneumatic, air to hydraulic conversion
- 2219/33268 . . . D-A, A-D
- 2219/33269 . . . Convert cartesian to machine coordinates
- 2219/33271 . . . Convert workpiece to machine coordinates
- 2219/33272 . . . Conversion, transformation of data before and after interpolator
- 2219/33273 . . . DCS distributed, decentralised controlsystem, multiprocessor
- 2219/33274 . . . Integrated communication and control, transmission delay, sampling rate effect
- 2219/33275 . . . Distributed, decision made by negotiation among executive components, execute it

- 2219/33276 . . . Decentralized, each component makes own decision, executes only own decision
- 2219/33277 . . . Distributed system with host as leader, host with multiple of agents
- 2219/33278 . . . Cooperation between autonomous modules by receipts, messages, no synchronisation
- 2219/33279 . . . Expansion by using secondary access to each module, extension module
- 2219/33281 . . . Architecture, nodes for communication and measuring on serial bus
- 2219/33282 . . . Node with communication, transducer, common core, application specific modules
- 2219/33283 . . . Customized nodes for desired functionality
- 2219/33284 . . . Remote diagnostic
- 2219/33285 . . . Diagnostic
- 2219/33286 . . . Test, simulation analyser
- 2219/33287 . . . Program panel to program, enter data for diagnostic
- 2219/33288 . . . Switch, select between normal and diagnostic control program
- 2219/33289 . . . During diagnostic of servocontroller, motor is isolated
- 2219/33291 . . . Logic analyser function of cnc
- 2219/33292 . . . Storage oscilloscope function of cnc to diagnose servo drive, axis oscilloscope
- 2219/33293 . . . For each actuated axis, set a bit in a word in memory, state of axis in word
- 2219/33294 . . . Nc in case of propagation error, search previous module, origin of error
- 2219/33295 . . . Fuzzy expert system for diagnostic, monitoring
- 2219/33296 . . . ANN for diagnostic, monitoring
- 2219/33297 . . . Diagnostic, test, debug
- 2219/33298 . . . Remote videoconferencing
- 2219/33299 . . . Real time, online diagnostic, integrated in normal control system
- 2219/33301 . . . Simulation during machining
- 2219/33302 . . . Different sets of monitoring parameters for each operation mode
- 2219/33303 . . . Expert system for diagnostic, monitoring use of tree and probability
- 2219/33304 . . . Display of diagnostic
- 2219/33305 . . . Display of relevant errors together with time mark
- 2219/33306 . . . Configuration file to set how data will be displayed
- 2219/33307 . . . On error, failure, fault automatically search and dial maintenance person
- 2219/33308 . . . If error message not clear, search help by index of message vocabulary
- 2219/33309 . . . Error recovery, automated error recovery
- 2219/33311 . . . System code for error recovery
- 2219/33312 . . . Operator selects action, system stores state, zero based error state
- 2219/33313 . . . Frames, database with environment and action, relate error to correction action
- 2219/33314 . . . Failure reason analysis, simple strategy or multiple outcome analysis
- 2219/33315 . . . Failure detection and reconfiguration
- 2219/33316 . . . On the fly software replacement on error
- 2219/33317 . . . Alternative strategy driver revises control behaviour
- 2219/33318 . . . Knowledge acquisition
- 2219/33319 . . . Interference justification network
- 2219/33321 . . . Observation learning
- 2219/33322 . . . Failure driven learning
- 2219/33323 . . . Self diagnostic of boards, own test program
- 2219/33324 . . . What to diagnose, whole system, test, simulate
- 2219/33325 . . . Diagnostic of only machining, operation
- 2219/33326 . . . Analyzer, diagnostic for servovalve
- 2219/33327 . . . Self diagnostic of control system, servo system
- 2219/33328 . . . Diagnostic for bus system of computer
- 2219/33329 . . . Measuring system, encoder
- 2219/33331 . . . Test, diagnostic of field device for correct device, correct parameters
- 2219/33332 . . . Each processor can execute all programs
- 2219/33333 . . . Network multiprocessing
- 2219/33334 . . . Load balancing, distribution between processors
- 2219/33335 . . . Microprocessor for max 3-D control otherwise host takes over for more axis
- 2219/33336 . . . first dsp calculates commands for each motor, second dsp regulates position
- 2219/33337 . . . For each axis a processor, microprocessor
- 2219/33338 . . . DNC distributed, decentralised nc, concurrent, multiprocessing
- 2219/33339 . . . Controller with lowest operation rate is selected as master
- 2219/33341 . . . Peer to peer, change master if overloaded
- 2219/33342 . . . Master slave, supervisor, front end and slave processor, hierarchical structure
- 2219/33343 . . . Each slave stores communication program to be used by master, exchangeability
- 2219/33344 . . . Each slave has several processors operating in parallel
- 2219/33345 . . . Several master modules, connection modules and slave modules
- 2219/33346 . . . Only memory of master module stores all position programs of slaves
- 2219/33347 . . . Master sends servo address, speed, kind of interpolation to slave
- 2219/33348 . . . Processor adapts signals to connected display
- 2219/34 . . . Director, elements to supervisory
- 2219/34001 . . . PLL phase locked loop
- 2219/34002 . . . Analog multiplexer
- 2219/34003 . . . Tri state driver
- 2219/34004 . . . Shift register
- 2219/34005 . . . Motion control chip, contains digital filter as control compensator
- 2219/34006 . . . Fifo
- 2219/34007 . . . Neuromine, input pulse train, can be inhibited or excited, output TTL, neuron
- 2219/34008 . . . Asic application specific integrated circuit, single chip microcontroller
- 2219/34009 . . . Coprocessor
- 2219/34011 . . . MMU
- 2219/34012 . . . Smart, intelligent I-O coprocessor, programmable sensor interface
- 2219/34013 . . . Servocontroller
- 2219/34014 . . . Sample hold circuit
- 2219/34015 . . . Axis controller
- 2219/34016 . . . Pulse processor
- 2219/34017 . . . Vector processor
- 2219/34018 . . . Forth controller
- 2219/34019 . . . Array of processors, parallel computing
- 2219/34021 . . . Dssp digital sensor signal processor

2219/34022 . . . Dcasp digital controlled analog signal processor	2219/34083 . . . Interpolation general
2219/34023 . . . Risc processor	2219/34084 . . . Software interpolator using microprocessor
2219/34024 . . . Fpga fieldprogrammable gate arrays	2219/34085 . . . Software interpolator
2219/34025 . . . Polynomial analysis	2219/34086 . . . At fixed periods pulses from table drive plural axis in unison
2219/34026 . . . Pga programmable gate array	2219/34087 . . . Enter at fixed periods distances in counter for each axis, pulse distribution
2219/34027 . . . Dual servo controller, for two motors	2219/34088 . . . Chamfer, corner shape calculation
2219/34028 . . . Hold relay	2219/34089 . . . Parametric, polynomial representation of path per axis as function of time
2219/34029 . . . Pam programmable axis controller, to control large number of axis	2219/34091 . . . Interpolate backwards
2219/34031 . . . Synchronous detector	2219/34092 . . . Polar interpolation
2219/34032 . . . Asic and microcontroller cooperate	2219/34093 . . . Real time toolpath generation, no need for large memory to store values
2219/34033 . . . Control processor and signal processor cooperate	2219/34094 . . . Library with different kind of interpolation curves
2219/34034 . . . Multiplier, prm, brm	2219/34095 . . . Look ahead segment calculation
2219/34035 . . . Time relay	2219/34096 . . . Approximate, replace curve, surface with circle, linear segments, least error
2219/34036 . . . Saturable reactor	2219/34097 . . . Calculate movement from part program offline, calculate axis references online
2219/34037 . . . Brm followed by postprocessor to smooth curve	2219/34098 . . . Slope fitting, fairing contour, curve fitting, transition
2219/34038 . . . Web, http, ftp, internet, intranet server	2219/34099 . . . Extrapolation
2219/34039 . . . Access central database through internet	2219/34101 . . . Data compression, look ahead segment calculation, max segment length
2219/34041 . . . Dda	2219/34102 . . . OCI on line interpolation
2219/34042 . . . Filter	2219/34103 . . . Taking planar slices from a 3-D shape
2219/34043 . . . Delay line	2219/34104 . . . Postprocessor coarse fine
2219/34044 . . . Mathematical coprocessor - processor	2219/34105 . . . Area pocket machining, space filling curve, to cover whole surface
2219/34045 . . . Timer	2219/34106 . . . Using spiral collapsed boundary, contour parallel machining
2219/34046 . . . Analog multiplier	2219/34107 . . . Zigzag workpiece parallel sweeps, direction parallel machining
2219/34047 . . . Dsp digital signal processor	2219/34108 . . . Using zigzag isoparametric parallel sweeps
2219/34048 . . . Fourier transformation, analysis, fft	2219/34109 . . . Using spiral scaled boundary
2219/34049 . . . Adder	2219/34111 . . . Using hilbert curves, fractals, only visible points of patches taken
2219/34051 . . . Bcd	2219/34112 . . . TSP traveling sales problem, SOM self organizing map for tool path
2219/34052 . . . Software counter	2219/34113 . . . Determine centerline, medial axis and branches in shape
2219/34053 . . . Counters, tellers	2219/34114 . . . Construct concentric polygons
2219/34054 . . . Half serial half parallel	2219/34115 . . . Area, pocket machining for area with partially open boundary
2219/34055 . . . Correction 3-excesscode	2219/34116 . . . Machine workpiece along, parallel to smallest side, dimension
2219/34056 . . . Nine complement	2219/34117 . . . Machine workpiece along, parallel to largest dimension
2219/34057 . . . Complement	2219/34118 . . . Using a pseudo-random or random tool path
2219/34058 . . . Up-down	2219/34119 . . . Function generator, filter after interpolator to control position error
2219/34059 . . . Preset counter	2219/34121 . . . Edge generator
2219/34061 . . . One counter per axis to unload cpu	2219/34122 . . . Function, profile generator
2219/34062 . . . Comparator	2219/34123 . . . Sine cosine generator
2219/34063 . . . Bcd	2219/34124 . . . Cordic processing
2219/34064 . . . N+1 comparator	2219/34125 . . . Sum squares
2219/34065 . . . Fuzzy logic, controller	2219/34126 . . . Overloop of counted axis pulses to servo
2219/34066 . . . Fuzzy neural, neuro fuzzy network	2219/34127 . . . Brm followed by postprocessor to smooth curve
2219/34067 . . . Multilayer fuzzy controller, execution and supervisor layer	2219/34128 . . . General surface replaced by sphere, cylinder, toroid, calculate quickly
2219/34068 . . . Fuzzy neural petri controller	
2219/34069 . . . Shared memory	
2219/34071 . . . Content addressable memory	
2219/34072 . . . Non volatile memory, core memory	
2219/34073 . . . Backup battery	
2219/34074 . . . Associative memory	
2219/34075 . . . Cognitive memory	
2219/34076 . . . Shared, common or dual port memory, ram	
2219/34077 . . . Fuzzy, rules are function of material, tool used	
2219/34078 . . . Membership functions as parameters for shape pattern	
2219/34079 . . . Extract only rules needed to obtain result	
2219/34081 . . . Fuzzy art map neural network, one art for input map, lookup table, other for output	
2219/34082 . . . Learning, online reinforcement learning	

- 2219/34129 . . . Approximation for calculation
- 2219/34131 . . . Split in approximation and accurate calculation
- 2219/34132 . . . Choosing largest, major coordinate axis
- 2219/34133 . . . Choosing slowest axis
- 2219/34134 . . . Choose optimal coordinate system
- 2219/34135 . . . Spline
- 2219/34136 . . . Ellipse, hyperbola
- 2219/34137 . . . Helicoidal
- 2219/34138 . . . Cubic interpolation
- 2219/34139 . . . Parabolic interpolation
- 2219/34141 . . . B-spline, NURBS non uniform rational b-spline
- 2219/34142 . . . Polynomial
- 2219/34143 . . . Approximate corner by polynomial
- 2219/34144 . . . Involute, evolute
- 2219/34145 . . . Bezier interpolation, spline
- 2219/34146 . . . Helical, spiral interpolation
- 2219/34147 . . . Epitrochoid
- 2219/34148 . . . Coons interpolation, patch
- 2219/34149 . . . Circular interpolation
- 2219/34151 . . . Analog
- 2219/34152 . . . Circular interpolation in space, on arbitrary planes
- 2219/34153 . . . Linear interpolation
- 2219/34154 . . . Analog
- 2219/34155 . . . Third degree
- 2219/34156 . . . Slope control, delta x, y proportional to x, y
- 2219/34157 . . . Synchronize interpolation of different axis boards, simultaneous start
- 2219/34158 . . . Tangents form curve
- 2219/34159 . . . Delta theta
- 2219/34161 . . . Superposition curves, combine xy slides with other xy or polar slides
- 2219/34162 . . . Linear in one axis, circular in other axis
- 2219/34163 . . . Rotate a segment
- 2219/34164 . . . Superposition manual control pulses on motion control pulses
- 2219/34165 . . . 4-D via 2-D+2-D
- 2219/34166 . . . Select between rectangular and polar controller, interpolator
- 2219/34167 . . . Coarse fine, macro microinterpolation, preprocessor
- 2219/34168 . . . External interpolation
- 2219/34169 . . . Coarse interpolator, path calculator delivers position, speed, acceleration blocks
- 2219/34171 . . . Generate polynomial fitting in tolerance zone around polygon
- 2219/34172 . . . Of the two or three axis, only one or two are controlled as function of tangent to other axis, plane
- 2219/34173 . . . Switch between involute, circular and linear interpolation
- 2219/34174 . . . Rotate segment over a certain angle
- 2219/34175 . . . Overlap, between two blocks, continuous, smooth speed change, movement
- 2219/34176 . . . Block segments, find next point on next segment by cross point circle and segment
- 2219/34177 . . . Calculate for different inclined segments stitch points evenly distributed
- 2219/34178 . . . Simulated pulse for better resolution
- 2219/34179 . . . Variable interpolation speed or resolution
- 2219/34181 . . . Adapt resolution as function of machining load, in corner, to keep constant surface speed
- 2219/34182 . . . Variable resolution
- 2219/34183 . . . Window path, contour of rectangle
- 2219/34184 . . . Straight cut
- 2219/34185 . . . Following line+circle
- 2219/34186 . . . Degree line
- 2219/34187 . . . Any angle, slope
- 2219/34188 . . . Safety, stop, slowdown interpolator if speed, position, torque error too large
- 2219/34189 . . . On each axis, for each block, a software limit switch, for safe slow down
- 2219/34191 . . . Pneumatic
- 2219/34192 . . . Memory management
- 2219/34193 . . . Memory refresh
- 2219/34194 . . . Bank switching, ping-pong memory for communication between processors
- 2219/34195 . . . Part program in consecutive memory blocks, each with spare space for corrections
- 2219/34196 . . . Memory management, dma direct memory access
- 2219/34197 . . . Search blank memory space to load program, storage, memory allocation
- 2219/34198 . . . Electric and fluidic modules integrated on one substrate
- 2219/34199 . . . Module with low maintenance connected to removable module with high maintenance
- 2219/34201 . . . Each module uses functions of a real time kernel
- 2219/34202 . . . Reusable software, generic resource model library
- 2219/34203 . . . Module has a general, high level and a specific, proprietary part
- 2219/34204 . . . Independent units, stackthrough in cabinet, no backplane
- 2219/34205 . . . Modular construction, plug-in module, lsi module
- 2219/34206 . . . Motion controller independent from nc, lmc local motor controller
- 2219/34207 . . . Array vlsi processor
- 2219/34208 . . . Motion controller
- 2219/34209 . . . Microprocessor only for display
- 2219/34211 . . . Microprocessor only for hand control
- 2219/34212 . . . Microprocessor only for mdi, control panel
- 2219/34213 . . . Same microprocessor for data input and for servocontrol
- 2219/34214 . . . I-apx-432 processor
- 2219/34215 . . . Microprocessor
- 2219/34216 . . . Programmable motion controller
- 2219/34217 . . . Microprocessor with build in pwm
- 2219/34218 . . . Transputer
- 2219/34219 . . . Special interface, peripheral to motor
- 2219/34221 . . . Computer delivers control pulses from table directly to motors
- 2219/34222 . . . Computer sends displacement and selected device to output register
- 2219/34223 . . . Combined input output module, single module
- 2219/34224 . . . Select appropriate interface, according to kind of tool or other detection
- 2219/34225 . . . Interface board for measuring system, for resolver, encoder or interferometer
- 2219/34226 . . . Select address of motor, control serial switches in power supply ring
- 2219/34227 . . . Alterable connector board between controller and machine

- 2219/34228 . . . Counter takes over measuring and pwm task from microprocessor
- 2219/34229 . . . SIU serial interface unit takes over communication task from microprocessor
- 2219/34231 . . . Interface controls either dc, ac or step motors
- 2219/34232 . . . Test with microcomputer self
- 2219/34233 . . . Multiplexed subsystem stores state of controlling microprocessor on switch off
- 2219/34234 . . . Each subsystem has own interrupt which is switched on during multiplex
- 2219/34235 . . . Control order of multiplexed axis
- 2219/34236 . . . Multiplex for servos, actuators
- 2219/34237 . . . Multiplexed d-a a-d
- 2219/34238 . . . Hydraulic multiplexer
- 2219/34239 . . . Multiplex for whole system
- 2219/34241 . . . For reading data only
- 2219/34242 . . . For measurement only
- 2219/34243 . . . Single feedback sensor, transducer for plurality, one at a time, driven tools
- 2219/34244 . . . Multiplex for control only
- 2219/34245 . . . Address several motors, each with its own identification
- 2219/34246 . . . OOC object oriented control
- 2219/34247 . . . Machining objects are hierarchically organised
- 2219/34248 . . . Machining object comprises a slide, a palet, workpieces, machining, a contour
- 2219/34249 . . . Sub divide machining object in machining groups, geometry, start point, special
- 2219/34251 . . . Cnc works with different operating systems, windows, os-2, vms in parallel
- 2219/34252 . . . OSY operating system
- 2219/34253 . . . Unix
- 2219/34254 . . . Operating system controls selection and execution of program modules
- 2219/34255 . . . Msdos
- 2219/34256 . . . Api application programming interface
- 2219/34257 . . . OS-2
- 2219/34258 . . . Real time system, qnx, works together with non real time system, windows nt
- 2219/34259 . . . Common language run time CLR, MS-NET, DOTNET, java run time environment
- 2219/34261 . . . Windows, microsoft windows
- 2219/34262 . . . DDE direct data exchange, DLL dynamic library linking
- 2219/34263 . . . OLE object linking and embedding, OPC ole for process control
- 2219/34264 . . . Odbc open database connectivity
- 2219/34265 . . . Windows nt, windows-2000
- 2219/34266 . . . Windows-95
- 2219/34267 . . . Windows nt and cooperating real time extension
- 2219/34268 . . . Cnc and pic controlled alternately by same processor, using timer
- 2219/34269 . . . Programmable computer controller, plc implemented with pc
- 2219/34271 . . . Nc integrated into pic, plc, combination of commands
- 2219/34272 . . . Communication pc and nc, pic over file system of pc, direct access pc to nc, pic
- 2219/34273 . . . Pc and plc and nc integrated, pcnc concept
- 2219/34274 . . . Connect pc card to industrial bus, with additional timing and adapting logic
- 2219/34275 . . . Windows file server to control pc hosted boards under ms windows
- 2219/34276 . . . Pc has priority over cnc controller
- 2219/34277 . . . Pc bypasses robot controller processor, access directly encoders, amplifiers
- 2219/34278 . . . Motion control board, card, in pc
- 2219/34279 . . . Pc, personal computer as controller
- 2219/34281 . . . Osaca open system architecture for control in automation, umc universal machine control
- 2219/34282 . . . Using special api's allowing user access to control machine, motion, servo
- 2219/34283 . . . Using windows nt for general control and real time unix for motion, plc control
- 2219/34284 . . . Using an operator console and a motion chassis connected by network
- 2219/34285 . . . Open system architecture, in general
- 2219/34286 . . . Intelligent positioning I-O
- 2219/34287 . . . Plc and motion controller combined
- 2219/34288 . . . Plc as main controller for cnc
- 2219/34289 . . . Plc as motion controller combined and plc for work type dependant data, parameter
- 2219/34291 . . . Programmable interface, pic, plc
- 2219/34292 . . . Filtering noise I-O
- 2219/34293 . . . Image table
- 2219/34294 . . . Diagnostic, locate failures
- 2219/34295 . . . System, logic analyser, simulation
- 2219/34296 . . . Level conversion
- 2219/34297 . . . Analog input, comparator delivers interrupt
- 2219/34298 . . . Custom window between pic, plc and nc, programmable adapter
- 2219/34299 . . . Memory with I-O and pointer, external I-O with map, edit map, pointer to adapt I-O
- 2219/34301 . . . Nc system has direct access to I-O of pic, plc
- 2219/34302 . . . Plc controls movement via nc, no direct interface to servo
- 2219/34303 . . . PNC is plc, pic and nc cooperation
- 2219/34304 . . . Pc as input, edit device for plc
- 2219/34305 . . . Connect, disconnect host computer by sleep command from local pc
- 2219/34306 . . . Power down, energy saving
- 2219/34307 . . . On nc power on or off, synchronize power on or off of displays with own supply
- 2219/34308 . . . Power supply sets relay switch, allows push button or automatic switch on off nc
- 2219/34309 . . . Dual power supply, for digital circuit and for analog signals
- 2219/34311 . . . Energy saving by recuperating braking, deceleration energy
- 2219/34312 . . . Power supply for servo delivered by, derived from 4-20-mA current loop
- 2219/34313 . . . Power supply for communication delivered by, derived from 4-20-mA current loop
- 2219/34314 . . . Slow down, limit speed for energy saving
- 2219/34315 . . . Power supply turning on or shutting off
- 2219/34316 . . . Install nc system, check voltages, power supply with incorporated a-d
- 2219/34317 . . . Execute same program on different machines by differently addressing axis
- 2219/34318 . . . Verify if workpiece is already machined, by its weight
- 2219/34319 . . . Sequence as function of nc controlled axis position, axis zone
- 2219/34321 . . . Database for control of a single machine

- 2219/34322 . . . Initialize execution program at reference position on workpiece
- 2219/34323 . . . Commanding different axis in sequential order as function of direction of movement
- 2219/34324 . . . Switch some axis over to manual control, while other stay automatic
- 2219/34325 . . . Speed up, optimize execution by combining instructions belonging together
- 2219/34326 . . . Program controls two operations simultaneously in opposite directions
- 2219/34327 . . . Modify, adapt system response to signals from process
- 2219/34328 . . . Cueing commands table
- 2219/34329 . . . Generate extended plc program during machining, execution of nc program
- 2219/34331 . . . First processor filters instructions for indexing only, all other instructions for second controller
- 2219/34332 . . . Program execution as function of direction, forward or backward
- 2219/34333 . . . Multi threading
- 2219/34334 . . . Scalability
- 2219/34335 . . . First look ahead for acyclic execution, followed by cyclic execution
- 2219/34336 . . . Avoid deadlock, lock-up
- 2219/34337 . . . Manual to automatic, tracer
- 2219/34338 . . . Execute control tasks, programs as well as user, application programs
- 2219/34339 . . . Single step execution of program
- 2219/34341 . . . Choose between electronic cam or time-dependent as function of required machining accuracy
- 2219/34342 . . . Matching closest patterns stored in database with actual components
- 2219/34343 . . . Generation of electronic cam data from nc program
- 2219/34344 . . . Standby commands, let proces wait while program controls other process
- 2219/34345 . . . Database for sequential control of several machines by messages
- 2219/34346 . . . User program fetches part of system program when flags are set and detected
- 2219/34347 . . . Execute auxiliary function, tool change, while concurrent machining
- 2219/34348 . . . Coordination of operations, different machines, robots execute different tasks
- 2219/34349 . . . Proper allocation of control components to the required task
- 2219/34351 . . . Knowledge acquisition of environment
- 2219/34352 . . . Explore discrete event properties, reliability, parallelism, availability
- 2219/34353 . . . Independent positioning motor controlled by microprocessor only if event, limit, pulse passed
- 2219/34354 . . . DES discrete event system, deds discrete event dynamic system
- 2219/34355 . . . List of failure events, list of actions, events, trigger actions
- 2219/34356 . . . Compensation variable interrupt execution delay, interrupt jitter
- 2219/34357 . . . Interrupt driven message passing network
- 2219/34358 . . . Interrupt changed to uninterruptable interrupt
- 2219/34359 . . . Real time based interrupt to control axis, other function
- 2219/34361 . . . Mask for interrupts, inhibit during more important tasks
- 2219/34362 . . . Sampling interrupt is product of integer times scheduler interrupt
- 2219/34363 . . . Encoder generates interrupt to synchronize closed loop
- 2219/34364 . . . Delay interpolation interrupt as function of machining rates and feeds of machine groups
- 2219/34365 . . . After interrupt of operation, do other task and go on - resume operation
- 2219/34366 . . . Interpolation interrupt so as to avoid fractions of command pulses
- 2219/34367 . . . Interrupts, different tasks foreground, midground, background
- 2219/34368 . . . Priority
- 2219/34369 . . . Cause of interrupt is sensor and actuator failure
- 2219/34371 . . . Abrupt change in system dynamics
- 2219/34372 . . . Inability to process, execute assigned task within allocated time interval
- 2219/34373 . . . Actuator overloading
- 2219/34374 . . . False alarm states
- 2219/34375 . . . Generate interrupt after a certain number of position, counter pulses
- 2219/34376 . . . Management nc programs, files
- 2219/34377 . . . Selection out of several databases according to workpiece or conditions
- 2219/34378 . . . Erase plural programs in a single operation
- 2219/34379 . . . Job management
- 2219/34381 . . . Multitasking
- 2219/34382 . . . Preemptive multitasking, cpu decides upon priority scheme, which task to start
- 2219/34383 . . . Dynamic preemptive, special event register manages time slices for applications
- 2219/34384 . . . Execute next block after predetermined time
- 2219/34385 . . . Execute next block if largest axis distance is reached
- 2219/34386 . . . Advance program without M function completion signal
- 2219/34387 . . . Delay command as function of speed
- 2219/34388 . . . Detect correct moment, position, advanced, delayed, then next command
- 2219/34389 . . . After rough plunge grinding, initiate backoff grinding as function of delay wheel position
- 2219/34391 . . . Synchronize axis movement and tool action, delay action, simulation inertia
- 2219/34392 . . . Stop program on detection of undefined variable, symbol, enter definition, continue
- 2219/34393 . . . Stop program if needed workpiece, tool or data lacks, misses
- 2219/34394 . . . Execute a certain number of program blocks and stop
- 2219/34395 . . . Synchronize between panel and control
- 2219/34396 . . . Control different groups of functions, commands simultaneously, synchronized
- 2219/34397 . . . Synchronize manipulators and machine by using a reference clock for all
- 2219/34398 . . . Channel stops and waits for marker until other channel puts that marker
- 2219/34399 . . . Switch between synchronous and asynchronous mode of controllers
- 2219/34401 . . . Synchronize position controller drive with interpolator

- 2219/34402 . . . Synchronize programs for machines, processes, tasks, if one stops other also
- 2219/34403 . . . RTI real time, kernel, processing
- 2219/34404 . . . Allocate storage, memory in each processor for a copy of needed data
- 2219/34405 . . . Switch register banks, each storing process states, for quick real time execution
- 2219/34406 . . . Effect of computer, communication delay in real time control
- 2219/34407 . . . Calculate elapsed time, store in counter, start task when time elapsed
- 2219/34408 . . . Design real time control system
- 2219/34409 . . . RNOS real time networked operating system
- 2219/34411 . . . Handling time critical and time non critical program sequences
- 2219/34412 . . . Mark some sequences of time non critical sequences as locked, non interruptable
- 2219/34413 . . . Add time stamp to command message
- 2219/34414 . . . Maximize utilisation workstation
- 2219/34415 . . . Execute urgent jobs quickly
- 2219/34416 . . . Examine, analyse sensor data for co-exclusion sets, memorize, correlate actions
- 2219/34417 . . . Multiprocessor scheduling
- 2219/34418 . . . Scheduler for sequential control, task planning, control sequence
- 2219/34419 . . . Structure of control system
- 2219/34421 . . . Termination for each device, enables easy insertion, connection or disconnection
- 2219/34422 . . . SBC single board computer
- 2219/34423 . . . Optical isolation, galvanic isolation
- 2219/34424 . . . Data flow architecture
- 2219/34425 . . . Same microprocessor for programming and for machine control
- 2219/34426 . . . Same hardware, servo controller for different control modes
- 2219/34427 . . . Diagnostic, monitoring incorporated in controller
- 2219/34428 . . . LSI
- 2219/34429 . . . Servo controller near main cpu but remote from servomotor, integrated in cnc
- 2219/34431 . . . Main uninterruptable servo loop processor and interruptable servo event processor
- 2219/34432 . . . Speed and current control integrated into nc control system
- 2219/34433 . . . Multitask processor controls real time processor via communication memory
- 2219/34434 . . . Separate power controller for drive, servodrives, one per axis, connected to cnc
- 2219/34435 . . . Position encoder and motor connection in one interface between motor and microprocessor
- 2219/34436 . . . Interface circuit build into connector, dongle
- 2219/34437 . . . Parallel processing of functions, each layer has own sample rate
- 2219/34438 . . . Panel connected to nc by means of switch matrixes
- 2219/34439 . . . One cable between controller and amplifier, two between amplifier and motor
- 2219/34441 . . . Common communication interface for panel and remote I-O
- 2219/34442 . . . Control unit serves also to match drive motor to power supply
- 2219/34443 . . . Sensors and actuator integrated into tool
- 2219/34444 . . . Web control system, with intelligent control components each with web server
- 2219/34445 . . . Several power modules for same actuator, motor
- 2219/34446 . . . No change of operation mode when slave axis is out of synchronisation
- 2219/34447 . . . A microprocessor for programming and a microprocessor for control execution of program
- 2219/34448 . . . Integrated servo control circuit fixed to housing, remote from cpu
- 2219/34449 . . . Fault tolerant control, task from one microprocessor can be done by other
- 2219/34451 . . . False alarm states evaluation, threshold to verify correctness alarm
- 2219/34452 . . . Synchronize control with pulse, if loss, excess, error, then stop
- 2219/34453 . . . Stop spreading, propagation failure through system, inhibit drivers defect boards
- 2219/34454 . . . Check functioning controller, cpu or program
- 2219/34455 . . . Different parameters are evaluated to indicate different faults
- 2219/34456 . . . Authorize control of machine, robot if control panel has been connected
- 2219/34457 . . . Emit alarm signal
- 2219/34458 . . . Inhibit start or related control switches if path boundary is outside limits
- 2219/34459 . . . Plausibility check on connection of module, control unit to machine
- 2219/34461 . . . Inhibit access to area if dangerous, cover taken off
- 2219/34462 . . . Interlock, stop motor if microprocessor starts interrupt, because no watchdog pulse from microprocessor
- 2219/34463 . . . Alarm canceled automatically when program corrected
- 2219/34464 . . . Adaptive threshold, level for alarm, eliminate false alarm
- 2219/34465 . . . Safety, control of correct operation, abnormal states
- 2219/34466 . . . Bad circuits, watchdog, alarm, indication
- 2219/34467 . . . Try again program
- 2219/34468 . . . Check memory by storing beforehand complement of expected result
- 2219/34469 . . . Normally messages over network, if failure, messages from operator over I-O
- 2219/34471 . . . Program memory is inhibited, not accessible as long as power fails
- 2219/34472 . . . Configure alterable memory as read only, to avoid erasing
- 2219/34473 . . . Inhibit control until control lever is first set to neutral position
- 2219/34474 . . . Sense voltage drop of system, shut down servo
- 2219/34475 . . . Detect abnormality of control system without inverted model, using input command
- 2219/34476 . . . Local control predicts next command data from past stored data if host control fails
- 2219/34477 . . . Fault prediction, analyzing signal trends
- 2219/34478 . . . Urgent safety signals treated with hardware; others with software
- 2219/34479 . . . Flush enclosure of circuit with air, keep clean air over pressure
- 2219/34481 . . . EFC explosion free control, intrinsically safe

- 2219/34482 . . . Redundancy, processors watch each other for correctness
- 2219/34483 . . . Monitor absolute position independently by two processors, if out of range
- 2219/34484 . . . Use dual channels
- 2219/34485 . . . Same functioncode, program is fully used in normal and abnormal case
- 2219/34486 . . . Monitor axis movement, speed, independently by two processors, if out of range
- 2219/34487 . . . Redundant diagnostic controllers watch redundant process controllers
- 2219/34488 . . . One computer, controller replaces other, backup computer
- 2219/34489 . . . Watchdog with adaptive timeout as function of speed of motor
- 2219/34491 . . . Count certain number of faults before delivering alarm or stop
- 2219/34492 . . . Time out, decide only after a lapse, period of time
- 2219/34493 . . . Supervision, display diagnostic, use or select between different stored screen
- 2219/34494 . . . Display machining time and real time clock to control machining time
- 2219/35 . . . Nc in input of data, input till input file format
- 2219/35001 . . . Data input, data handling, programming, monitoring of nc
- 2219/35002 . . . Parametric machine control, direct control from cad data, no nc data
- 2219/35003 . . . Kad kam knowledge aided design, knowledge aided manufacturing
- 2219/35004 . . . Mechanical design and electronic design integrated
- 2219/35005 . . . Sheet metal cad
- 2219/35006 . . . Object oriented design
- 2219/35007 . . . Cad makes template of tool as function of spindle, machine tool and set on spindle
- 2219/35008 . . . Www cad, world wide design and manufacturing
- 2219/35009 . . . Dynamic simulation
- 2219/35011 . . . Use of spreadsheet
- 2219/35012 . . . Cad cam
- 2219/35013 . . . Define workpiece, dimension from characteristics, strength, performance
- 2219/35014 . . . From design, calculate additional parameters, for strength
- 2219/35015 . . . Calculate production compensation, heat shrinkage, overetching
- 2219/35016 . . . Analyse model, decide on number of sections to take
- 2219/35017 . . . Finite elements analysis, finite elements method FEM
- 2219/35018 . . . Determining bending die radius from part data, estimated radius and calculation
- 2219/35019 . . . From product constraints select optimum process out of plurality of DTM means
- 2219/35021 . . . Identify object characteristics, elasticity, density, hardness and select material
- 2219/35022 . . . Calculate gear dimensions, tooth surfaces for optimum contact
- 2219/35023 . . . Constraint based modeling, keep relationships between elements
- 2219/35024 . . . Incremental constraint solving, constraints are handled in sequence
- 2219/35025 . . . Design and manufacture jig
- 2219/35026 . . . Design of machine tool, of cnc machine
- 2219/35027 . . . Design for assembly DFA, ease of object assembly
- 2219/35028 . . . Adapt design as function of manufacturing merits, features, for manufacturing, DFM
- 2219/35029 . . . Design of modular control system
- 2219/35031 . . . Redesign, use former design
- 2219/35032 . . . Check correctness, violation of design, rule check
- 2219/35033 . . . Reliability by design, error free object
- 2219/35034 . . . Adapt design to customer feedback
- 2219/35035 . . . Design gear, tooth surfaces
- 2219/35036 . . . Correct model by comparing 3-D measured data of modified workpiece with original model
- 2219/35037 . . . Use medial axis transformation to decompose a domain, limits combinations
- 2219/35038 . . . Combine, superpose model, foot data with style data
- 2219/35039 . . . Model for analysis of workpiece displacement due to clamping, fixture
- 2219/35041 . . . Genetic algorithm for selforganizing designs
- 2219/35042 . . . Add finishing allowances to a cutter path
- 2219/35043 . . . Tool, fixture design
- 2219/35044 . . . Tool, design of tool, mold, die tooling
- 2219/35045 . . . Design tool for minimal tool change
- 2219/35046 . . . Design tool to minimize manufacturing, machining time
- 2219/35047 . . . Design tools in pairs, to be used together
- 2219/35048 . . . Recognition of punch shapes provided in die component catalogue
- 2219/35049 . . . BCL binary cutter location, rs494 standard CL format
- 2219/35051 . . . Data exchange between cad systems, cad and cam
- 2219/35052 . . . High level language conversion program, DXF format to nc format
- 2219/35053 . . . IGES initial graphics exchange specification
- 2219/35054 . . . STEP or PDES, standard for exchange of product data, form or surface data
- 2219/35055 . . . Data modeling language
- 2219/35056 . . . Manual entry of source, destination, data, format to be used for transfer
- 2219/35057 . . . Create also operation data concerning operating device
- 2219/35058 . . . Block cyclus time, time to prepare a block of data to be sent to machine
- 2219/35059 . . . Convert pcb design data to control data for surface mounting machine
- 2219/35061 . . . From cad make drawing with text for dimensions, scan it and read dimensions
- 2219/35062 . . . Derive mating, complementary, mirror part from computer model data
- 2219/35063 . . . Geometrical transformation of image
- 2219/35064 . . . Transform sketch by replacing free curves with mathematical curves, two display
- 2219/35065 . . . Undo part of design
- 2219/35066 . . . Modify design, modify shape, stretch, scale, add, delete
- 2219/35067 . . . Parametric function, group of lines, curves, change one, all change
- 2219/35068 . . . Command files, subroutines for drawing
- 2219/35069 . . . Derive missing surface from mirror part of computer model

- 2219/35071 . . . Drawing function, rotate designed figure, rotation
- 2219/35072 . . . Scale, zoom a designed figure
- 2219/35073 . . . Copy, duplicate a designed figure
- 2219/35074 . . . Display object, recognition of geometric forms
- 2219/35075 . . . Display picture of scanned object together with picture of cad object, combine
- 2219/35076 . . . Display from bottom or top side, adjust drawing lines, visible or not
- 2219/35077 . . . Display part and patterns to be machined on part, make selection
- 2219/35078 . . . Do not load non necessary or obstructive parts of drawing, remove from screen
- 2219/35079 . . . Features, functions like special relationship, assembly locations
- 2219/35081 . . . Product design and process machining planning concurrently, machining as function of design
- 2219/35082 . . . Product, feature based modeling, geometric and engineering info
- 2219/35083 . . . Parametric design, parameters for geometric design and for process planning
- 2219/35084 . . . Geometric feature extraction, concave and convex regions, object recognition
- 2219/35085 . . . Incremental feature recognition, extraction, changes are added as new features
- 2219/35086 . . . Machining feature extraction, geometry and machining parameters
- 2219/35087 . . . Hole extraction for sheet metal
- 2219/35088 . . . Using graph grammars to describe parts
- 2219/35089 . . . Feature definition language
- 2219/35091 . . . Feature conversion, from design to process features or else
- 2219/35092 . . . MBM modular boundary model, FFC face to face composition model
- 2219/35093 . . . Feature is stad single tool approach direction, or mtd multiple tool approach
- 2219/35094 . . . Object oriented feature finder
- 2219/35095 . . . Features library
- 2219/35096 . . . Kind of feature, rotational parts with machining features and relation
- 2219/35097 . . . Generation of cutter path, offset curve
- 2219/35098 . . . Automatic coarse, rough and finish cutting path generation
- 2219/35099 . . . Generation of cutter path for only a designated part of surface
- 2219/35101 . . . CC cutter contact path
- 2219/35102 . . . Isoparametric, contact points at intersection of parameter lines on surface
- 2219/35103 . . . Cl cartesian method, apt style, cutter tangent, parallel to drive planes
- 2219/35104 . . . Steepest directed tree approach intelligent cutter path planning
- 2219/35105 . . . Polyhedral machining, cutter moved between centroids of adjacent surface triangles
- 2219/35106 . . . Contour map, cutter moved along contour lines, terraces of part surface
- 2219/35107 . . . Generate planar section toolpath
- 2219/35108 . . . Generate offset tool moving path in restrained curved plane
- 2219/35109 . . . Clean up region, volume left uncut by too large tool pass after finishing
- 2219/35111 . . . Automatically search for clean up regions, generate clean up tool pass
- 2219/35112 . . . Define object with spline, convert to raster, mosaic of points to make object
- 2219/35113 . . . Generation of compound, composite surface
- 2219/35114 . . . Generation of connection between two or more surfaces
- 2219/35115 . . . Project 3-D surface on 2-D plane, define grid in plane
- 2219/35116 . . . RFS rotation free surfaces, needs c x y z axis, non axis symmetrical surfaces
- 2219/35117 . . . Define surface by elements, meshes
- 2219/35118 . . . Generate intersection of offset surfaces
- 2219/35119 . . . Combine different forms, shapes
- 2219/35121 . . . Generate connection between two paths
- 2219/35122 . . . Generate random paths along a raster path
- 2219/35123 . . . Calculate volume of object
- 2219/35124 . . . Calculate center of gravity of object
- 2219/35125 . . . Surface with changing cone angle, different upper and lower surface shape
- 2219/35126 . . . Bezier or Ferguson surface
- 2219/35127 . . . Visibility maps, tool sees all points of interest on workpiece
- 2219/35128 . . . Propeller blade
- 2219/35129 . . . Generate composite surface by a single polynomial calculation
- 2219/35131 . . . Generate polynomial surface
- 2219/35132 . . . Generate path as function of precision and surface finish of each portion
- 2219/35133 . . . B-spline surface fitting
- 2219/35134 . . . 3-D cad-cam
- 2219/35135 . . . Predict surface machining precision
- 2219/35136 . . . Determine offset using closed ball expansion, 2-D square, 3-D cubic approximation
- 2219/35137 . . . Create part generic, derive from known part or combination of parts
- 2219/35138 . . . Superpose part of 3-D model on a straight, curved wall
- 2219/35139 . . . Define surface by cyclides, circular sections with variable radius
- 2219/35141 . . . Specify side of zone, line, circle for allowed region
- 2219/35142 . . . Generate tile patterns, mosaic
- 2219/35143 . . . Reconstruct free form surfaces
- 2219/35144 . . . Egosphere: spherical shell 2-5-D around robot, objects are projected on it
- 2219/35145 . . . Voxel map, 3-D grid map
- 2219/35146 . . . Enter data, calculate 3-D curve or surface, sculptured surface, okisurf
- 2219/35147 . . . Generation of nice looking composite surface
- 2219/35148 . . . Geometric modeling for swept volume of moving solids
- 2219/35149 . . . Generate model with haptic interface, virtual sculpting
- 2219/35151 . . . Modeling geometric, generation or forming of curved surface
- 2219/35152 . . . Part coding, description from 3-D cad database
- 2219/35153 . . . Group and retrieve similar designs from cad data
- 2219/35154 . . . Convert 2-D workpiece in rectilinear polygon, simplified skeleton
- 2219/35155 . . . From parts catalog, database, define part relationships, product definitions, specifications
- 2219/35156 . . . Group technology, identify and group similar parts, tools and machines

- 2219/35157 . . . Machinability, producibility, reject nc program if tool motion not possible
- 2219/35158 . . . Calculation of contact point of tool on surface, curve
- 2219/35159 . . . With nominal blank and model in memory define tool path and machine workpiece
- 2219/35161 . . . Determine orientation of workpiece
- 2219/35162 . . . Determine workpiece placement, nesting in blank, optimize, minimize loss material
- 2219/35163 . . . Generation of inverse offset surface, tool center on surface, tip shows offset
- 2219/35164 . . . Reverse engineering, camera and probe to inspect workpiece and machine are the same ones
- 2219/35165 . . . Automatic cutter selection
- 2219/35166 . . . Virtual boundary method to plan coarse and then fine machining
- 2219/35167 . . . Automatic toolpath generation and tool selection
- 2219/35168 . . . Automatic selection of machining conditions, optimum cutting conditions
- 2219/35169 . . . Automatic generation of set up data as function of form to be machined, kind of operation
- 2219/35171 . . . Automatic selection of machining conditions as function of controlled machine
- 2219/35172 . . . Lookup tables for technology, machining parameters
- 2219/35173 . . . Automatic selection of machine type
- 2219/35174 . . . Decide if blank has to be measured beforehand
- 2219/35175 . . . Select machining parameters with fuzzy logic
- 2219/35176 . . . Constraint, machining constraint, process type like only milling possible
- 2219/35177 . . . Power constraint for horizontal and vertical cutting forces
- 2219/35178 . . . Machining parameter constraint, feed, speed, dimension of part
- 2219/35179 . . . Tolerance constraints as function of process capability and manufacturing costs
- 2219/35181 . . . Machining condition constraints, coolant, chip removal, previous forming
- 2219/35182 . . . Scallop hull generation and its offset, interference free offset
- 2219/35183 . . . Maximizing side step, constant CUSP, scallop height, smaller CL datafile for minimizing machining time
- 2219/35184 . . . Variable step over, from toolpath to toolpath
- 2219/35185 . . . Select optimum tool radius
- 2219/35186 . . . Variable step forward on same toolpath
- 2219/35187 . . . Surface ridges, cusps, scallops, distance of tool traverses as function of curvature
- 2219/35188 . . . Project workpiece and sheet on screen, position layout to be cut, store contour
- 2219/35189 . . . Manufacturing function, derive gripper position on workpiece from cad data
- 2219/35191 . . . Project workpiece and gripper, control relative movement, store result
- 2219/35192 . . . From design derive sequence of bending so that bending is possible
- 2219/35193 . . . Manufacturability
- 2219/35194 . . . From workpiece data derive tool data
- 2219/35195 . . . Design mosaic, cut tiles, paint tiles and pack mosaic
- 2219/35196 . . . From workpiece data derive assembly tool data
- 2219/35197 . . . Assemblability
- 2219/35198 . . . Combine component electronic catalog, cdrom with cad data to generate nc program
- 2219/35199 . . . Processability
- 2219/35201 . . . Use cad data to test function of designed part, design for test DFT
- 2219/35202 . . . Macroplanning, setup fixture cafp, library machine tables, sequence
- 2219/35203 . . . Parametric modelling, variant programming, process planning
- 2219/35204 . . . Planning, generic process planning
- 2219/35205 . . . Planning of toolstages, comprising selection tools, position and motion
- 2219/35206 . . . Microplanning, specific machining operations and parameters
- 2219/35207 . . . Design agent selects planning agent, which selects fabrication agent
- 2219/35208 . . . Object oriented planning
- 2219/35209 . . . Modifying, adding machining features to elementary cad-parts as function of their assembling
- 2219/35211 . . . Using a search tree
- 2219/35212 . . . Estimating a cost associated with each operation, amount of time, target cost
- 2219/35213 . . . Minimize number of setups
- 2219/35214 . . . Setup planning, number of them, machines needed, part orientation, order
- 2219/35215 . . . Generate optimal nc program variant as function of cost, time, surface, energy
- 2219/35216 . . . Program, generate nc program, code from cad data
- 2219/35217 . . . Cagd computer aided geometric design, sbgd scanning based geometric design
- 2219/35218 . . . From cad data derive fixture configuration and assembly program
- 2219/35219 . . . From cad data derive cutting, stacking, sorting program
- 2219/35221 . . . Generate cutter path as function of speed, acceleration condition selected by operator
- 2219/35222 . . . From cad derive data points for endball mill, grinder, then radius compensation
- 2219/35223 . . . Tolerance, consider tolerance in design, design for assembly
- 2219/35224 . . . Kinematic tolerance analysis, variation in kinematic function as function of tolerance
- 2219/35225 . . . Tolerance in setup planning
- 2219/35226 . . . Analysis of tolerance propagation
- 2219/35227 . . . Use FMEA failure modes and effects analysis in tolerance assignment design
- 2219/35228 . . . Automated tolerance chain generation
- 2219/35229 . . . Code
- 2219/35231 . . . Biquinary code, 2-of-7 symbols
- 2219/35232 . . . Bcd
- 2219/35233 . . . Octal
- 2219/35234 . . . First column has 1-2-4, second column has 8-16-32
- 2219/35235 . . . Decimal to binary
- 2219/35236 . . . Excess-code
- 2219/35237 . . . Under four is 0xxx, over four is 1xxx
- 2219/35238 . . . Gray-code
- 2219/35239 . . . Ternary code
- 2219/35241 . . . End, stop code of program
- 2219/35242 . . . To enable manual operation on detection of inserted code

- 2219/35243 . . . Inserted code calls parallel execution of another program, synchronize
- 2219/35244 . . . Select in corner different program according to inner, outer machining
- 2219/35245 . . . Expansion of control words, code of standard language to increase functionality
- 2219/35246 . . . Data handling for auxilliary functions as function of setting of switch, block delete
- 2219/35247 . . . Mode selection between two machining modes, laser beam and laser shutter control
- 2219/35248 . . . Pallet exchange code to get mating nc program
- 2219/35249 . . . In corner change cutting command to piercing command, to keep angle point intact
- 2219/35251 . . . Several M codes sent to several machines simultaneously
- 2219/35252 . . . Function, machine codes G, M
- 2219/35253 . . . To stop program until a cycle start key is pressed
- 2219/35254 . . . GPF, G preparatory functions, G111 indicate switch to polar, absolute to reference
- 2219/35255 . . . G112 switch to polar, relative to last polar coordinate
- 2219/35256 . . . Assign a macro to a key
- 2219/35257 . . . Macro, assign a name to macro
- 2219/35258 . . . A named macro can be called from a program, a key, a menu
- 2219/35259 . . . Divide program in machining division blocks, and name them
- 2219/35261 . . . Use of mathematical expression, functional equation
- 2219/35262 . . . Macro instruction, canned cycles, subroutines, subprogram
- 2219/35263 . . . Using variables, parameters in program, macro, parametrized instruction
- 2219/35264 . . . Reread same data
- 2219/35265 . . . Check time differences of command signals
- 2219/35266 . . . On error display code, message for recovery from fault
- 2219/35267 . . . Compare ram data to rom data, verify correctness, validity data, tolerance
- 2219/35268 . . . Detection of presence of rom cassette or similar, if coupled to internal memory
- 2219/35269 . . . Checking data, parity, diagnostic
- 2219/35271 . . . Checking electronics
- 2219/35272 . . . Watchdog, count or integrate number of data errors before alarm
- 2219/35273 . . . Sensor to detect functioning of signal conditioning elements
- 2219/35274 . . . Parity
- 2219/35275 . . . Excess in error
- 2219/35276 . . . Two identical tapes
- 2219/35277 . . . Double reader
- 2219/35278 . . . Checksum CRC
- 2219/35279 . . . Ignoring invalid program
- 2219/35281 . . . Detect overlap of program, if new data is entered before old is handled, stop
- 2219/35282 . . . Verify if loaded program into memory or stored into tape, cassette is correct
- 2219/35283 . . . Plausibility check for function, program, inhibit dangerous, unallowed program
- 2219/35284 . . . Programmed speed automatically limited to min and max transmission range speed
- 2219/35285 . . . Plausibility check for data, within permissible range
- 2219/35286 . . . Run tape without machining, tape proving, dry run, test run
- 2219/35287 . . . Verify, check program by drawing, display part, testpiece
- 2219/35288 . . . Verification of instructions on tape, direct or by comparing with reference
- 2219/35289 . . . Display machining state and corresponding control program
- 2219/35291 . . . Record history, log, journal, audit of machine operation
- 2219/35292 . . . By making, plotting a drawing
- 2219/35293 . . . Execute program and check block of data, on interrupt display block
- 2219/35294 . . . Display concentric circles
- 2219/35295 . . . Stop test run, correct instruction or block, restart test run
- 2219/35296 . . . Inhibit operation if part shape not compatible with raw material shape
- 2219/35297 . . . Convert program to voice output to check program
- 2219/35298 . . . Print screen display
- 2219/35299 . . . Verify if generalised data block has all words required
- 2219/35301 . . . On error, push button to reverse execution mode of block, stop, correct
- 2219/35302 . . . Set and store command code together with display colour, detected on execution
- 2219/35303 . . . Dry run, compare simulated output with desired finished profile, alarm, inhibit
- 2219/35304 . . . Real time analysis, check of program, just before machining
- 2219/35305 . . . Before machining, verify if all different machining start points are correct
- 2219/35306 . . . Interference of all tools of turret, or part of tool base with chuck, workpiece
- 2219/35307 . . . Print out of program on paper, on screen
- 2219/35308 . . . Update simulator with actual machine, control parameters before start simulation
- 2219/35309 . . . Actual execution times acquired during machining used in simulation
- 2219/35311 . . . Remote simulation of machining program
- 2219/35312 . . . Display working state, process
- 2219/35313 . . . Display, validate tool path for boundary, surface interference
- 2219/35314 . . . Display workpiece and machine, chuck, jig, clamp, tool
- 2219/35315 . . . Projection, two, three section views
- 2219/35316 . . . Interference checking between tool, machine, part, chuck, machining range
- 2219/35317 . . . Display tool shape, to select tool for program, or for interference
- 2219/35318 . . . 3-D display of workpiece, workspace, tool track
- 2219/35319 . . . Show alternatively static and dynamic locus, during static update of dynamic
- 2219/35321 . . . Display only tool locus, dynamic
- 2219/35322 . . . Display dynamic tool locus from entered start point to present position
- 2219/35323 . . . Point to two points on tool locus, calculate and display value
- 2219/35324 . . . Two, more pictures separated on screen, display

- 2219/35325 . . . Display of locus with possible correction of machining
- 2219/35326 . . . Scale image automatically to display whole tool locus or indicated area
- 2219/35327 . . . Display tool locus together with correlated machining parameter, load motor
- 2219/35328 . . . Shift view as function of shift of tool with respect to workpiece
- 2219/35329 . . . Display entire image within an enlarged image
- 2219/35331 . . . Display only machined part
- 2219/35332 . . . Use solid and wire frame plotting to display tool locus, workpiece
- 2219/35333 . . . Display raw material, blank, tool locus, workpiece, alarm if error
- 2219/35334 . . . Display entire part and zoom of detail
- 2219/35335 . . . Update display image only if tool advanced over a defined distance
- 2219/35336 . . . Display locus and corresponding actual block
- 2219/35337 . . . Program has instruction to display specific information
- 2219/35338 . . . Display virtual tool, locus, part to check possibility of execution next block
- 2219/35339 . . . A mark for present position of tool, a mark for end point of block, colour
- 2219/35341 . . . Display finishing, finishing margin, work, tool and chuck shape, different colours
- 2219/35342 . . . Set colour change for a block, display locus for that block in different colour
- 2219/35343 . . . Display path and coating thickness and painting time
- 2219/35344 . . . Display part, programmed locus and not yet machined, uncompleted portions of part
- 2219/35345 . . . Display entry of high level program together with corresponding nc program
- 2219/35346 . . . VMMC: virtual machining measuring cell simulate machining process with modeled errors, error prediction
- 2219/35347 . . . Replace tool by light emitter, operator checks light path on workpiece
- 2219/35348 . . . Different colour, texture as function of distance, direction between tool and workpiece
- 2219/35349 . . . Display part, programmed locus and tool path, trajet, dynamic locus
- 2219/35351 . . . While machining probe model, sense drawing by same program, stop if deviation
- 2219/35352 . . . By making a testpiece
- 2219/35353 . . . While machining compare real path with simulated, command path, contour display
- 2219/35354 . . . Polar coordinates, turntable
- 2219/35355 . . . Generate at jump a fictive instruction equal to sum of previous instructions
- 2219/35356 . . . Data handling
- 2219/35357 . . . Setup data, includes scale, range, type, selected together with part program
- 2219/35358 . . . If a pattern contains another pattern, separate date to avoid overlap
- 2219/35359 . . . Discriminate between setup data and machining data
- 2219/35361 . . . Discriminate between data for servocontrol directly and nc processing data
- 2219/35362 . . . Group similar operations, to select correction, compensation values
- 2219/35363 . . . Generate data on component arrangement
- 2219/35364 . . . Merge normal nc program with manual entered monitoring, diagnostic criteria
- 2219/35365 . . . Configure buffer dynamically, store two 3-D blocks or one 6-D block
- 2219/35366 . . . Fill buffer dynamically, track read out and write in addresses, fifo
- 2219/35367 . . . Only read buffer, advance tape while machining with data from read buffer
- 2219/35368 . . . Read and work buffer, machine while read in, no switching between buffers
- 2219/35369 . . . Read and work buffer, machine while read in, buffers switched alternative
- 2219/35371 . . . Data from read instead of work buffer, load data directly to work buffer
- 2219/35372 . . . Store variable block, word length into memory
- 2219/35373 . . . Data storage, buffer
- 2219/35374 . . . First memory for independent axis, second memory for synchronized axis
- 2219/35375 . . . Store command data into latch, buffer synchronized to clock
- 2219/35376 . . . Input program, analyze, store to buffer ready to control nc, no further data handling
- 2219/35377 . . . Check for end of block
- 2219/35378 . . . Detect if reference data is not changing anymore to decide a still stand, stop
- 2219/35379 . . . Conversion, normalize
- 2219/35381 . . . Convert in real time input peripheral data to processor data, output data format
- 2219/35382 . . . Distribution
- 2219/35383 . . . Input serial or parallel
- 2219/35384 . . . Serial data handling
- 2219/35385 . . . Decode several blocks at the same time, as a single block, simultaneous, parallel
- 2219/35386 . . . Look ahead processing of plural block data from buffer
- 2219/35387 . . . Transfer measured data first to fastest controller, processor then to slower
- 2219/35388 . . . Processors in parallel, second, third handle rest old block while first starts new block
- 2219/35389 . . . Different block length to select between panel and remote I-O
- 2219/35391 . . . Sort, order entered data hierarchical
- 2219/35392 . . . Set switches, load, cancel data for different axis, spindles simultaneous
- 2219/35393 . . . Coordinate selection switch
- 2219/35394 . . . A separate processor for block, span
- 2219/35395 . . . Memory, ram table with waveform, no need to be loaded by nc program, quicker
- 2219/35396 . . . Table of contour for cyclic machining, only data for one cycle, derive other
- 2219/35397 . . . Cross bar switch
- 2219/35398 . . . Machining, change parameters as function of machining type
- 2219/35399 . . . Split part program in elementary machining steps, executable by a single tool
- 2219/35401 . . . Tool edge, tool shape, dead corner because of tool shape
- 2219/35402 . . . Calculate allowable machining capability from cutting conditions
- 2219/35403 . . . Calculate midline of tapelike contour, as reference line for stitching
- 2219/35404 . . . Divide scanned pattern in several closed area, store as intermediate data

- 2219/35405 . . . Prepare seam data for each pattern size as function of scale and intermediate data
- 2219/35406 . . . Decompose axis movement, group components, interpolate separately, superpose pulses
- 2219/35407 . . . Position data, calculate data to project characters along curve
- 2219/35408 . . . Calculate new position data from actual data to compensate for contour error
- 2219/35409 . . . DPC direct programming at the console
- 2219/35411 . . . Clamp detachable teaching box magnetically on housing
- 2219/35412 . . . Special interface for manual input to pc
- 2219/35413 . . . Manual device is automatically recognised and its interface selected
- 2219/35414 . . . Remote instruction to operate machine tool
- 2219/35415 . . . 3-D three dimension, space input, spaceball
- 2219/35416 . . . 3-D joystick
- 2219/35417 . . . Handle, joystick connected to n+1 wires for n degrees of freedom
- 2219/35418 . . . Bird, free flying hand controller, receives signals from transmitters in space
- 2219/35419 . . . Four and more-DOF hand controller, joystick, manipulandum
- 2219/35421 . . . 3-D matrix to input a 3-D surface, position displaced elements read by computer
- 2219/35422 . . . Unit freely movable in space, detect its position, orientation by triangulation
- 2219/35423 . . . 6-DOF force reflective hand controller frhc
- 2219/35424 . . . 16-DOF glove attached to 6-DOF hand controller, superposition
- 2219/35425 . . . 18-DOF glove with fifteen load detectors on each finger, eighty one in total
- 2219/35426 . . . Prepare, enter next program during execution of actual program, machining
- 2219/35427 . . . User controls machine with eye motion, activates icons on display
- 2219/35428 . . . Block selection, search
- 2219/35429 . . . Enter code number directly for function, no use of function keys
- 2219/35431 . . . Interactive
- 2219/35432 . . . Format guide to guide user during input of data
- 2219/35433 . . . During execution, display asks for parameters, operator answers, machine again
- 2219/35434 . . . Enter part geometry and manually control path free, directly, real time, cutting
- 2219/35435 . . . Display, if needed, tolerance memo data at place where real data must be input
- 2219/35436 . . . Means, manual input, input reference, hand wheel
- 2219/35437 . . . Decimal
- 2219/35438 . . . Joystick
- 2219/35439 . . . Keys or buttons
- 2219/35441 . . . Production design metaphore, tool, operation like input system
- 2219/35442 . . . Hand wheel turns resolver to control movement slide
- 2219/35443 . . . Portable drill, screw driver to set position of axis instead of handwheel
- 2219/35444 . . . Gesture interface, controlled machine observes operator, executes commands
- 2219/35445 . . . Joystick for coarse and handwheel for fine movement
- 2219/35446 . . . Earprotection, earphone
- 2219/35447 . . . Potentiometer
- 2219/35448 . . . Datasuit, arm sleeve, actor, operator wears datasuit and generates motion
- 2219/35449 . . . Joystick and buttons for menu and function selection, scrolling, +sign and -sign
- 2219/35451 . . . Mouse with additional wheel, switches for position control
- 2219/35452 . . . Two axis foot pedal
- 2219/35453 . . . Voice announcement, oral, speech input
- 2219/35454 . . . Switch between joystick and pedal control
- 2219/35455 . . . Foot pedal
- 2219/35456 . . . Disk segments connected to different inputs of microprocessor, represent different positions
- 2219/35457 . . . Joystick for coarse, rotary encoder for fine movement
- 2219/35458 . . . Control command embedded in video, audio stream, signal
- 2219/35459 . . . Knob, handle, handwheel delivers pulses, electronic handwheel, digipot
- 2219/35461 . . . Digitizing, menu tablet, pencil
- 2219/35462 . . . Mouse
- 2219/35463 . . . Trackball
- 2219/35464 . . . Glove, movement of fingers
- 2219/35465 . . . Hand wheel
- 2219/35466 . . . Select with mouse button coarse or fine movement control
- 2219/35467 . . . Select between control modes, jog, freeform, grid, corner, locate, contour, slot
- 2219/35468 . . . Select between teaching, regulate position and direct control of position
- 2219/35469 . . . Select with button specified picture, interrupt addresses selection table
- 2219/35471 . . . Select between run and step command mode, step forward, reverse
- 2219/35472 . . . Mode selection
- 2219/35473 . . . Input limit values of speed, position, acceleration or force
- 2219/35474 . . . Enter fuzzy command, instruction, like move closer
- 2219/35475 . . . Set tolerance values
- 2219/35476 . . . Switch from auto to manual if operator moves feedback detector, to set parameter
- 2219/35477 . . . Accelerate input data, exponent as function of pressure, time, turning speed
- 2219/35478 . . . Set flexibility of axis in working coordinates, to move real axis manually easily
- 2219/35479 . . . Set values, speed of machine as function of force, pressure, duration on key
- 2219/35481 . . . Display, panel
- 2219/35482 . . . Eyephone, head-mounted 2-D or 3-D display, also voice and other control
- 2219/35483 . . . Synoptic display for work shape during machining
- 2219/35484 . . . Use two image memories, update second memory while display first memory
- 2219/35485 . . . Library of images, pictures, select and modify each, compose them
- 2219/35486 . . . Use of two cursors on screen
- 2219/35487 . . . Display and voice output incorporated in safety helmet of operator
- 2219/35488 . . . Graphical user interface, labview

- 2219/35489 . . . Discriminate, different colour, highlight between two states
- 2219/35491 . . . Workpiece date display, position, height
- 2219/35492 . . . Display needed workpiece, tool or data to continue execution of program
- 2219/35493 . . . Display workpiece and tool data together
- 2219/35494 . . . Online documentation, manual, procedures, operator, user guidance, assistance
- 2219/35495 . . . Messages to operator in multimedia, voice and image and text
- 2219/35496 . . . Display cursor in changing colour to indicate that object can be selected
- 2219/35497 . . . Use colour tone, hue to indicate amount of processed quantity
- 2219/35498 . . . Synoptic display of available, selectable control modules with their functions
- 2219/35499 . . . Model of process, machine and parameters
- 2219/35501 . . . Colour display
- 2219/35502 . . . Display picture, image of place of error
- 2219/35503 . . . Eye tracking associated with head mounted display to detect eye position
- 2219/35504 . . . Multilingual communication, messages in different languages
- 2219/35505 . . . Display two windows, one with nc-data, other with general application data
- 2219/35506 . . . Camera images overlaid with graphics, model
- 2219/35507 . . . Spider, radar, parallel axes, multivariate plot
- 2219/35508 . . . Operator chooses among different GUI formats
- 2219/35509 . . . Double large character on screen
- 2219/35511 . . . Cursor on screen
- 2219/35512 . . . Display entered, measured values with bargraph
- 2219/35513 . . . Setting tool condition, tool set in tool exchanger, present or not
- 2219/35514 . . . Display tool data
- 2219/35515 . . . Workpiece set condition, workpiece present or not
- 2219/35516 . . . Three linear movements in a single plane for three actuators
- 2219/35517 . . . Use same data, program for workpieces with different length, but same profile
- 2219/35518 . . . Superposition data, three memories for 2-D projection and z profile and surface structure
- 2219/35519 . . . Machining data and tool data
- 2219/35521 . . . Machining and parts on workpiece arrangement data, machine each, then cut out
- 2219/35522 . . . Database for standard machining data and for personal machining data
- 2219/35523 . . . Data one bit better than measurement, rest accumulated in memory
- 2219/35524 . . . Approach data and machining data
- 2219/35525 . . . Use same data for different operations, coarse and fine, cutting and grinding
- 2219/35526 . . . Number of workpieces to be machined, cut
- 2219/35527 . . . Range of number of workpieces to be machined, cut
- 2219/35528 . . . Create machining conditions database by analyzing actual machining nc program
- 2219/35529 . . . Monitoring current machining, store information in database as a new working case
- 2219/35531 . . . Operator inputs manually evaluation of current machining
- 2219/35532 . . . Comment, work directive, message to operator and control signals together
- 2219/35533 . . . Use, input 2-D data, sectional profile to machine 3-D surface
- 2219/35534 . . . Conversion input data
- 2219/35535 . . . Decimal to binary
- 2219/35536 . . . Digital to analog
- 2219/35537 . . . Bcd to phase
- 2219/35538 . . . Bcd to decimal
- 2219/35539 . . . Gray to frequency
- 2219/35541 . . . Bcd to 5-2-1-1-code
- 2219/35542 . . . Bcd to binary
- 2219/35543 . . . Cartesian to polar and vice versa
- 2219/35544 . . . Convert male to female form, die to stamp form
- 2219/35545 . . . Serial to parallel conversion
- 2219/35546 . . . Convert input data to execution data
- 2219/35547 . . . 1-to-8-bit conversion
- 2219/35548 . . . 1-to-16-bit conversion
- 2219/35549 . . . Convert buffer content to executable data in case of short execution time
- 2219/35551 . . . Convert and select between EIA and ISO code
- 2219/35552 . . . ISO and EIA code detected by difference of parity bit
- 2219/35553 . . . Convert ISO or EIA code to internal or standard code
- 2219/35554 . . . Mirror, other conversions
- 2219/35555 . . . Turn figure over 90-degrees or 180-degrees, convert data for new state
- 2219/35556 . . . Conversion inch to metric
- 2219/35557 . . . Workpiece related data to axis related data
- 2219/35558 . . . Convert speed value into two signals sin, cos representing position
- 2219/35559 . . . Convert 15-bit image into 20-bit image
- 2219/35561 . . . Analog to digital
- 2219/35562 . . . Radius to diameter
- 2219/35563 . . . Use of conversion tables
- 2219/35564 . . . High speed data processor between host and nc for direct conversion of data
- 2219/35565 . . . Communications adapter converts program to machine or controls directly machine
- 2219/35566 . . . Use of only delta x values, no absolute values
- 2219/35567 . . . Each block contains connection, index to other blocks, to form patterns
- 2219/35568 . . . Array structure corresponding to display format
- 2219/35569 . . . Single block format indicates change of speed at start and end
- 2219/35571 . . . Table with constant speed and corresponding distance for each segment
- 2219/35572 . . . Data contains header and type of data
- 2219/35573 . . . Header has code to select proper load program
- 2219/35574 . . . Header with information for display position
- 2219/35575 . . . Part program contains movement and condition statements
- 2219/35576 . . . Data divided in blocks to be covered by small movement, to origin by large movement
- 2219/35577 . . . Delta x, delta v and delta t
- 2219/35578 . . . Gerber, hp format to drive plotter or similar xy device
- 2219/35579 . . . Store motion parameters as function of encoder position
- 2219/35581 . . . Position data for module and position data within module
- 2219/35582 . . . Control format in browser, use of xml and xslt

- 2219/35583 . . . Difference between signals and sign of difference are the controlling signals
- 2219/35584 . . . Link geometry, workpiece data with machining data, select region
- 2219/35585 . . . Motion command profile
- 2219/35586 . . . Position, time and slope, tangent of curve
- 2219/35587 . . . Store curves with packed code, indicating bezier curve parameters
- 2219/35588 . . . Pack, compress data efficiently in memory
- 2219/36 . . . Nc in input of data, input key till input tape
- 2219/36001 . . . File format, initial graphics exchange specification, iges standard
- 2219/36002 . . . Dimensional measurement interface specification dmis standard
- 2219/36003 . . . Start key, switch to start performing program
- 2219/36004 . . . Program mask depends on physical position of panel
- 2219/36005 . . . Same knob, different functions, turn for position, push and turn for speed
- 2219/36006 . . . A key delivers a series of key codes
- 2219/36007 . . . Special keys, automatic switch over x or y to numerical values
- 2219/36008 . . . Illuminated, lighting up keys, build in led, display, show sequence data entry
- 2219/36009 . . . Keys with variable control code, multifunction keys
- 2219/36011 . . . Page key, go to next or previous page
- 2219/36012 . . . Percentage keys, input percentage values
- 2219/36013 . . . Up-down keys for calling sequentially functions, parameters
- 2219/36014 . . . Overlay to indicate function of key
- 2219/36015 . . . Display areas, fields on screen correspond to position of keys on panel, matrix
- 2219/36016 . . . Unified language for machines and translation to each
- 2219/36017 . . . Graphic assisted robot programming, display projection of surface
- 2219/36018 . . . Language for dimensional measuring, inspection
- 2219/36019 . . . Using interpreted descriptive commands giving G-codes
- 2219/36021 . . . Switch high level and assembly, machine language as function of capacity memory and speed
- 2219/36022 . . . Switch between machining language for execution and high level for editing
- 2219/36023 . . . Attribute programming
- 2219/36024 . . . State language
- 2219/36025 . . . Link, connect icons together to form program
- 2219/36026 . . . Combine general high level language and specialised plc language
- 2219/36027 . . . Decompiler, translate machine code to hll, reverse processing, easy modification
- 2219/36028 . . . C++
- 2219/36029 . . . Basic
- 2219/36031 . . . Programming in assembler, machine or high level language
- 2219/36032 . . . Script, interpreted language
- 2219/36033 . . . High level graphics language, gks
- 2219/36034 . . . APT
- 2219/36035 . . . Special language, task programming, oop object oriented programming
- 2219/36036 . . . Motion, graphical motion control language gmcl
- 2219/36037 . . . Application programming interface associates component code with driver function
- 2219/36038 . . . Ladder program for plc, using functions and motion data
- 2219/36039 . . . Learning task dynamics, process
- 2219/36041 . . . Edit program step by step
- 2219/36042 . . . Point to defect, faulty instruction or locus, call up corresponding command block
- 2219/36043 . . . Correction or modification of program
- 2219/36044 . . . Program modified after breakage, crash, jamming
- 2219/36045 . . . Skip of program blocks, jump over certain blocks
- 2219/36046 . . . Adapt, modify program as function of configuration of machine
- 2219/36047 . . . Edit program, change or not header, starting code, output new program with header
- 2219/36048 . . . Verify, probe workpiece, if position deviation edit, modify program
- 2219/36049 . . . Relational geometry, change one element, rest of part is adjusted according
- 2219/36051 . . . Store history of modified file, back-up, update, using different file extensions
- 2219/36052 . . . Tape tuning with expert system, correction of tape as function of measured parameters
- 2219/36053 . . . Adapt, modify program in real time as function of workpiece configuration
- 2219/36054 . . . Modify offset for whole sections collectively, different offsets for sections
- 2219/36055 . . . Separate, temporary memory or special storage region for corrections only
- 2219/36056 . . . Modify program, machining order in real time, during operation, dynamically
- 2219/36057 . . . Select center of pattern for placement of new scaled pattern
- 2219/36058 . . . Modify workpiece part program without changing approach program
- 2219/36059 . . . Modify approach program as function of changed part program
- 2219/36061 . . . Storage, memory area to store history data for previous corrections, editable
- 2219/36062 . . . Verify if editing, modifying program is suitable for connected controller
- 2219/36063 . . . During machining, compare simulated with detected profile, correct, modify program
- 2219/36064 . . . Modify data by using the four rules of arithmetic such as +sign, -sign, xsign, :sign
- 2219/36065 . . . Modify data by entering a compensation rate value
- 2219/36066 . . . Collectively modify data instead of each in particular
- 2219/36067 . . . Altering working order of program blocks
- 2219/36068 . . . Change program at allowed point of time or program step
- 2219/36069 . . . Display, on machining error, display error message and correct program
- 2219/36071 . . . Simulate on screen, if operation value out of limits, edit program
- 2219/36072 . . . Select pattern, input modification of tolerance
- 2219/36073 . . . Display original and modified part in different colour, highlight, shading, filling

2219/36074 . . .	Display part, select, mark element and edit corresponding block	2219/36118 . . .	Adapt interactive dialog, help to experience, short cut menu
2219/36075 . . .	Set certain command codes, discriminate codes and display in different colour	2219/36119 . . .	Mouse with buttons to assist operator with selection of menu instead of pointing
2219/36076 . . .	Select icon and display corresponding instructions	2219/36121 . . .	Tree oriented menu, go to root, scroll up down, select mode
2219/36077 . . .	Display and select, modify shape, pattern on screen	2219/36122 . . .	Operator menu with submenu for each item
2219/36078 . . .	Insert, read in new command instruction to modify fixed program	2219/36123 . . .	Store statistical history of selected menus, recall for quick data entry
2219/36079 . . .	Replace faulty instructions and execute only that portion of the program	2219/36124 . . .	Screen with certain display menu called by pointer, number
2219/36081 . . .	Merge, mix original program with teached program	2219/36125 . . .	Select out of library, beforehand only functions needed for part program
2219/36082 . . .	Delete a block by overwriting block with delete control character	2219/36126 . . .	Programmable, configurable function keys, execute a programmed sequence
2219/36083 . . .	Insert a block by using insert control character pointing to address in memory	2219/36127 . . .	Menu, help menu for operator, messages
2219/36084 . . .	Amend, modify program by inserting wait and wait dismiss command	2219/36128 . . .	Function menu, switches, keys replaced by menu
2219/36085 . . .	Replace faulty instructions from rom, tape by instructions from ram, error setting	2219/36129 . . .	Menu keys, function of keys soft defined
2219/36086 . . .	Select, modify machining, cutting conditions	2219/36131 . . .	Cyclic selection of functions or values by pushing a single key
2219/36087 . . .	Edit, modify program for position errors, moving path, use conversion matrix	2219/36132 . . .	Selection of menu with lightpen on screen, display
2219/36088 . . .	Machining parameters, override	2219/36133 . . .	MMI, HMI: man machine interface, communication
2219/36089 . . .	Machining parameters, modification during operation	2219/36134 . . .	Osf-motif standard
2219/36091 . . .	Modification, override as function of conditions, distance	2219/36135 . . .	Link between sequence, motion or process and diagnostic control
2219/36092 . . .	Override limit contour	2219/36136 . . .	User configurable graphics selected as function of kind of machining, display builder
2219/36093 . . .	Lookup table with override for each pattern, tool path	2219/36137 . . .	Configuration of display device, operator panel
2219/36094 . . .	Inhibit or permit override by separate manual switch	2219/36138 . . .	Configuration of operator panel, using os-2 modular programs, masks
2219/36095 . . .	Inhibit or permit override by program instruction	2219/36139 . . .	Edit templates for screen display, and use of keyboard
2219/36096 . . .	Override program by selecting another font, size for letters	2219/36141 . . .	Configuration with visual basic extension
2219/36097 . . .	Override program to scale workpiece	2219/36142 . . .	Using window display, selection of function calls in a window
2219/36098 . . .	Override program to execute a certain number of same blocks, repeat pattern	2219/36143 . . .	Use of icon to represent a function, part of program
2219/36099 . . .	Stop machine and correct position manually	2219/36144 . . .	Display of not allowed function in a different way, light
2219/36101 . . .	During machining keep override log, history, journal, kind of record playback	2219/36145 . . .	In case of alarm a window is maximised automatically
2219/36102 . . .	Display override log and nc instructions, select nc block to modify permanent	2219/36146 . . .	Group windows into coherent sets to facilitate a task
2219/36103 . . .	Adapt, update machining parameters automatically as function of state of processing	2219/36147 . . .	Limit number of windows displayed simultaneously
2219/36104 . . .	IC card	2219/36148 . . .	Main process, alarm window takes priority, always on top, safe view
2219/36105 . . .	Cd rom	2219/36149 . . .	Window, X window
2219/36106 . . .	Cassette	2219/36151 . . .	Display is a TV
2219/36107 . . .	Bubble memory	2219/36152 . . .	Panel
2219/36108 . . .	Eprom, eeprom, eerom	2219/36153 . . .	Two, several consoles, displays, panels, two different input, joystick
2219/36109 . . .	Flash memory	2219/36154 . . .	Two displays, for part shape and for corresponding instructions, block
2219/36111 . . .	Local memory instead of tape, or combined	2219/36155 . . .	Plc switches functions of panel when changing kind of machining
2219/36112 . . .	Floppy disk, diskette	2219/36156 . . .	Keyboard as a drawer
2219/36113 . . .	Rom	2219/36157 . . .	Pendant control box for handwheel control, mounted on controlled axis
2219/36114 . . .	Eprom, prom	2219/36158 . . .	Panel for disabled, scanned sequentially
2219/36115 . . .	Card		
2219/36116 . . .	Harddisk		
2219/36117 . . .	Magnetic tape cassette		

- 2219/36159 . . . Detachable or portable programming unit, display, pc, pda
- 2219/36161 . . . Common program panel for nc, pic, switch display diagnostic or part
- 2219/36162 . . . Pendant control box
- 2219/36163 . . . Local as well as remote control panel
- 2219/36164 . . . Common CRT for two input devices
- 2219/36165 . . . Common program panel for host and cnc, at cnc place, for data from host, cnc
- 2219/36166 . . . Several panels can be selected by rotation, limited space needed
- 2219/36167 . . . Use camera of handheld device, pda, pendant, head mounted display
- 2219/36168 . . . Touchscreen
- 2219/36169 . . . Remote, host controlled, operated manual data input, keyboard
- 2219/36171 . . . Edit velocity, motion profile, graphic plot of speed as function of time, position
- 2219/36172 . . . Select block, item, highlight, colour this block with respect to rest
- 2219/36173 . . . Combine record play back, hand wheel with normal cnc programming, software
- 2219/36174 . . . Program divided into modules
- 2219/36175 . . . Capture image of part, create automatically geometry, sequence of machining
- 2219/36176 . . . Edit servo control parameters
- 2219/36177 . . . Select block and display graphic representation associated with block type
- 2219/36178 . . . Derive finishing allowance, tolerance from shape and work information
- 2219/36179 . . . Combine nc programming with cad and order system
- 2219/36181 . . . Input part data, dimensions, without graphical representation of part
- 2219/36182 . . . First block contour then parameter input
- 2219/36183 . . . Offline teaching is sound assisted
- 2219/36184 . . . Record actions of human expert, teach by showing
- 2219/36185 . . . Application, for cylindrical groove shape
- 2219/36186 . . . Programming languages for lathe, mill or general use mixed
- 2219/36187 . . . End shape data input for end surface configuration
- 2219/36188 . . . Deep drilling cycle
- 2219/36189 . . . Wheel dressing program
- 2219/36191 . . . Prepare rough, coarse machining program
- 2219/36192 . . . End facing
- 2219/36193 . . . Semi finish and finish machining
- 2219/36194 . . . Taper angle machining
- 2219/36195 . . . Assembly, mount of electronic parts onto board
- 2219/36196 . . . Grinding cycle
- 2219/36197 . . . Non circular workpiece, radius and angle input
- 2219/36198 . . . Gear, thread cutting
- 2219/36199 . . . Laser cutting
- 2219/36201 . . . Hole machining
- 2219/36202 . . . Freeform surfaces
- 2219/36203 . . . Bending of workpiece, also for long slender workpiece
- 2219/36204 . . . Lathe, turning
- 2219/36205 . . . For aspheric non symmetrical mirrors
- 2219/36206 . . . Embroidery
- 2219/36207 . . . Involute curve, compressor
- 2219/36208 . . . Roll grinding
- 2219/36209 . . . Specify hole shape pattern for boring and store in hole file
- 2219/36211 . . . Using different cutter sizes, largest as possible for minimizing machining time
- 2219/36212 . . . Using generic virtual pocket, having virtual boundary, arbitrarily shaped
- 2219/36213 . . . Grouping of decomposed volumes with similar features
- 2219/36214 . . . Pocket machining, area clearance, contained cutting, axis milling
- 2219/36215 . . . Insert automatically program sequence, for corner execution, avoid machining error
- 2219/36216 . . . Replace entered position data with previous if difference less than tolerance
- 2219/36217 . . . Commands trigger programming functions
- 2219/36218 . . . Reuse stored data as programming data after confirmation
- 2219/36219 . . . Calculate machining information, like time, surface to be machined from program
- 2219/36221 . . . Entry of chamfer, beveling, rounding of corner shape
- 2219/36222 . . . Indicate entered element on top, next element below, after input, update top
- 2219/36223 . . . Enter machining conditions, determine automatically machining data
- 2219/36224 . . . Enter machining and positioning elements, derive order of execution in real time
- 2219/36225 . . . Select and insert program from library, select case, variant
- 2219/36226 . . . Global selection of grid or circle of points by number, distance, angle
- 2219/36227 . . . Assist operator to calculate unknown points, contours
- 2219/36228 . . . Combine two programs to obtain new shifted positions and new processing data
- 2219/36229 . . . Generate missed line when last end point is different from next start point
- 2219/36231 . . . Translate, convert machine independent to machine dependent program
- 2219/36232 . . . Before machining, convert, adapt program to specific possibilities of machine
- 2219/36233 . . . Convert program so that it can be executed in reverse order
- 2219/36234 . . . Convert program for a 2-axis machine into program for 4-axis machine
- 2219/36235 . . . Convert grinding machine oriented language to nc machine oriented
- 2219/36236 . . . Convert character, ascii, text code to internal code and vice versa
- 2219/36237 . . . Prepare nc program for selected, distinct nc machines
- 2219/36238 . . . Derive marking from punching program, secondary from principal program
- 2219/36239 . . . Determine automatic, manual machining of workpiece as function of specific possibilities of machine tool
- 2219/36241 . . . Convert, translate milling to laser machining program
- 2219/36242 . . . Convert program for different machines with different M-code, G-code, header
- 2219/36243 . . . Convert source, high level code to machine, object code
- 2219/36244 . . . Means, use of tables, correlating functions to instructions

- 2219/36245 . . . Use of tables to store order of execution of functions
- 2219/36246 . . . Comments, messages displayed with program instructions, explain process
- 2219/36247 . . . Remarks, comments as hierarchical structure, indented, corresponds to instructions
- 2219/36248 . . . Generate automatically machining, stitching points from scanned contour
- 2219/36249 . . . Generate automatically a balance program for workpiece, dynamic balance
- 2219/36251 . . . Superpose scanned or finished object image on workpiece model for best fitting
- 2219/36252 . . . Generate machining program based on a simulation to optimize a machine parameter
- 2219/36253 . . . Generate machining program from previous test run
- 2219/36254 . . . Generate machining program from history of similar tools
- 2219/36255 . . . Machining condition, parameter is workpiece conicity, inclination between surfaces
- 2219/36256 . . . Define upper lower limit of reciprocating machining, chopping
- 2219/36257 . . . Indicate region and kind of machining on shape of part
- 2219/36258 . . . Machining planning, indicate kind of operation
- 2219/36259 . . . Indicate primary and secondary operations on shape, deliver nc data for each
- 2219/36261 . . . Program with subroutines for machining process
- 2219/36262 . . . Input workpiece mounting position, setup
- 2219/36263 . . . Select cutting direction
- 2219/36264 . . . Program movement from first to second machining area
- 2219/36265 . . . Set machining start point from tool, machining data avoiding interference
- 2219/36266 . . . Tool path editor, for offset, multi-passes
- 2219/36267 . . . Process planning editor
- 2219/36268 . . . From blank and finished entered shape, derive machining features
- 2219/36269 . . . Separate machining data as function of dependance or independence of material
- 2219/36271 . . . Enter, edit workpiece data
- 2219/36272 . . . Enter start position, program number for each workpiece
- 2219/36273 . . . Use general and tool data to select available tool and machining operation
- 2219/36274 . . . Automatic calculation cutting conditions, but operator can enter them also
- 2219/36275 . . . Select automatically transmission ratio as function of programmed speed
- 2219/36276 . . . Program virtual, logical tools, select tool from tables
- 2219/36277 . . . Flexible fixturing, clamp workpiece, mark clamp regions and store them
- 2219/36278 . . . Topological classification of forming, machining process
- 2219/36279 . . . Machining parameter is strategy for making corners
- 2219/36281 . . . Machining parameter is technology: surface roughness, corner, contour tolerance
- 2219/36282 . . . Divide complex sculptured surface into smaller, easier to machine areas
- 2219/36283 . . . Select, enter machining, cutting conditions, material file, tool file
- 2219/36284 . . . Use of database for machining parameters, material, cutting method, tools
- 2219/36285 . . . Display symbol pattern for kind of machining performed
- 2219/36286 . . . Show shape of workpiece, point to coordinates to enter machining parameters
- 2219/36287 . . . Selection of speed as function of tool diameter
- 2219/36288 . . . Select machining method, parameters as function of dimensions of workpiece
- 2219/36289 . . . Cutting, machining conditions by optimisation of time, cost, accuracy
- 2219/36291 . . . Cutting, machining conditions by empirical equation, like tool life
- 2219/36292 . . . Method to drill, machine based on ratio bore depth, diameter, select tools
- 2219/36293 . . . Set feed and speed for specified tool, workpiece as function of ratio cutting force, speed
- 2219/36294 . . . Stored coefficients, standard cutting conditions, calculate for entered material
- 2219/36295 . . . Select optimum process for manufacturing articles with longer life
- 2219/36296 . . . Order, select, determine, change machining sequence, order
- 2219/36297 . . . Machining plan, indicate order of machining as function of presence of operator
- 2219/36298 . . . Enter, change order of different programs to be executed
- 2219/36299 . . . Generate sequences of operations starting from finished product, end with raw
- 2219/36301 . . . Optimisation of sequence of operations
- 2219/36302 . . . Determine several machining processes and order as function of available tools
- 2219/36303 . . . Determine several machining processes and order as function of number of mountable tools
- 2219/36304 . . . Divide into several machining processes, divide each also in several sub processes
- 2219/36305 . . . Table, correlation tool type and machining category, process
- 2219/36306 . . . Table correlation different turrets, slides and possible simultaneous operations
- 2219/36307 . . . Table with workpiece features and corresponding machining parameters, methods
- 2219/36308 . . . Table for cutting conditions
- 2219/36309 . . . Program has different modules, each with own load program
- 2219/36311 . . . Machining mode selection, pocket, grooving, raster, area, profile
- 2219/36312 . . . Enter shape with cursor, joystick directions up, down, left, right, slash
- 2219/36313 . . . If elements cannot be combined, show error
- 2219/36314 . . . Superpose and combine shapes
- 2219/36315 . . . Library for shapes of tool holders, fixtures, chucks
- 2219/36316 . . . Define profile from elements, show only selectable elements
- 2219/36317 . . . Input symbol for element, search in library and display
- 2219/36318 . . . Enter start, begin and stop, end point
- 2219/36319 . . . Simplify display, calculation of shapes by deleting holes, grooves
- 2219/36321 . . . Program only shape, add approach path and machining conditions automatically

- 2219/36322 . . . Program shape interactively and tool change position manually by teaching
- 2219/36323 . . . Shape is alphabetical character
- 2219/36324 . . . Scan drawing, sketch of part, enter on screen coordinates, lines, circles
- 2219/36325 . . . Enter shape with mouse, tablet, enter on screen coordinates, lines, circles
- 2219/36326 . . . Define blank, part, area
- 2219/36327 . . . Define shape of part
- 2219/36328 . . . Display closed shape
- 2219/36329 . . . Display path on cylinder by developing cylinder into a plane
- 2219/36331 . . . Display block with cursor or highlight actual contour element
- 2219/36332 . . . Display different faces of work in different colour
- 2219/36333 . . . Selection from standard forms, shapes, partprograms, enter value for variable
- 2219/36334 . . . Select a shape, select a point or line and enter data
- 2219/36335 . . . Select and show already defined lines, circles to define from them new element
- 2219/36336 . . . Select a shape and use it to create a similar shape
- 2219/36337 . . . Select similar shape and derive motion defining sentences from original shape
- 2219/36338 . . . Create program for parallel, simultaneous operated slides, timing
- 2219/36339 . . . Time necessary for one slide equals time for second slide
- 2219/36341 . . . Prepare program to control multiple slides at the same time
- 2219/36342 . . . Tool path processing, sequence to cut paths
- 2219/36343 . . . Select machining method as function of selected tool
- 2219/36344 . . . Display different tools in different colours
- 2219/36345 . . . Prepare program for minimal idle strokes with multitool turret
- 2219/36346 . . . Display feed quantity and cutting speed as function of material to help user
- 2219/36347 . . . Select tool if tool life duration is sufficient for operation
- 2219/36348 . . . Enter, edit tool, cutter data
- 2219/36349 . . . Compensation part program with form of tool, in memory
- 2219/36351 . . . Display tool shapes to select tool and enter tool dimensions
- 2219/36352 . . . Select tool as function of part shape, number of grooves and groove width
- 2219/36353 . . . Display different offset surfaces in different colours to select right tool
- 2219/36354 . . . Select from table with machining type and corresponding tools
- 2219/36355 . . . Select tool with fuzzy logic
- 2219/36356 . . . Select tool as function of collision avoidance
- 2219/36357 . . . Tool line up, select right order of tool, optimal tool order loading, tool file
- 2219/36358 . . . Use of cd rom with catalog of tools
- 2219/36359 . . . As function of tool location
- 2219/36361 . . . Tool change time, program for optimal tool change time
- 2219/36362 . . . Tool change time as function of location in tool magazine, index
- 2219/36363 . . . Tool change time as function of cutter trajectory, spindle and slide times
- 2219/36364 . . . Tool change time as function of tool switch time, to replace tool with another
- 2219/36365 . . . Program so that minimal tool changes are needed
- 2219/36366 . . . Data, read in, distribution
- 2219/36367 . . . A tape reader for each axis
- 2219/36368 . . . Tape reader
- 2219/36369 . . . Measuring object, spectacle glass, to derive position data
- 2219/36371 . . . Barcode reader
- 2219/36372 . . . Light, magnetic pen
- 2219/36373 . . . Common tape reader for two controllers
- 2219/36374 . . . Dual, multiple tape reader
- 2219/36375 . . . Combination of two devices, floppy disk and tape reader
- 2219/36376 . . . Read out of memory synchronized with machine driven axis
- 2219/36377 . . . Read of several jobs
- 2219/36378 . . . Either from tape or other source, using same electronics
- 2219/36379 . . . Read in
- 2219/36381 . . . Timing, synchronization, start of reader
- 2219/36382 . . . Speed of read in of data as function of available power for driving servo, safety
- 2219/36383 . . . Manual input combined with input from computer or tape
- 2219/36384 . . . Load machining program and workpiece delivery program together
- 2219/36385 . . . Transfer, load data from rom, bubble memory into ram
- 2219/36386 . . . Bootstrap loader
- 2219/36387 . . . Interface between reader and nc
- 2219/36388 . . . Simulate reader to input data direct to nc, behind tape reader BTR
- 2219/36389 . . . Switch between input from internal manual thumbwheel and external input
- 2219/36391 . . . Keep subsystem stopped while load of program
- 2219/36392 . . . Rewrite date if power loss, check flag area, marked at start, end of writing
- 2219/36393 . . . Variable read in speed, from max to zero, controls execution speed of program
- 2219/36394 . . . Read in data from connected pc instead of nc control panel
- 2219/36395 . . . Load local computer program from host, data transfer ram to rom, BTR
- 2219/36396 . . . Load also function code needed to execute part program, compact controller
- 2219/36397 . . . Read reference data only after certain delay, to be sure data will not change
- 2219/36398 . . . Read of handwritten text
- 2219/36399 . . . On excess error or on release joystick stop movement, dead man, shut off motors
- 2219/36401 . . . Record play back, teach position and record it then play back
- 2219/36402 . . . Use rope, wire, cable, chain to record position and for playback
- 2219/36403 . . . Incremental detector of position deviation attached to tool for correction
- 2219/36404 . . . Adapt taught position as function of deviation 3-D, 2-D position workpiece

- 2219/36405 . . . Adjust path by detecting path, line with a photosensor
- 2219/36406 . . . Use a spring or gas pressure to keep tool on desired path
- 2219/36407 . . . Follow path with probe, store deviations for correction during normal operation
- 2219/36408 . . . During machining, store begin and end of region not finished during first pass
- 2219/36409 . . . Geometric adaptation by sensing force on surface of workpiece, object
- 2219/36411 . . . By coarse model of robot to modify commands, learned by feedforward controller
- 2219/36412 . . . Fine, autonomous movement of end effector by using camera
- 2219/36413 . . . Adapt playback as function of hardness material, time comparison to reach start point
- 2219/36414 . . . Compare image detected path with stored reference, difference corrects position
- 2219/36415 . . . Adjust path and attitude tool by detecting path, line with a photosensor, laser
- 2219/36416 . . . Adapt taught position as function of deviation 3-D, 2-D position of end effector, tool
- 2219/36417 . . . Programmed coarse position, fine position by alignment, follow line, path adaptive
- 2219/36418 . . . Modify trajectory by operator gesture, gesture force sensed by end effector
- 2219/36419 . . . Compare modified, corrected path with stored reference, difference too large alarm
- 2219/36421 . . . Assist in correction of position to form a circle or line
- 2219/36422 . . . During teaching shut off, disable motor to move arm easy
- 2219/36423 . . . During teaching release brake or decouple clutch from motor
- 2219/36424 . . . Balance mechanically arm to be moved
- 2219/36425 . . . Move manually, touch surface, record position
- 2219/36426 . . . Pilot lamp on end effector to guide operator
- 2219/36427 . . . Jog feed to a command position, if close enough robot takes over positioning
- 2219/36428 . . . During teaching set torque instruction for motor to zero
- 2219/36429 . . . Power assisted positioning
- 2219/36431 . . . Tv camera in place of tool, on display operator marks points, crosshair
- 2219/36432 . . . By putting some constraints on some DOF, move within limited volumes, areas, planes, limits motion in x, y or z planes, virtual reality constraints
- 2219/36433 . . . Position assisted teaching
- 2219/36434 . . . During teaching direct control signal to power servo for quick response
- 2219/36435 . . . Electromyographical, myoelectric control signal
- 2219/36436 . . . Arm follows movement of handheld device, camera detects, analyses motion
- 2219/36437 . . . Follow coarse programmed surface, detect contact feeler or no force, record point
- 2219/36438 . . . Manually selection of points on surface to select area to scan automatically
- 2219/36439 . . . Guide arm in path by slaving arm to projected path, beam riding
- 2219/36441 . . . Follow contour, line with sensor and record points
- 2219/36442 . . . Automatically teaching, teach by showing
- 2219/36443 . . . Auto follow coarse contour, operator can correct contour before recording
- 2219/36444 . . . Contour, teach contour of sawblade
- 2219/36445 . . . Mode selection between large displacement and precision work
- 2219/36446 . . . Keep tool stationary, move workpiece
- 2219/36447 . . . Project light on path to be followed, keep also distance constant
- 2219/36448 . . . Teaching, consider workpoint on workpiece temporarily as tip of end effector
- 2219/36449 . . . During teaching use standard subroutines, assemble them to macro sequences
- 2219/36451 . . . Handheld toollike probe, work instructor, lightweighted, connected to recorder
- 2219/36452 . . . Touch points with handheld probe, camera detects position and orientation probe
- 2219/36453 . . . Handheld tool like probe
- 2219/36454 . . . Master slave, director agent, operator replication
- 2219/36455 . . . Sensor, tactile feedback, operator feels forces of tool on workpiece
- 2219/36456 . . . Learning tool holding dynamics
- 2219/36457 . . . During teaching, force set point is automatically adapted to circumstances
- 2219/36458 . . . Teach only some points, for playback interpolation between points
- 2219/36459 . . . offline program for plural robots, send data to corresponding robots
- 2219/36461 . . . Teach for each next similar fixture, piece only some reference points
- 2219/36462 . . . Minimize teach time, compress data, many points in curve, few in line
- 2219/36463 . . . Manual switch to drive motor to wanted position, store, memorize position
- 2219/36464 . . . Position, teach, store extreme, full open, closed positions
- 2219/36465 . . . Teach and store also intermediate, between full open and closed positions, areas
- 2219/36466 . . . Teach motion profile in both directions, between full closed and open position
- 2219/36467 . . . Teach and store time needed from open to closed and closed to open position
- 2219/36468 . . . Teach and store intermediate stop position in moving route to avoid collision
- 2219/36469 . . . Separate axis movement with higher acceleration replaces simultaneous movement
- 2219/36471 . . . Recording speed different from playback speed
- 2219/36472 . . . During teaching low servo power, during playback high servo power
- 2219/36473 . . . Prohibit teaching if force, speed, acceleration of end effector is out of safe range
- 2219/36474 . . . Prohibit normal manipulator control during teaching
- 2219/36475 . . . When operator near robot, local pendant is enabled otherwise select local remote
- 2219/36476 . . . Record points if sufficient difference with previous position exists
- 2219/36477 . . . Timing record position according to pulses coding wheel
- 2219/36478 . . . Record on predetermined time, read in position, measured data
- 2219/36479 . . . Record position on trigger of touch probe
- 2219/36481 . . . Record at predetermined distances, read in position, measured data

2219/36482	. . .	Recording of position and of command instructions	2219/36523	. . .	Select with code on workpiece, fixture, clamp, object
2219/36483	. . .	Recording mechanical properties, tonal quality by force detection	2219/36524	. . .	Selection of Rom and ram
2219/36484	. . .	Each teach point has a correlated amount of shift data, independently modified	2219/36525	. . .	On bad data block, reverse motion, correct and execute block
2219/36485	. . .	Memorize open and closed state, motion parameters at each start up	2219/36526	. . .	Regenerate, hold reference previous block for bad actual value, block
2219/36486	. . .	Memorize workpiece deviations as function of angle, compensate, extra feed	2219/36527	. . .	Separate input for machine data from operator and for program from programmer
2219/36487	. . .	Record position, motion and sound	2219/36528	. . .	Interlock, inhibit nc control while transferring data from host
2219/36488	. . .	Record motion and emotion, mimics	2219/36529	. . .	Warn, alert, notify operator to confirm a preset override value, command
2219/36489	. . .	Position and force	2219/36531	. . .	Inhibit, ignore or postpone new command if previous is still in execution
2219/36491	. . .	Contour of workpiece where other workpiece is to be installed	2219/36532	. . .	Detect overflow of buffer
2219/36492	. . .	Record position and orientation, posture of probe, tool	2219/36533	. . .	Writing critical contour data as a whole, inhibit read out during writing
2219/36493	. . .	Position of stillstand if no reverse and acceleration only, data compression	2219/36534	. . .	Manual input overrides automatic control
2219/36494	. . .	Record position and inclination of tool, wrist	2219/36535	. . .	Check if instruction is executable, if not message to operator
2219/36495	. . .	Recording position and other parameters, current, tool diameter, voltage	2219/36536	. . .	Inhibit, forbid, prevent execution of program if no tool or workpiece data
2219/36496	. . .	Memorize open, closed state of hand and corresponding motion parameters such as open, close and move, no move	2219/36537	. . .	On error acoustic signal
2219/36497	. . .	Select program, main and secondary program	2219/36538	. . .	Different tunes, melodies, voice patterns for different error indication
2219/36498	. . .	Main and secondary program for repeating same operations	2219/36539	. . .	Different colours for program and machine error, failure display
2219/36499	. . .	Part program, workpiece, geometry and environment, machining dependant, combine	2219/36541	. . .	Operation command stored in register, on completion also in other register
2219/36501	. . .	For each contour a tape, a program	2219/36542	. . .	Cryptography, encrypt, access, authorize with key, code, password
2219/36502	. . .	Ram for variable servo data, rom for fixed servo routine	2219/36543	. . .	Input a standard value automatically on power up or after power loss
2219/36503	. . .	Adapt program to real coordinates, software orientation	2219/36544	. . .	Inhibiting manual control while under automatic, other control <u>vice versa</u>
2219/36504	. . .	Adapt program to real coordinates, shape, dimension of tool, offset path	2219/36545	. . .	Safety, save data at power loss
2219/36505	. . .	Compare stored conditions to actual, adapt program	2219/36546	. . .	Memory protection, protected fields
2219/36506	. . .	Store in Rom and Ram	2219/36547	. . .	Use binary code to avoid program tampering
2219/36507	. . .	Select program or execute command, control instructions as function of axis position	2219/36548	. . .	Save data if trigger signal received
2219/36508	. . .	Each pallet, workpiece, tool holder, selects corresponding tape reader, program	2219/36549	. . .	Regenerate faulty program block from previous and next block
2219/36509	. . .	Select as function of shape, dimension of workpiece	2219/36551	. . .	Inhibiting control after detecting data error
2219/36511	. . .	Select by a detector	2219/36552	. . .	Inhibiting simultaneous input from local and remote keyboard
2219/36512	. . .	Select by a selector, dip switch	2219/36553	. . .	Track, channel on tape for each direction of movement
2219/36513	. . .	Select out of a plurality of programs, patterns	2219/36554	. . .	Copy modified, corrected program to another tape, keep original intact
2219/36514	. . .	Select by force, height or other detection	2219/36555	. . .	Two tapes, programs one for position data, one for commands
2219/36515	. . .	As function of material or pattern direction, nerves of wood for optimal cutting	2219/36556	. . .	Compare, check original tape with converted, copy tape
2219/36516	. . .	Select acceleration deceleration profile as function of kind of machine	2219/36557	. . .	Copy entered program in memory to tape
2219/36517	. . .	Selecting nc program points to mated manipulator, robot program	2219/36558	. . .	Forward and backward reading of tape, reverse execution program
2219/36518	. . .	Selection of calibration program as function of parameter to be calibrated	2219/36559	. . .	Copy one tape to another, transfer program from tape to tape, back-up
2219/36519	. . .	After sporadic change of program, return to program in use before	2219/36561	. . .	Tape, band
2219/36521	. . .	Select by combination of detected force, acceleration, speed, work rate	2219/36562	. . .	One tape, copy feeler controls several machines
2219/36522	. . .	Select program using a management, workpiece number	2219/36563	. . .	Two tapes
			2219/36564	. . .	Position of hole in tape corresponds with position of hole on workpiece

- 2219/36565 . . . Cartesian and polar data mixed
- 2219/36566 . . . Mix polar data with cartesian data
- 2219/36567 . . . On tape also commands for equipment attached to machine
- 2219/36568 . . . Control data is sequence of position, axis indication, time delay for speed
- 2219/36569 . . . Enter, punch only different, changed data, same not repeated in next block
- 2219/36571 . . . Coarse and fine dimensions
- 2219/36572 . . . Macro data or coarse dimension on tape
- 2219/36573 . . . X, y, z and tooloffset values or direction values
- 2219/36574 . . . Absolute x or delta x values
- 2219/36575 . . . On tape reference and command signals
- 2219/36576 . . . Relative phase of signals is variable
- 2219/36577 . . . Signals have a position dependant frequency
- 2219/36578 . . . Tracks for x, two for delta x, one for sign, three for y
- 2219/36579 . . . Only true dimension is recorded, no tool offset
- 2219/36581 . . . X, Y, Vx, Vy
- 2219/36582 . . . Special order
- 2219/36583 . . . Each punched hole is one pulse, increment
- 2219/36584 . . . X, Y, Z and tool offset or corrections
- 2219/36585 . . . Speed and acceleration, rate of change of speed
- 2219/36586 . . . Word address format
- 2219/36587 . . . Binary format
- 2219/36588 . . . Endless loop
- 2219/36589 . . . Making control tape
- 2219/36591 . . . Tape moves synchronized with machine driven axis
- 2219/36592 . . . Each track controls an axis
- 2219/37 . . Measurements
- 2219/37001 . . . Measuring problems
- 2219/37002 . . . Absence, detect absence, presence or correct position of workpiece
- 2219/37003 . . . Detect if no workpiece in holder
- 2219/37004 . . . Detect absence of tool
- 2219/37005 . . . Absence of tool accessories, material, like nails, staples, glue
- 2219/37006 . . . Measuring bars
- 2219/37007 . . . Join bars or cilinders binary
- 2219/37008 . . . Calibration of measuring system, probe, sensor
- 2219/37009 . . . Calibration of vision system, camera, adapt light level
- 2219/37011 . . . Set absolute marks on disk as exact position or address to position memory
- 2219/37012 . . . Adjust angular position of transducer
- 2219/37013 . . . Faulty number of total scale increments corrected evenly over scale
- 2219/37014 . . . Use of calibration bar, bar with cams
- 2219/37015 . . . Adaptive online camera, vision calibration
- 2219/37016 . . . Calibrate dc offset, measure offset and maintain fixed level
- 2219/37017 . . . Calibration of vision system, set correct attitude of sensor to workpiece
- 2219/37018 . . . Make measuring scale machine tool
- 2219/37019 . . . Position detection integrated in actuator, lvdt integrated linear actuator
- 2219/37021 . . . Robot controls position of touch probe
- 2219/37022 . . . Detector, measuring device incorporated within workpiece holder
- 2219/37023 . . . Step motor used as measuring device and as drive motor
- 2219/37024 . . . Measure single value, parameter with two detectors
- 2219/37025 . . . Retract, swing out of the way, measuring device during normal machining for protection
- 2219/37026 . . . Adjust sensor radially
- 2219/37027 . . . Sensor integrated with tool or machine
- 2219/37028 . . . Detail, extended range, discrimination, switch from one range to other
- 2219/37029 . . . Power supply position detector in common with drive motor
- 2219/37031 . . . Lvdt for x and y in a plane, center lines intersect at locating point
- 2219/37032 . . . Generate vibrations, ultrasound
- 2219/37033 . . . Energy saving by powering feedback device, potentiometer only during measuring
- 2219/37034 . . . Actuator coil is also used as measuring coil
- 2219/37035 . . . Sensor in air gap of drive, detect directly speed or position
- 2219/37036 . . . Position normally, stop, measure position tool with second independent sensor
- 2219/37037 . . . Remeasure workpiece regularly for deformation
- 2219/37038 . . . Protection cover over measuring device, probe, feeler opened when measuring
- 2219/37039 . . . Digitize position with flexible feeler, correction of position as function of flexion
- 2219/37041 . . . Digitize, electric wires form grid on surface
- 2219/37042 . . . Photographic, picture on film, photogrammetry
- 2219/37043 . . . Touch probe, store position of touch point on surface
- 2219/37044 . . . Ultrasound transmitters on surface, touch probe detects ultrasound, triangulation
- 2219/37045 . . . Probe detects electromagnetic fields from grid, antenna like digitizing tablet
- 2219/37046 . . . Use simultaneous several pairs of stereo cameras, synchronized
- 2219/37047 . . . After digitizing, edit graphically data
- 2219/37048 . . . Split beam, stripe projection on object, lines detected with cameras
- 2219/37049 . . . First a rasterscan, then align workpiece as function of height average, scan again
- 2219/37051 . . . First coarse measurement, around each point a fine measurement of surface
- 2219/37052 . . . Sense surface, mean value used as reference surface
- 2219/37053 . . . Optical triangulation
- 2219/37054 . . . Digitize every grid point of a raster
- 2219/37055 . . . Project stripes having a regular sine wave
- 2219/37056 . . . Mark point to be digitized graphically on screen
- 2219/37057 . . . Several feelers, probes touch model in rasterpoints
- 2219/37058 . . . Digitize not only position but also colour
- 2219/37059 . . . Probe connected to three pair of wires of which the length is measured
- 2219/37061 . . . Use matrix of optical sensors to detect form, edges of object
- 2219/37062 . . . Regulated scanning, the head deflection is controlled by a regulation circuit
- 2219/37063 . . . Controlled scanning, the head is moved along a given path
- 2219/37064 . . . After digitizing, reconstruct surface by interpolating the initial mesh points

- 2219/37065 . . . Map of stiffness, compliance of object
- 2219/37066 . . . Image from object together with references on background
- 2219/37067 . . . Calibrate work surface, reference markings on object, work surface
- 2219/37068 . . . Setting reference coordinate frame
- 2219/37069 . . . Calibrate probe, imitated tool, repeated measurements for different orientations
- 2219/37071 . . . Measurement program is created, executed on object data, no real object, no CMM is present
- 2219/37072 . . . Surface covered with grid of electric wires, of coloured tape on object
- 2219/37073 . . . Workpiece surface covered with shielding coating, against disturbing fields
- 2219/37074 . . . Projection device, monitor, track tool, workpiece form, process on display
- 2219/37075 . . . Print out of document measured results or record on tape
- 2219/37076 . . . Display load on tool, motor graphically on screen
- 2219/37077 . . . Relative movement
- 2219/37078 . . . Display machining, processing parameters with curves, pictograms
- 2219/37079 . . . Display probing result on drawing taken from cad data
- 2219/37081 . . . Display machining parameters
- 2219/37082 . . . Indicate, point region on path, locus, display path and machining parameters
- 2219/37083 . . . Switch display from normal mode to inspection mode, to monitor conditions
- 2219/37084 . . . Display tool parameters
- 2219/37085 . . . Display in real time of state variables of control system
- 2219/37086 . . . Display real, measured machining load
- 2219/37087 . . . Cutting forces
- 2219/37088 . . . Indicate service condition, status
- 2219/37089 . . . Speed error
- 2219/37091 . . . Motion and force
- 2219/37092 . . . Display position actual and or target
- 2219/37093 . . . Display speed
- 2219/37094 . . . Hall sensor
- 2219/37095 . . . Digital handheld device with data interface
- 2219/37096 . . . Invar scale, low temperature coefficient
- 2219/37097 . . . Marker on workpiece to detect reference position
- 2219/37098 . . . X y scale plate instead of two ruler scale, two dimensional scale
- 2219/37099 . . . One detector for coarse and fine target location, variable resolution
- 2219/37101 . . . Vector gauge, telescopic ballbar
- 2219/37102 . . . Single detector for whole range, both x and y axis
- 2219/37103 . . . Limit, proximity switch
- 2219/37104 . . . Absolute encoder
- 2219/37105 . . . Soft limit, store limits in counters, use content of counters as limit
- 2219/37106 . . . Inductive, differential transformer, pins
- 2219/37107 . . . Acupin
- 2219/37108 . . . Rasters, grid on xy-plane
- 2219/37109 . . . Photoelectric scanned raster, rule and photocell, microscope
- 2219/37111 . . . Rule and photocell, microscope
- 2219/37112 . . . Several scales with one device
- 2219/37113 . . . Psd position sensitive detector, light spot on surface gives x, y position
- 2219/37114 . . . Precision screw
- 2219/37115 . . . Photogrammetric position detection
- 2219/37116 . . . Shape sensor leads tool, in front of tool
- 2219/37117 . . . Optical sensor, delivers analog signal as function of displacement
- 2219/37118 . . . Inductive, coil moves over conical, tapered core
- 2219/37119 . . . Atomic force probe
- 2219/37121 . . . Linear transducer
- 2219/37122 . . . Signal analyser
- 2219/37123 . . . Extensible ball bar with potentiometer, lvdt
- 2219/37124 . . . Magnetic sensor
- 2219/37125 . . . Photosensor, as contactless analog position sensor, signal as function of position
- 2219/37126 . . . Wire, tape around cylinder measures displacement, string encoder
- 2219/37127 . . . Spm scanning probe microscopy, stm scanning tunneling microscopy
- 2219/37128 . . . Tool itself emits vibrations to be detected to build an image of surface
- 2219/37129 . . . Mark, engrave workpiece at specific surface point for measurement, calibration
- 2219/37131 . . . Moire pattern, diffraction grating, fringe
- 2219/37132 . . . Polyhedral prism
- 2219/37133 . . . Linear, rotary variable differential transformer, lvdt, rvdt
- 2219/37134 . . . Gyroscope
- 2219/37135 . . . Two counters receiving pulses from two encoders, one for speed, one for position
- 2219/37136 . . . Control resolution of encoder
- 2219/37137 . . . Encoder combined with barcode label, reader
- 2219/37138 . . . Encoder and gear and absolute coder, give together absolute position of rotation
- 2219/37139 . . . Sampling output of encoder at precisely defined intervals
- 2219/37141 . . . Programmable divider for counter as buffer for microprocessor, read on interrupt
- 2219/37142 . . . Center position between two pulses, in the middle of a bit
- 2219/37143 . . . Divide feedback pulses to make feedback independent from resolution encoder
- 2219/37144 . . . Delay marker to synchronize motions
- 2219/37145 . . . Multiturn fine counter counts total pulses, index counter counts turns
- 2219/37146 . . . Second counter reset to zero on marker, to detect counting errors
- 2219/37147 . . . Sampling rate low during power loss
- 2219/37148 . . . Switch between rise, fall of pulses of one phase and of both phases, coarse fine
- 2219/37149 . . . Multiplexer to send encoder and rotor pole position to same output lines
- 2219/37151 . . . Handling encoder signal, compensation for light variation, stray light
- 2219/37152 . . . Combination 00-01-10-11, previous, actual pulses, or two series of pulses, and rom
- 2219/37153 . . . Encoder delivers only one channel of pulses, using only one detector
- 2219/37154 . . . Encoder and absolute position counter
- 2219/37155 . . . Encoder and delta position counter
- 2219/37156 . . . Pulse derived from belt driving drum

- 2219/37157 . . . Pulses derived from brake disk having north and south poles
- 2219/37158 . . . Pulse derived from perforated belt along track
- 2219/37159 . . . Source of pulse, pulse derived from gear, plate teeth
- 2219/37161 . . . Motor rotor has a normal magnetised ring and a second ring, magnetic decoder
- 2219/37162 . . . Marker, reflector mounted on chuck, workpiece holder
- 2219/37163 . . . Marker derived from phase of motor
- 2219/37164 . . . Pulse derived from encoder built into ball bearing
- 2219/37165 . . . Derive pulse from commutation position, build into brushless motor
- 2219/37166 . . . Rotating magnets shunt motor over resistance, cause current variations
- 2219/37167 . . . Count number of periods of voltage supply
- 2219/37168 . . . Inductive sensor senses fluctuations, spikes in motor current
- 2219/37169 . . . Derive incremental pulse from motor current deviation
- 2219/37171 . . . Commutation brushes, sensors deliver increment
- 2219/37172 . . . Encoder with hall effect and reed relays, and decoder gives absolute position
- 2219/37173 . . . Encapsulate electronics of encoder in resin, electronics and encoder integrated
- 2219/37174 . . . Encoder with infrared
- 2219/37175 . . . Normal encoder, disk for pulses, incremental
- 2219/37176 . . . Disk emits phase shifted pulses, special convertor
- 2219/37177 . . . Linear encoder
- 2219/37178 . . . Magnetic marks on screw
- 2219/37179 . . . Coarse encoder combined with fine grid ccd detector
- 2219/37181 . . . Encoder delivers sinusoidal signals
- 2219/37182 . . . Slit plate encoder
- 2219/37183 . . . Marker or index or coded information as well as position pulses
- 2219/37184 . . . Hall generator cooperates with magnetic ring, gives signal with dc offset
- 2219/37185 . . . Magnetic ring and sensor
- 2219/37186 . . . Camera reads large number of marks, derive frequency of dark-light
- 2219/37187 . . . Disk with magnetic, inductive sensors
- 2219/37188 . . . Encoder pulses reset high resolution clock, get position from counting clock pulses
- 2219/37189 . . . Camera with image processing emulates encoder output
- 2219/37191 . . . General problems for standing waves, torque, surface inspection
- 2219/37192 . . . Problems
- 2219/37193 . . . Multicoordinate measuring system, machine, cmm
- 2219/37194 . . . Probe work, calculate shape independent of position, orientation, best fit
- 2219/37195 . . . Measuring dimension independent from accuracy of nc, machine tool
- 2219/37196 . . . Measuring station, flexible, integrated cmm
- 2219/37197 . . . From measured data derive form, roundness, orientation, parallel, straightness
- 2219/37198 . . . Machine as measuring station, use tool or probe, in process incycle
- 2219/37199 . . . Hole location
- 2219/37201 . . . Measuring several points at the same time
- 2219/37202 . . . Footprint, probe piece on machine, then on cmm to avoid errors of machine
- 2219/37203 . . . Compensate probed values as function of reference plane of fixture, clamp
- 2219/37204 . . . Move synchronously associated sensor elements independently at both sides
- 2219/37205 . . . Compare measured, vision data with computer model, cad data
- 2219/37206 . . . Inspection of surface
- 2219/37207 . . . Verify, probe, workpiece
- 2219/37208 . . . Vision, visual inspection of workpiece
- 2219/37209 . . . Estimate life of gear, drive
- 2219/37211 . . . Measure temperature, compensate cmm program for temperature
- 2219/37212 . . . Visual inspection of workpiece and tool
- 2219/37213 . . . Inhibit measuring if one of the joints is near endstop
- 2219/37214 . . . Detect failed machine component, machine performance degradation
- 2219/37215 . . . Inspect application of solder paste, glue to workpiece
- 2219/37216 . . . Inpect component placement
- 2219/37217 . . . Inspect solder joint, machined part, workpiece, welding result
- 2219/37218 . . . Compensate for offset due to probe diameter, detect exact contact point
- 2219/37219 . . . Predict next probed point from previous probed points
- 2219/37221 . . . Probe fixture to know datum points
- 2219/37222 . . . Probe workpiece for correct setup
- 2219/37223 . . . Identify minimum number of appropriate measuring points
- 2219/37224 . . . Inspect wafer
- 2219/37225 . . . Tool holder, measure forces in chuck, tool holder
- 2219/37226 . . . Monitor condition of spindle, tool holder, transmit to nc controller
- 2219/37227 . . . Probing tool for its geometry
- 2219/37228 . . . Tool inspection, condition, dull tool
- 2219/37229 . . . Test quality tool by measuring time needed for machining
- 2219/37231 . . . Tool used as touch probe, sensor
- 2219/37232 . . . Wear, breakage detection derived from tailstock, headstock or rest
- 2219/37233 . . . Breakage, wear of rotating tool with multident saw, mill, drill
- 2219/37234 . . . Monitor tool before, after and during machining
- 2219/37235 . . . Detect bad tool by relative movement of tool with respect to tool holder
- 2219/37236 . . . Tool serves, acts also as measuring device
- 2219/37237 . . . Tool collision, interference
- 2219/37238 . . . Missing tool
- 2219/37239 . . . Plastic deformation of tool
- 2219/37241 . . . Displacement of tool, miss inserted
- 2219/37242 . . . Tool signature, compare pattern with detected signal
- 2219/37243 . . . Tool breakage by comparing tool image, length before and after machining
- 2219/37244 . . . Detect tool breakage already in tool magazine
- 2219/37245 . . . Breakage tool, failure

- 2219/37246 . . . Compare estimated torques of different axis with reference for breakage
- 2219/37247 . . . By electrical contact, disappears when breakage
- 2219/37248 . . . By monitoring changes in capacitive circuit
- 2219/37249 . . . Correction coefficient of life time as function of kind of machining
- 2219/37251 . . . Selfcorrecting, counter for tool life adapts correction
- 2219/37252 . . . Life of tool, service life, decay, wear estimation
- 2219/37253 . . . Fail estimation as function of lapsed time of use
- 2219/37254 . . . Estimate wear of subsystem of machine with measures from other subsystems
- 2219/37255 . . . Using fuzzy logic techniques
- 2219/37256 . . . Wear, tool wear
- 2219/37257 . . . Crater wear of tool
- 2219/37258 . . . Calculate wear from workpiece and tool material, machining operations
- 2219/37259 . . . Resolver for coarse, photo cell for fine position on grid crossing
- 2219/37261 . . . Encoder and potentiometer to detect fault measurement
- 2219/37262 . . . Mixing pins and fine positioning
- 2219/37263 . . . Absolute and incremental encoder, detector combined
- 2219/37264 . . . Cam for absolute positions, encoder for incremental position
- 2219/37265 . . . Rotary potentiometer and incremental counter for each maximum
- 2219/37266 . . . Infrared
- 2219/37267 . . . Thermocouple
- 2219/37268 . . . Tool workpiece junction, thermoelectric interface
- 2219/37269 . . . Ultrasonic, ultrasound, sonar
- 2219/37271 . . . Using standing waves
- 2219/37272 . . . Capacitive
- 2219/37273 . . . Wheatstone bridge
- 2219/37274 . . . Strain gauge
- 2219/37275 . . . Laser, interferometer
- 2219/37276 . . . Position changes frequency
- 2219/37277 . . . Inductive proximity sensor
- 2219/37278 . . . Optical waveguide, fiberoptic sensor
- 2219/37279 . . . Fiber optic proximity sensor
- 2219/37281 . . . Laser range finder
- 2219/37282 . . . Current transformer
- 2219/37283 . . . Photoelectric sensor
- 2219/37284 . . . Capacitive 3-D proximity sensor
- 2219/37285 . . . Load, current taken by motor
- 2219/37286 . . . Photoelectric sensor with reflection, emits and receives modulated light
- 2219/37287 . . . Fiber optic interferometer
- 2219/37288 . . . Tracking lasers follow object, reflection gives 3-D position
- 2219/37289 . . . Inductive
- 2219/37291 . . . Electro acoustic
- 2219/37292 . . . Eddy current
- 2219/37293 . . . Magnetostrictive effect on ferrous rod, ultrasonic wave, time delay measured
- 2219/37294 . . . Coarse digitized position combined with fine digitized analog position signal
- 2219/37295 . . . Measure workpiece while machining other workpiece
- 2219/37296 . . . Electronic graduation, scale expansion, interpolation
- 2219/37297 . . . Two measurements, on driving motor and on slide or on both sides of motor
- 2219/37298 . . . Two measurements, position of slide and position of tool
- 2219/37299 . . . Measure same parameter from three different space directions
- 2219/37301 . . . Two measurements, speed with tachometer and speed with encoder
- 2219/37302 . . . Measure tool length, workpiece configuration without stopping movement
- 2219/37303 . . . Two measurements, speed of motor and speed of load
- 2219/37304 . . . Combined position measurement, encoder and separate laser, two different sensors
- 2219/37305 . . . Drive step motor with pulses, at stop with dc current to avoid emi when measuring
- 2219/37306 . . . Two sensors and two scales for same measurement of relative movement between x y
- 2219/37307 . . . Detector in line, in plane of tool to avoid parallax
- 2219/37308 . . . Measure workpiece relieved from stress, redrawn, disengaged tool
- 2219/37309 . . . Selecting a desired sensor structure
- 2219/37311 . . . Derive speed from current, use of lookup table
- 2219/37312 . . . Derive speed from motor current
- 2219/37313 . . . Derive speed from position
- 2219/37314 . . . Derive position from speed
- 2219/37315 . . . High speed and low speed signals are derived in a different way
- 2219/37316 . . . Derive speed from two phased position signals, with high range and resolution
- 2219/37317 . . . Derive position from current, voltage, back electromotive force bembf
- 2219/37318 . . . Derive speed from back electromotive force, bembf
- 2219/37319 . . . Derive acceleration, force, torque from current
- 2219/37321 . . . Derive acceleration from net driving force
- 2219/37322 . . . Derive position from frequency power supply
- 2219/37323 . . . Derive acceleration from position or speed
- 2219/37324 . . . Derive position, speed from acceleration
- 2219/37325 . . . Multisensor integration, fusion, redundant
- 2219/37326 . . . Automatic configuration of multisensor, adaptive, active sensing
- 2219/37327 . . . Select lookup table corresponding to sensor
- 2219/37328 . . . Decentralised data fusion
- 2219/37329 . . . Far away and near by sensor groups
- 2219/37331 . . . Sensor fusion using extended kalman filter
- 2219/37332 . . . Detect power of noise source using sound and visual sensors
- 2219/37333 . . . Position of control valve and position of controlled actuator
- 2219/37334 . . . Diameter of tool with teeth
- 2219/37335 . . . Diameter tool
- 2219/37336 . . . Cutting, machining time
- 2219/37337 . . . Noise, acoustic emission, sound
- 2219/37338 . . . Magnetic or electric property of tool to control feed
- 2219/37339 . . . Eccentricity, cylindricity, circularity
- 2219/37341 . . . Sectional distortion of machining face of workpiece

2219/37342 . . .	Overload of motor, tool	2219/37397 . . .	Measuring gap between tool and workpiece
2219/37343 . . .	Load, vectorial components of load	2219/37398 . . .	Thickness
2219/37344 . . .	Torque, thrust, twist, machining force measurement	2219/37399 . . .	Pressure
2219/37345 . . .	Dimension of workpiece, diameter	2219/37401 . . .	Differential pressure
2219/37346 . . .	Cutting, chip quality	2219/37402 . . .	Flatness, roughness of surface
2219/37347 . . .	Speed, velocity	2219/37403 . . .	Bending, springback angle
2219/37348 . . .	Power, wattmeter voltage times current	2219/37404 . . .	Orientation of workpiece or tool, surface sensor
2219/37349 . . .	Unbalance of tool or tool holder	2219/37405 . . .	Contact detection between workpiece and tool, probe, feeler
2219/37351 . . .	Detect vibration, ultrasound	2219/37406 . . .	Detect position of detector contact point relative to reference on tool slide
2219/37352 . . .	Frequency	2219/37407 . . .	Detect position of detector contact point relative to reference on tool
2219/37353 . . .	Amplitude	2219/37408 . . .	Combination of contact and contactless detection to avoid tool contact with workpiece
2219/37354 . . .	Powerfactor, phase between voltage and current	2219/37409 . . .	Measure different pressure of fluid flow on contacting surface
2219/37355 . . .	Cutting, milling, machining force	2219/37411 . . .	Measure contact from force and velocity detection
2219/37356 . . .	Torsion, twist	2219/37412 . . .	acoustical detection of contact
2219/37357 . . .	Force, pressure, weight or deflection	2219/37413 . . .	By conductivity, short circuit between tool, probe and metallic surface
2219/37358 . . .	Depth of cut	2219/37414 . . .	By microswitch
2219/37359 . . .	Contour, to sense corners, edges of surface	2219/37415 . . .	By cutting light beam
2219/37361 . . .	acoustic feedback, for speed, if speed very low hearing is better than seeing	2219/37416 . . .	By measuring phase shift between voltage and current of feedmotor
2219/37362 . . .	Hardness	2219/37417 . . .	By linear varying electrical signal
2219/37363 . . .	Texture	2219/37418 . . .	By capacitive means
2219/37364 . . .	Thermal conductivity	2219/37419 . . .	Measuring rotation of non driven axis after being touched by driven axis
2219/37365 . . .	Surface shape, gradient	2219/37421 . . .	Measure braking, slower rotation of driven axis, tool upon contact
2219/37366 . . .	Colour, surface colour	2219/37422 . . .	Distance and attitude detector
2219/37367 . . .	Grinding rate	2219/37423 . . .	Distance, gap between tool and surface sensor
2219/37368 . . .	Displacement perpendicular to probe movement	2219/37424 . . .	Calculate distance from known inner diameter of coil, bobbin and detected image
2219/37369 . . .	Measure tool length and diameter together with single sensor	2219/37425 . . .	Distance, range
2219/37371 . . .	Flow	2219/37426 . . .	Detected with infrared sensor
2219/37372 . . .	Position and speed	2219/37427 . . .	Detected with thermocouple
2219/37373 . . .	Friction	2219/37428 . . .	Temperature of tool
2219/37374 . . .	Deflection	2219/37429 . . .	Temperature of motor
2219/37375 . . .	Climate, temperature and humidity	2219/37431 . . .	Temperature
2219/37376 . . .	Inclination, gradient of machine base	2219/37432 . . .	Detected by accelerometer, piezo electric
2219/37377 . . .	Roundness of workpiece	2219/37433 . . .	Detected by acoustic emission, microphone
2219/37378 . . .	Balance of workpiece from vibration sensor and angle sensor	2219/37434 . . .	Measuring vibration of machine or workpiece or tool
2219/37379 . . .	Profile, diameter along workpiece	2219/37435 . . .	Vibration of machine
2219/37381 . . .	Force in steady rest	2219/37436 . . .	Prediction of displacement, relative or absolute, motion
2219/37382 . . .	Voltage over or short circuit between tool and workpiece	2219/37437 . . .	Prediction of cutting force with flexible ball end milling model
2219/37383 . . .	Tool length	2219/37438 . . .	Prediction of machining error with flexible ball end milling model
2219/37384 . . .	Change of actuator current	2219/37439 . . .	Computer assisted inspection, cad interactive with manual commands
2219/37385 . . .	Peripheral speed	2219/37441 . . .	Use nc machining program, cad data for measuring, inspection
2219/37386 . . .	Lateral movement of tool	2219/37442 . . .	Cad and cap for cmm
2219/37387 . . .	Nanometer position	2219/37443 . . .	Program cmm, coordinate measuring machine, use cad data
2219/37388 . . .	Acceleration or deceleration, inertial measurement	2219/37444 . . .	Program cmm by using a stylus to detect points on a real workpiece
2219/37389 . . .	Magnetic flux		
2219/37391 . . .	Null, initial load, no load torque detection or other parameter at no load		
2219/37392 . . .	Motion		
2219/37393 . . .	acoustic feedback varies as function of positional error		
2219/37394 . . .	Measuring diameter of workpieces with longitudinal grooves		
2219/37395 . . .	Detection sparks during machining		
2219/37396 . . .	Tactile feedback, operator feels reaction, force reflection		

- 2219/37445 . . . Load teaching program from file server, enter teaching data at pendant
- 2219/37446 . . . Select measuring program together with control parameters
- 2219/37447 . . . Path planning using ann, for measurement task pattern, optimal path, dummy points
- 2219/37448 . . . Inspection process planner
- 2219/37449 . . . Inspection path planner
- 2219/37451 . . . Plan sensor placement for optimal inspection
- 2219/37452 . . . Generate nc program from metrology program, defining cmm probe path
- 2219/37453 . . . Simulate measuring program, graphical interactive generation of program
- 2219/37454 . . . Interactive, enter also tolerance
- 2219/37455 . . . After entering one measuring cycle, display in separate window instruction list
- 2219/37456 . . . Program proposes measuring points
- 2219/37457 . . . On machine, on workpiece
- 2219/37458 . . . Reference on machine, on workpiece and on tool
- 2219/37459 . . . Reference on workpiece, moving workpiece moves reference point
- 2219/37461 . . . Two rotary potentiometers, only one used, switch over to other on ambiguity
- 2219/37462 . . . Resistor, potentiometers
- 2219/37463 . . . Tapped resistors, not continuous
- 2219/37464 . . . Potentiometer with dual wiper
- 2219/37465 . . . Magnetic resistor
- 2219/37466 . . . Dual potentiometers with sin and cos output
- 2219/37467 . . . Continuous rotary potentiometer, no end
- 2219/37468 . . . Magnetic resistor sensors used as incremental encoder
- 2219/37469 . . . Two, more slides use resolver with common secondary, different primary frequency
- 2219/37471 . . . Resolver, synchro
- 2219/37472 . . . Synchro
- 2219/37473 . . . Resolver
- 2219/37474 . . . Resolver with several phases
- 2219/37475 . . . Resolver emits two redundant signals for safety
- 2219/37476 . . . Single resolver for speed, rotor and absolute position, IMAS
- 2219/37477 . . . Inductosyn
- 2219/37478 . . . Excitation of resolver by pulses instead of continuous wave, to save energy
- 2219/37479 . . . Excitation as function of speed of rotor, to get always stable detection waves
- 2219/37481 . . . Sampling rate for output of resolver as function of pulse rate of excitation
- 2219/37482 . . . Control amplitude of excitation of resolver
- 2219/37483 . . . Synchronize resolver reference frequency with clock of position control
- 2219/37484 . . . Differential resolver
- 2219/37485 . . . Phaseshift to reference counted
- 2219/37486 . . . Resolver emits pulses at zerocrossings, counter
- 2219/37487 . . . Counter combined with angle to digital convertor
- 2219/37488 . . . Angle to digital conversion
- 2219/37489 . . . Emit binary code at quadrant 00+01+10+11, count pulse for 11-to-000 and 00-to-11
- 2219/37491 . . . Compensate non linearity of transducer by lookup table
- 2219/37492 . . . Store measured value in memory, to be used afterwards
- 2219/37493 . . . Use of different frequency band pass filters to separate different signals
- 2219/37494 . . . Intelligent sensor, data handling incorporated in sensor
- 2219/37495 . . . Correction of measured value as function of given, reference surface
- 2219/37496 . . . Root mean square
- 2219/37497 . . . Summing, integration of signal
- 2219/37498 . . . Variable amplification, gain for detected signal, select correct level range
- 2219/37499 . . . Determine cumulative deviation, difference
- 2219/37501 . . . Delay detected signal avoids transients, start up noise
- 2219/37502 . . . Input signal converted to logarithmic value
- 2219/37503 . . . Set integrator of acceleration detector to zero at velocity zero, avoids drift
- 2219/37504 . . . Differential use of sensors, to double precision
- 2219/37505 . . . Debounce contact signal from absolute reference position cam
- 2219/37506 . . . Correction of position error
- 2219/37507 . . . Spectral density analysis
- 2219/37508 . . . Cross correlation
- 2219/37509 . . . Intelligent sensor, incorporation temperature compensation
- 2219/37511 . . . Select and process only those detected signals needed for a certain purpose
- 2219/37512 . . . Correction for detection delay
- 2219/37513 . . . Convert time domain signal to frequency domain signal
- 2219/37514 . . . Detect normality, novelty in time series for online monitoring
- 2219/37515 . . . Error separation, eliminate eccentricity
- 2219/37516 . . . Combine results, opinions of multiple but same sensors, fuzzy logic
- 2219/37517 . . . Compensation of position for vibration of probe, calibration x-y lookup table
- 2219/37518 . . . Prediction, estimation of machining parameters from cutting data
- 2219/37519 . . . From machining parameters classify different fault cases
- 2219/37521 . . . Ann to map sensor signals to decision signals
- 2219/37522 . . . Determine validity of measured signals
- 2219/37523 . . . Reduce noise by combination of digital filter and estimator
- 2219/37524 . . . Sampling of forces and signal analysis are triggered as function of rotation angle
- 2219/37525 . . . Mean, average values, statistical derived values
- 2219/37526 . . . Determine time or position to take a measurement
- 2219/37527 . . . Frequency filtering and amplitude qualification
- 2219/37528 . . . Separate force signal into static and dynamic component
- 2219/37529 . . . Synchronous demodulation
- 2219/37531 . . . Superpose modulated measuring signal on servo command reference
- 2219/37532 . . . Synchronized data acquisition
- 2219/37533 . . . Real time processing of data acquisition, monitoring
- 2219/37534 . . . Frequency analysis
- 2219/37535 . . . Signal processing, ratio of signals against fluctuation of signals
- 2219/37536 . . . Rate of change, derivative
- 2219/37537 . . . Virtual sensor

- 2219/37538 . . . Window for signal, to detect signal at peak or zero values
- 2219/37539 . . . Read values twice, for correctness
- 2219/37541 . . . Switch off measuring, control system during test of encoder, resolver
- 2219/37542 . . . Curve fitting measured points, predict, extrapolate dimension in time
- 2219/37543 . . . Set, compare to maximum, peak, minimum value
- 2219/37544 . . . Compare detected signal to several references to derive several control actions
- 2219/37545 . . . References to be compared vary with evolution of measured signals, auto-calibrate
- 2219/37546 . . . Compare two positions measured with different methods, alarm if difference too high
- 2219/37547 . . . Ignore position information from detector during invalid intervals
- 2219/37548 . . . Avoid false motion condition, jitter, compare three recent values with possible values
- 2219/37549 . . . Limit switch protected against overload
- 2219/37551 . . . Select for each detector type corresponding signal processor
- 2219/37552 . . . Detect loss of correct excitation moment of step motor, correct excitation
- 2219/37553 . . . Two cameras one for coarse scanning, other for fine scanning
- 2219/37554 . . . Two camera, or tiltable camera to detect different surfaces of the object
- 2219/37555 . . . Camera detects orientation, position workpiece, points of workpiece
- 2219/37556 . . . Camera detects fictive contour of workpiece, by reflection
- 2219/37557 . . . Camera for coarse, acoustic array for fine vision
- 2219/37558 . . . Optical sensor, scanner
- 2219/37559 . . . Camera, vision of tool, compute tool center, detect tool wear
- 2219/37561 . . . Move camera until image corresponds to stored image of same workpiece
- 2219/37562 . . . Scan mark at certain angle, to avoid glare noise
- 2219/37563 . . . Ccd, tv camera
- 2219/37564 . . . Center of camera vision aligned with axis of drill
- 2219/37565 . . . Camera to detect precisely, crosshair, positions on workpiece by operator
- 2219/37566 . . . Explore autonomous, explore surface until useful measurement possible
- 2219/37567 . . . 3-D vision, stereo vision, with two cameras
- 2219/37568 . . . 3-D spectacles, glasses, left and right synchronised with images on screen
- 2219/37569 . . . Radiography in x and y, x-ray images
- 2219/37571 . . . Camera detecting reflected light from laser
- 2219/37572 . . . Camera, tv, vision
- 2219/37573 . . . In-cycle, insitu, during machining workpiece is measured continuously
- 2219/37574 . . . In-process, in cycle, machine part, measure part, machine same part
- 2219/37575 . . . Pre-process, measure workpiece before machining
- 2219/37576 . . . Post-process, measure workpiece after machining, use results for new or same
- 2219/37577 . . . In-process and post-process measurement combined
- 2219/37578 . . . Compare images of workpiece before and after machining
- 2219/37579 . . . Run away measured value by differentiating measured signal, rate of change
- 2219/37581 . . . Measuring errors
- 2219/37582 . . . Position, angle of workpiece surface
- 2219/37583 . . . Detect separation, cutting, penetration, piercing, break through material
- 2219/37584 . . . Deformation of machined material
- 2219/37585 . . . Start, begin and end, halt, stop of machining
- 2219/37586 . . . Detect, discriminate cutting or non cutting machining state
- 2219/37587 . . . Count number of machining cycles, frequency use of tool
- 2219/37588 . . . Detect swarf, building up of swarf
- 2219/37589 . . . Measure drift of servo during positioning, not disturbing actual position
- 2219/37591 . . . Plant characteristics
- 2219/37592 . . . Detect machine, workpiece noise by operator with headphone, directional
- 2219/37593 . . . Measure correct setting of workpiece
- 2219/37594 . . . Detect discharge state between electrode and workpiece
- 2219/37595 . . . Detect if drill bit is in peck cycle
- 2219/37596 . . . Surface layer to be machined away, lowest point, minimum material to be cut
- 2219/37597 . . . Spectrum analyser
- 2219/37598 . . . Chip length
- 2219/37599 . . . Presence of metal
- 2219/37601 . . . Count number of times tool is overloaded, derived from mean and limit
- 2219/37602 . . . Material removal rate
- 2219/37603 . . . System time constant
- 2219/37604 . . . Hysteresis of actuator, servo
- 2219/37605 . . . Accuracy, repeatability of machine, robot
- 2219/37606 . . . Thread form, parameters
- 2219/37607 . . . Circular form
- 2219/37608 . . . Center and diameter of hole, wafer, object
- 2219/37609 . . . Over-travel
- 2219/37611 . . . Relative movement between tool and workpiece carriage
- 2219/37612 . . . Transfer function, kinematic identification, parameter estimation, response
- 2219/37613 . . . Cutter axis tilt of end mill
- 2219/37614 . . . Number of workpieces, counter
- 2219/37615 . . . Dead time, between detecting finished workpieces and feedback measured value
- 2219/37616 . . . Use same monitoring tools to monitor tool and workpiece
- 2219/37617 . . . Tolerance of form, shape or position
- 2219/37618 . . . Observe, monitor position, posture of tool
- 2219/37619 . . . Characteristics of machine, deviation of movement, gauge,
- 2219/37621 . . . Inertia, mass of rotating, moving tool, workpiece, element
- 2219/37622 . . . Detect collision, blocking, stall by change, lag in position
- 2219/37623 . . . Detect collision, blocking by use of integrated load between two limits
- 2219/37624 . . . Detect collision, blocking by measuring change of velocity or torque
- 2219/37625 . . . By measuring changing forces in a time window

- 2219/37626 . . . By measuring changing forces in different position zones
- 2219/37627 . . . Measure elapsed time needed for positioning
- 2219/37628 . . . Use of special detector the output of which changes if object detected
- 2219/37629 . . . Detect sudden change of direction due to collision
- 2219/37631 . . . Means detecting object in forbidden zone
- 2219/37632 . . . By measuring current, load of motor
- 2219/37633 . . . Output modulated signal on detection of blocking instead of flat signal
- 2219/37634 . . . By measuring vibration
- 2219/39 . . Robotics, robotics to robotics hand
- 2219/39001 . . . Robot, manipulator control
- 2219/39002 . . . Move tip of arm on straight line
- 2219/39003 . . . Move end effector on ellipse, circle, sphere
- 2219/39004 . . . Assisted by automatic control system for certain functions
- 2219/39005 . . . Feedback for stability of manipulator, felt as force reflection
- 2219/39006 . . . Move end effector in a plane, describing a raster, meander
- 2219/39007 . . . Calibrate by switching links to mirror position, tip remains on reference point
- 2219/39008 . . . Fixed camera detects reference pattern held by end effector
- 2219/39009 . . . Using fixture with potentiometer, wire to end effector, estimate length of wire
- 2219/39011 . . . Fixed camera detects deviation end effector from reference on workpiece, object
- 2219/39012 . . . Calibrate arm during scanning operation for identification of object
- 2219/39013 . . . Locate movable manipulator relative to object, compare to stored gridpoints
- 2219/39014 . . . Match virtual world with real world
- 2219/39015 . . . With different manipulator configurations, contact known sphere, ballbar
- 2219/39016 . . . Simultaneous calibration of manipulator and camera
- 2219/39017 . . . Forward calibration, find actual pose world space for given joint configuration
- 2219/39018 . . . Inverse calibration, find exact joint angles for given location in world space
- 2219/39019 . . . Calibration by cmm coordinate measuring machine over a certain volume
- 2219/39021 . . . With probe, touch reference positions
- 2219/39022 . . . Transform between measuring and manipulator coordinate system
- 2219/39023 . . . Shut off, disable motor and rotate arm to reference pin
- 2219/39024 . . . Calibration of manipulator
- 2219/39025 . . . Spheric tool interrupts transmitted calibration beam, in different configurations
- 2219/39026 . . . Calibration of manipulator while tool is mounted
- 2219/39027 . . . Calibrate only some links, part of dofs, lock some links, ref pins on links
- 2219/39028 . . . Relative to base calibrated 6-DOF device, cmm connected between wrist and base
- 2219/39029 . . . Verify if calibration position is a correct, by comparing with range in rom
- 2219/39031 . . . Use of model for robot and for measuring device
- 2219/39032 . . . Touch probe senses constraint known plane, derive kinematic calibration
- 2219/39033 . . . Laser tracking of end effector, measure orientation of rotatable mirror
- 2219/39034 . . . Use of telescopic ballbar
- 2219/39035 . . . Screw axis measurement, each joint moved in circle, cpa circle point analysis
- 2219/39036 . . . Screw axis measurement, jacobian estimation from wrist and joint torques, no motion
- 2219/39037 . . . Screw axis measurement, jacobian estimation from end effector and joint speeds
- 2219/39038 . . . Determine position of two cameras by using a common reference grid
- 2219/39039 . . . Two cameras detect same reference on workpiece to define its position in space
- 2219/39041 . . . Calibrate only for end position
- 2219/39042 . . . Interchange robot and reference pattern, measure by camera at same location
- 2219/39043 . . . Self calibration using ANN to map robot poses to the commands, only distortions
- 2219/39044 . . . Estimate error model from error at different attitudes and points
- 2219/39045 . . . Camera on end effector detects reference pattern
- 2219/39046 . . . Compare image of plate on robot with reference, move till coincidence, camera
- 2219/39047 . . . Calibration plate mounted on robot, plate comprises sensors for measuring target
- 2219/39048 . . . Closed loop kinematic self calibration, grip part of robot with hand
- 2219/39049 . . . Calibration cooperating manipulators, closed kinematic chain by bolting
- 2219/39051 . . . Calibration cooperating manipulators, closed kinematic chain by alignment
- 2219/39052 . . . Self calibration of parallel manipulators
- 2219/39053 . . . Probe, camera on hand scans many points on own robot body, no extra jig
- 2219/39054 . . . From teached different attitudes for same point calculate tool tip position
- 2219/39055 . . . Correction of end effector attachment, calculated from model and real position
- 2219/39056 . . . On line relative position error and orientation error calibration
- 2219/39057 . . . Hand eye calibration, eye, camera on hand, end effector
- 2219/39058 . . . Sensor, calibration of sensor, potentiometer
- 2219/39059 . . . Sensor adaptation for robots by software
- 2219/39061 . . . Calculation direct dynamics
- 2219/39062 . . . Calculate, jacobian matrix estimator
- 2219/39063 . . . Quick calculation of coordinates by using precalculated, stored matrixes, inverses
- 2219/39064 . . . Learn kinematics by ann mapping, map spatial directions to joint rotations
- 2219/39065 . . . Calculate workspace for end effector, manipulator
- 2219/39066 . . . Two stage inverse kinematics algorithm, first inner joint variables, then outer
- 2219/39067 . . . Calculate max load a manipulator can repeatedly lift
- 2219/39068 . . . Time needed to execute an instruction
- 2219/39069 . . . Inverse kinematics by arm splitting, divide six link arm into two three link arms
- 2219/39071 . . . Solve inverse kinematics by ann learning nonlinear mappings, consider smoothness

- 2219/39072 . . . Solve inverse kinematics by linear hopfield network
- 2219/39073 . . . Solve inverse kinematics by fuzzy algorithm
- 2219/39074 . . . By formal substitution of two consecutive joints by a spherical joint
- 2219/39075 . . . Solve inverse kinematics by error back propagation ebp
- 2219/39076 . . . Learn by function division, change only one variable at a time, combine shapes
- 2219/39077 . . . Solve inverse geometric model by iteration, no matrixes inversion
- 2219/39078 . . . Divide workspace in sectors, lookup table for sector joint angle
- 2219/39079 . . . Solve inverse differential kinematics in closed, feedback loop, iterate
- 2219/39081 . . . Inexact solution for orientation or other DOF with relation to type of task
- 2219/39082 . . . Collision, real time collision avoidance
- 2219/39083 . . . Robot interference, between two robot arms
- 2219/39084 . . . Parts handling, during assembly
- 2219/39085 . . . Use of two dimensional maps and feedback of external and joint sensors
- 2219/39086 . . . Reduce impact effect by impact configuration of redundant manipulator
- 2219/39087 . . . Artificial field potential algorithm, force repulsion from obstacle
- 2219/39088 . . . Inhibit movement in one axis if collision danger
- 2219/39089 . . . On collision, lead arm around obstacle manually
- 2219/39091 . . . Avoid collision with moving obstacles
- 2219/39092 . . . Treat interference in hardware, circuit and also in software
- 2219/39093 . . . On collision, ann, bam, learns path on line, used next time for same command
- 2219/39094 . . . Interference checking between robot and fixture
- 2219/39095 . . . Use neural geometric modeler, overlapping spheres
- 2219/39096 . . . Self-collision, internal collision, collision between links of one robot
- 2219/39097 . . . Estimate own stop, brake time, then verify if in safe distance
- 2219/39098 . . . Estimate stop, brake distance in predef time, then verify if in safe distance
- 2219/39099 . . . Interlocks inserted in movement process if necessary to avoid collision
- 2219/39101 . . . Cooperation with one or more rotating workpiece holders, manipulators
- 2219/39102 . . . Manipulator cooperating with conveyor
- 2219/39103 . . . Multicooperating sensing modules
- 2219/39104 . . . Manipulator control orders conveyor to stop, to visualize, pick up
- 2219/39105 . . . Manipulator cooperates with moving machine, like press brake
- 2219/39106 . . . Conveyor, pick up article, object from conveyor, bring to test unit, place it
- 2219/39107 . . . Pick up article, object, measure, test it during motion path, place it
- 2219/39108 . . . Regrasp object as function of impact
- 2219/39109 . . . Dual arm, multiarm manipulation, object handled in cooperation
- 2219/39111 . . . Use of flexibility or free joint in manipulator to avoid large forces
- 2219/39112 . . . Force, load distribution
- 2219/39113 . . . Select grasp pattern based on motion oriented coordinability
- 2219/39114 . . . Hand eye cooperation, active camera on first arm follows movement of second arm
- 2219/39115 . . . Optimal hold and moving force, torque
- 2219/39116 . . . Constraint object handled in cooperation
- 2219/39117 . . . Task distribution between involved manipulators
- 2219/39118 . . . Cooperation between manipulator and vehicle with manipulator
- 2219/39119 . . . Path constraint handling of object
- 2219/39121 . . . Two manipulators operate on same object
- 2219/39122 . . . Follower, slave mirrors leader, master
- 2219/39123 . . . Manipulate, handle flexible object
- 2219/39124 . . . Grasp common rigid object, no movement end effectors relative to object
- 2219/39125 . . . Task is grasp object with movable parts, like pliers
- 2219/39126 . . . Manipulate very large objects, not possible to grasp, open palm and use of links
- 2219/39127 . . . Roll object on base by link control
- 2219/39128 . . . Grasp tool with two manipulators, rigidity, and use tool
- 2219/39129 . . . One manipulator holds one piece, other inserts, screws other piece, dexterity
- 2219/39131 . . . Each of the manipulators holds one of the pieces to be welded together
- 2219/39132 . . . Robot welds, operates on moving workpiece, moved by other robot
- 2219/39133 . . . Convert taught program for fixed workpiece to program for moving workpiece
- 2219/39134 . . . Teach point, move workpiece, follow point with tip, place tip on next point
- 2219/39135 . . . For multiple manipulators operating at same time, avoid collision
- 2219/39136 . . . Teach each manipulator independently or dependently from each other
- 2219/39137 . . . Manual teaching, set next point when tool touches other tool, workpiece
- 2219/39138 . . . Calculate path of robots from path of point on gripped object
- 2219/39139 . . . Produce program of slave from path of master and desired relative position
- 2219/39141 . . . Slave program has no taught positions, receives position from master, convert from master
- 2219/39142 . . . Moving time between positions in slave program coordinated online with master
- 2219/39143 . . . One program in robot controller for both robot and machine, press, mold
- 2219/39144 . . . Scale moving time of all robots, machines to match slowest, no waiting
- 2219/39145 . . . Slave path is the same as master path and superposed desired relative movement
- 2219/39146 . . . Swarm, multiagent, distributed multitask fusion, cooperation multi robots
- 2219/39147 . . . Group transport, transfer object, ant problem
- 2219/39148 . . . To push or pull on objects, boxes
- 2219/39149 . . . To assemble two objects, objects manipulation
- 2219/39151 . . . Use intention inference, observe behaviour of other robots for their intention
- 2219/39152 . . . Basic behaviour, avoid, follow, aggregate, disperse, home, wander, grasp, drop

- 2219/39153 . . . Human supervisory control of swarm
- 2219/39154 . . . Each robot can pick up an information carrier, read and write it, exchange it
- 2219/39155 . . . Motion skill, relate sensor data to certain situation and motion
- 2219/39156 . . . To machine together workpiece, desktop flexible manufacturing
- 2219/39157 . . . Collectively grasping object to be transported
- 2219/39158 . . . Configuration description language, to define behaviour of system
- 2219/39159 . . . Task modelling
- 2219/39161 . . . Search, grip object and bring to a home area, gather object, object placement
- 2219/39162 . . . Learn social rules, greedy robots become non-greedy, adapt to other robots
- 2219/39163 . . . Formation control, robots form a rigid formation, fixed relationship
- 2219/39164 . . . Embodied evolution, evolutionary robots with basic ann learn by interactions with each other
- 2219/39165 . . . Evolution, best performing control strategy is transmitted to other robots
- 2219/39166 . . . Coordinate activity by sending pheromone messages between robots, no central control
- 2219/39167 . . . Resources scheduling and balancing
- 2219/39168 . . . Multiple robots searching an object
- 2219/39169 . . . Redundant communication channels with central control
- 2219/39171 . . . Vehicle moves towards arm if stretched arm, away from it if folded, singular point
- 2219/39172 . . . Vehicle, coordination between manipulator arm and its moving vehicle
- 2219/39173 . . . Dynamic interaction between vehicle and manipulator
- 2219/39174 . . . Add DOFs of mobility to DOFs of manipulator to add user defined tasks to motion
- 2219/39175 . . . Cooperation between fixed manipulator and manipulator on vehicle
- 2219/39176 . . . Compensation deflection arm
- 2219/39177 . . . Compensation position working point as function of inclination tool, hand
- 2219/39178 . . . Compensation inertia arms
- 2219/39179 . . . Of movement after lock stop by small movement against load, stop again
- 2219/39181 . . . Compensation of coulomb friction in joint
- 2219/39182 . . . Compensation for base, floor deformation
- 2219/39183 . . . Compliance compensation
- 2219/39184 . . . Forward compensation in robot world space, inverse in joint space
- 2219/39185 . . . ANN as compensator
- 2219/39186 . . . Flexible joint
- 2219/39187 . . . Coriolis and centripetal compensation
- 2219/39188 . . . Torque compensation
- 2219/39189 . . . Compensate for dead weight of tool as function of inclination tool
- 2219/39191 . . . Compensation for errors in mechanical components
- 2219/39192 . . . Compensate thermal effects, expansion of links
- 2219/39193 . . . Compensate movement before lock stop, by small movement against load, gravity
- 2219/39194 . . . Compensation gravity
- 2219/39195 . . . Control, avoid oscillation, vibration due to low rigidity
- 2219/39196 . . . Use of passive joint, no actuator but brake, brake on or off
- 2219/39197 . . . Passive compliance, no input of force reference, mechanical resilience, spring
- 2219/39198 . . . Manipulator used as workpiece handler and for machining operation
- 2219/39199 . . . Active vibration absorber
- 2219/39201 . . . Control of joint stiffness
- 2219/39202 . . . Invariant inertia, constant inertia matrix independent of joint positions
- 2219/39203 . . . Fuzzy petrinet controller
- 2219/39204 . . . Petrinet controller
- 2219/39205 . . . Markov model
- 2219/39206 . . . Joint space position control
- 2219/39207 . . . Manipulator is passive, gives operator only feedback of what is currently done
- 2219/39208 . . . Robot is active, realizes planned trajectory by itself
- 2219/39209 . . . Switch over from free space motion to constraint motion
- 2219/39211 . . . If operator on platform moves in certain direction, arm will follow
- 2219/39212 . . . Select between autonomous or teleoperation control
- 2219/39213 . . . Distributed tasks, space motion, contact, kinematic conditioning tasks
- 2219/39214 . . . Compensate tracking error by using model, polynomial network
- 2219/39215 . . . Adaptive control with stabilizing compensation
- 2219/39216 . . . Motion scaling
- 2219/39217 . . . Keep constant orientation of handled object while moving manipulator
- 2219/39218 . . . Force tracking
- 2219/39219 . . . Trajectory tracking
- 2219/39221 . . . Control angular position of joint by length of linear actuator
- 2219/39222 . . . Disturbance rejection, suppression
- 2219/39223 . . . Resonance ratio control, between arm and motor
- 2219/39224 . . . Jacobian transpose control of force vector in configuration and cartesian space
- 2219/39225 . . . Rmfc resolved motion force control, apply known acceleration to payload mass
- 2219/39226 . . . Operational space formulation, project model into cartesian coordinates
- 2219/39227 . . . Configuration control, generate end effector forces to compensate dynamics
- 2219/39228 . . . Computed torque method and H-compensation
- 2219/39229 . . . Linear parameterization of robot dynamics
- 2219/39231 . . . Parameterization of inertia, coriolis and centrifugal matrix
- 2219/39232 . . . Fuzzy adaptation of sliding mode controller
- 2219/39233 . . . Adaptive switching of multiple models, same model but different initial estimates, different robot model for different areas
- 2219/39234 . . . Constraint accelerated feedback, distance dependant sampling rate
- 2219/39235 . . . Track surface without knowing surface geometry
- 2219/39236 . . . Hybrid integrator back-stepping control, cascaded motor and manipulator subsystems
- 2219/39237 . . . Torque disturbance control

- 2219/39238 . . . Trajectory feedforward and feedback to input ann, output a control function
- 2219/39239 . . . Control additional actuator in each flexible link
- 2219/39241 . . . Force and vibration control
- 2219/39242 . . . Velocity blending, change in a certain time from first to second velocity
- 2219/39243 . . . Adaptive trajectory tracking
- 2219/39244 . . . Generic motion control operations, primitive skills each for special task
- 2219/39245 . . . Computed torque fuzzy controller
- 2219/39246 . . . Control position and orientation of handled object
- 2219/39247 . . . Control speed, acceleration as function of load and rate of fatigue
- 2219/39248 . . . Visual servoing combined with inertial measurements
- 2219/39249 . . . Computed torque controller combined with ann compensating switch type controller
- 2219/39251 . . . Autonomous distributed control, joint and link is a subsystem, communication intensive
- 2219/39252 . . . Autonomous distributed control, task distributed into each subsystem, task space
- 2219/39253 . . . Virtual arm, has end effector on any joint of real manipulator
- 2219/39254 . . . Behaviour controller, robot have feelings, learns behaviour
- 2219/39255 . . . Penalty invariance:distribute disturbance equally over all joints, nodes
- 2219/39256 . . . Task space controller
- 2219/39257 . . . Switch from task space to joint space controller when close to singularity
- 2219/39258 . . . Three objective attitude control
- 2219/39259 . . . GPS to control robotic arm
- 2219/39261 . . . Calculate driving torque from dynamic model, computed torque method variant
- 2219/39262 . . . Position joint to minimize energy in previous joints, equilibrium point, attractor
- 2219/39263 . . . Normal and overload operation modes, robot speed or torque higher than nominal
- 2219/39264 . . . Torque control using hardware designed for position control
- 2219/39265 . . . Cutting force disturbances compensated by accelerating a mass within tool head
- 2219/39266 . . . Algorithm for control
- 2219/39267 . . . Uncertainty estimation by the bounds
- 2219/39268 . . . Layer perceptron, drive torque from state variables
- 2219/39269 . . . Neural adaptation followed by fuzzy correction
- 2219/39271 . . . Ann artificial neural network, ffw-nn, feedforward neural network
- 2219/39272 . . . Course by expert rule based system to correct fine fuzzy system
- 2219/39273 . . . Neural oscillator
- 2219/39274 . . . CMAC cerebellar model articulation controller network
- 2219/39275 . . . Ann in parallel to known dynamics model to correct for unknown dynamics
- 2219/39276 . . . FFW and PD and ANN for compensation position error
- 2219/39277 . . . Segmented tree ANN
- 2219/39278 . . . Ann with pd in parallel, pd corrects response of ANN
- 2219/39279 . . . Ann parallel with p controller
- 2219/39281 . . . Ann for compensation torque
- 2219/39282 . . . FFW ann for torque command, adapt as function of speed and detected speed
- 2219/39283 . . . Ffw ann to compensate torque or speed
- 2219/39284 . . . NSC neural servo controller
- 2219/39285 . . . From database find strategy and select corresponding neural servo controller
- 2219/39286 . . . Forward inverse, dynamics model, relaxation neural network model firm
- 2219/39287 . . . Position and speed error to fuzzy input, output corrected by ann as function of position
- 2219/39288 . . . Track control with ann
- 2219/39289 . . . Adaptive ann controller
- 2219/39291 . . . Fuzzy neural for adaptive force control
- 2219/39292 . . . Neural brain based controller based on simplified model of vertebrate nervous system
- 2219/39293 . . . Ann parallel to pd, learn inverse dynamics and feedforward of torque signal
- 2219/39294 . . . Learn inverse dynamics, ffw decomposed ann adapted by pid
- 2219/39295 . . . Learn position correction values to be added to reference values
- 2219/39296 . . . Learn inverse and forward model together
- 2219/39297 . . . First learn inverse model, then fine tune with ffw error learning
- 2219/39298 . . . Trajectory learning
- 2219/39299 . . . Learn forward dynamics
- 2219/39301 . . . Learn feedforward control
- 2219/39302 . . . Backpropagation end effector location error through the link equations
- 2219/39303 . . . Feedback error learn inverse dynamics, felc use position reference and error
- 2219/39304 . . . Feedback error learn inverse dynamics, use actual position and error
- 2219/39305 . . . Learn, detect kinematic constraints in a plane from displacement and force
- 2219/39306 . . . Three networks, data to cartesian, cartesian to joint angle, joint angle to control
- 2219/39307 . . . Multiple ann, trajectory control net and force control net
- 2219/39308 . . . Position control net, pcn combined with velocity control net, vcn
- 2219/39309 . . . Inverse dynamic network combined with time scaling network for trajectory plan
- 2219/39311 . . . Multilayer, MNN, four layer perceptron, sigmoidal neural network
- 2219/39312 . . . Double neural network for tracking, slave microprocessor for servo control
- 2219/39313 . . . Ann for joint control, ann for trajectory optimization
- 2219/39314 . . . Ann for identification, ann for convergence, ann for tracking control
- 2219/39315 . . . Art ann classifier and input selector, bam ann to retrieve collision free path
- 2219/39316 . . . Two ann, second ann trained with calibration data to learn error first ann
- 2219/39317 . . . Adapt weights MNN online, MNN as feedforward, maps inputs to joint torques
- 2219/39318 . . . Position loop ann and velocity loop ann and force loop ann
- 2219/39319 . . . Force control, force as reference, active compliance
- 2219/39321 . . . Force control as function of position of tool

- 2219/39322 . . . Force and position control
- 2219/39323 . . . Force and motion control
- 2219/39324 . . . Force as function of distance from boundary, border of grinding area
- 2219/39325 . . . External force control, additional loop comparing forces corrects position
- 2219/39326 . . . Model compensates positions as function of position to compensate force deformations
- 2219/39327 . . . Fuzzy adaptive force control
- 2219/39328 . . . Fuzzy pi force control
- 2219/39329 . . . Adaptive force and position control
- 2219/39331 . . . Switch between position and force control by fuzzy logic
- 2219/39332 . . . Adaptive force control
- 2219/39333 . . . Fuzzy adaptive force and position control, hybrid
- 2219/39334 . . . Fuzzy reinforcement compliance control
- 2219/39335 . . . Independent joint control, decentralised
- 2219/39336 . . . Pd controller combined with disturbance rejection at joint
- 2219/39337 . . . Pd controller combined with joint energy based controller
- 2219/39338 . . . Impedance control, also mechanical
- 2219/39339 . . . Admittance control, admittance is tip speed-force
- 2219/39341 . . . Sliding mode based impedance control
- 2219/39342 . . . Adaptive impedance control
- 2219/39343 . . . Force based impedance control
- 2219/39344 . . . Cooperative impedance control, between fingers or arms
- 2219/39345 . . . Active compliance control, control tension of spring with dc motor
- 2219/39346 . . . Workspace impedance control
- 2219/39347 . . . Joint space impedance control
- 2219/39348 . . . Generalized impedance control
- 2219/39349 . . . RCC remote center compliance device inserted between wrist and gripper
- 2219/39351 . . . Compensation ann for uncertain trajectory in impedance control
- 2219/39352 . . . Feedback error learning, ffw ann compensates torque, feedback from pd to ann
- 2219/39353 . . . Joint space observer
- 2219/39354 . . . Operation, work space observer
- 2219/39355 . . . Observer, disturbance observer
- 2219/39356 . . . Fuzzy logic velocity observer, to estimate velocity in joints
- 2219/39357 . . . Execute motion of path in minimum of time
- 2219/39358 . . . Time optimal control along path for singular points, having velocity constraints
- 2219/39359 . . . Tracking path, priority control for component perpendicular to path
- 2219/39361 . . . Minimize time-energy cost
- 2219/39362 . . . Adaption path of gripping point as function of position of cooperating machine
- 2219/39363 . . . Track circular path on inclined surface
- 2219/39364 . . . Path, correction of path in function of load
- 2219/39365 . . . By using a cue, part of a stimulus to prompt an adapted reaction pattern
- 2219/39366 . . . SMC sensory motor coordination
- 2219/39367 . . . Using a motion map, association between visual position and joint position
- 2219/39368 . . . Sensorimotor command layer, between task space and sensor, motor space
- 2219/39369 . . . Host and robot controller and vision processing
- 2219/39371 . . . Host and robot controller
- 2219/39372 . . . Expert rule based system to correct parameters impedance controller
- 2219/39373 . . . Fuzzy for planning, fuzzy neural for adaptive force control
- 2219/39374 . . . Ffw and ann combined to compensate torque
- 2219/39375 . . . MMI to path planner to servo controller
- 2219/39376 . . . Hierarchical, learning, recognition and skill level and adaptation servo level
- 2219/39377 . . . Task level supervisor and planner, organizer and execution and path tracking
- 2219/39378 . . . Control panel separated from power control of articulations
- 2219/39379 . . . Open architecture such as nasrem, ngc, dicam, saridis, chimera, gisc, utap, nomad, roblines
- 2219/39381 . . . Map task, application to behaviour, force tracking, singularity to motion to actuator
- 2219/39382 . . . Level, organization and coordination or distribution of tasks and execution level
- 2219/39383 . . . Supervisor communicates with several ion control agents
- 2219/39384 . . . Control unit near robot, control and teaching panel in safe zone
- 2219/39385 . . . Hybrid control system with neural brain based controller and classical ctrlr
- 2219/39386 . . . Cell configuration, selection and connection of cell combinations
- 2219/39387 . . . Reflex control, follow movement, track face, work, hand, visual servoing
- 2219/39388 . . . Visual compliance, xy constraint is 2-D image, z position controlled
- 2219/39389 . . . Laparoscopic surgery, camera on center of operated part, view around, scale
- 2219/39391 . . . Visual servoing, track end effector with camera image feedback
- 2219/39392 . . . Dynamic pyramiding, change vision field to small area if high tracking speed, zoom
- 2219/39393 . . . Camera detects projected image, compare with reference image, position end effector
- 2219/39394 . . . Compensate hand position with camera detected deviation, new end effector attitude
- 2219/39395 . . . Expectation based visual servoing, use of model
- 2219/39396 . . . Manipulator action on screen depends from displayed position on screen
- 2219/39397 . . . Map image error directly to robot movement, position with relation to world, base not needed, image based visual servoing
- 2219/39398 . . . Convert hand to tool coordinates, derive transform matrix
- 2219/39399 . . . Convert position of old, teach to new, changed, actual tool by transform matrix
- 2219/39401 . . . Machine tool coordinates to manipulator coordinates
- 2219/39402 . . . Transfer matrix for moving object and robot to absolute space, motion independent
- 2219/39403 . . . Method, axial rotation of tool to make tool and base coordinates parallel
- 2219/39404 . . . Design of manipulator
- 2219/39405 . . . Develop inverse model of system with ann
- 2219/39406 . . . Obtain optimal parameters of model of system
- 2219/39407 . . . Power metrics, energy efficiency
- 2219/39408 . . . Integrated structure and control design

- 2219/39409 . . . Design of gripper, hand
- 2219/39411 . . . Effect of scaling drive arms
- 2219/39412 . . . Diagnostic of robot, estimation of parameters
- 2219/39413 . . . Robot self diagnostics
- 2219/39414 . . . 7-DOF
- 2219/39415 . . . Hyper redundant, infinite number of DOFs
- 2219/39416 . . . 12-DOF
- 2219/39417 . . . 6-DOF
- 2219/39418 . . . 3-DOF
- 2219/39419 . . . 4-DOF
- 2219/39421 . . . DOF is degree of freedom, 2-DOF
- 2219/39422 . . . 7-DOF for arm and 6-DOF for end effector
- 2219/39423 . . . 5-DOF
- 2219/39424 . . . 16-DOF
- 2219/39425 . . . 9-DOF
- 2219/39426 . . . 10-DOF
- 2219/39427 . . . Panel on arm, hand of robot, controlled axis
- 2219/39428 . . . Panel with special keys for robot programming, like gripper, hand, wrist
- 2219/39429 . . . Using graphic kinematic perspective entered and represented by keys
- 2219/39431 . . . Keys represent function of gripper, open, close
- 2219/39432 . . . Direct robot control, click on mouse on variety of display command buttons
- 2219/39433 . . . Enter a move file, robot will follow a series of instructions
- 2219/39434 . . . Each function key of pc corresponds to a motor, jog each motor
- 2219/39435 . . . Free movable unit has push buttons for other than position, orientation control
- 2219/39436 . . . Joystick mimics manipulator to provide spatial correspondance
- 2219/39437 . . . Joystick with additional handle for wrist and gripper control
- 2219/39438 . . . Direct programming at the console
- 2219/39439 . . . Joystick, handle, lever controls manipulator directly, manually by operator
- 2219/39441 . . . Voice command, camera detects object, grasp, move
- 2219/39442 . . . Set manual a coordinate system by jog feed operation
- 2219/39443 . . . Portable, adapted to handpalm, with joystick, function keys, display
- 2219/39444 . . . Display of position, of shape of robot and tool
- 2219/39445 . . . Select between jog modes, user, robot coordinates, tool, system feed, joint feed
- 2219/39446 . . . Display of manipulator and workpiece and jog directions
- 2219/39447 . . . Dead man switch
- 2219/39448 . . . Same teach pendant connects to many robot controllers over network
- 2219/39449 . . . Pendant, pda displaying camera images overlaid with graphics, augmented reality
- 2219/39451 . . . Augmented reality for robot programming
- 2219/39452 . . . Select with mouse button a coordinate plane for micromanipulation
- 2219/39453 . . . Select program as function of location of mobile manipulator
- 2219/39454 . . . Rubber actuator, two muscle drive, one for extension other for traction
- 2219/39455 . . . Flexible microactuator, fluidic controlled fibre reinforced rubber, three tubes
- 2219/39456 . . . Direct drive
- 2219/39457 . . . Tendon drive
- 2219/39458 . . . Vehicle levitated, arm pushes to position vehicle
- 2219/39459 . . . Finger actuator, ac motor and harmonic gear and encoder
- 2219/39461 . . . Rotate arm in one direction, forearm in other direction but double speed
- 2219/39462 . . . Pneumatic actuator, imitates human muscle
- 2219/39463 . . . Exercise treatment end effector, dexter cube with various switches for tasks
- 2219/39464 . . . Estimation of human hand impedance in multijoint arm movements
- 2219/39465 . . . Two fingers each with 2-DOF
- 2219/39466 . . . Hand, gripper, end effector of manipulator
- 2219/39467 . . . Select hand as function of geometric form of hand
- 2219/39468 . . . Changeable hand, tool, code carrier, detector
- 2219/39469 . . . Grip flexible, deformable plate, object and manipulate it
- 2219/39471 . . . Push workpiece in order to grip it correctly
- 2219/39472 . . . Braced manipulator, for fine positioning hand is resting on table
- 2219/39473 . . . Autonomous grasping, find, approach, grasp object, sensory motor coordination
- 2219/39474 . . . Coordination of reaching and grasping
- 2219/39475 . . . Grasp slightly, rotate object between two fingers by action of gravity
- 2219/39476 . . . Orient hand relative to object
- 2219/39477 . . . Finger tracks moving light spot on object
- 2219/39478 . . . Control force and posture of hand
- 2219/39479 . . . Grip, release again to put object in correct position in tray, regrip and move
- 2219/39481 . . . Control distance finger from center, radius
- 2219/39482 . . . Control position of center of grip
- 2219/39483 . . . Control angle of rotation
- 2219/39484 . . . Locate, reach and grasp, visual guided grasping
- 2219/39485 . . . Lift workpiece with two fingers, then grasp it with two additional fingers
- 2219/39486 . . . Fingered hand, multifingered hand
- 2219/39487 . . . Parallel jaws, two fingered hand
- 2219/39488 . . . Each finger gets 1-DOF, one more movement, translation or rotation
- 2219/39489 . . . Soft fingertip, electro rheological controlled fluid
- 2219/39491 . . . Each finger controlled by a controller
- 2219/39492 . . . Finger impedance control
- 2219/39493 . . . Passive compliant finger, array of resilient rods in tip
- 2219/39494 . . . Each finger has 4-DOF
- 2219/39495 . . . Active electromechanical compliance for each finger
- 2219/39496 . . . 3-Fingered hand
- 2219/39497 . . . Each finger can be controlled independently
- 2219/39498 . . . Each finger has force torque sensor in tip of finger
- 2219/39499 . . . 4-Fingers with each 6-DOF
- 2219/39501 . . . 5-Fingers with each 4-DOF
- 2219/39502 . . . 4-Fingers with each 3-DOF
- 2219/39503 . . . 4-Fingers with each 4-DOF
- 2219/39504 . . . Grip object in gravity center
- 2219/39505 . . . Control of gripping, grasping, contacting force, force distribution

- 2219/39506 . . . Grip flexible wire at fixed base, move gripper to top of wire and grip
- 2219/39507 . . . Control of slip motion
- 2219/39508 . . . Reorientation of object, orient, regrasp object
- 2219/39509 . . . Gripping, grasping, links embrace, encircle, envelop object to grasp
- 2219/39511 . . . Reorient, rotate object in hand between fingers by action of fingers
- 2219/39512 . . . Whole hand manipulation, use of fingertips and hand surface
- 2219/39513 . . . Tip prehension grasp, grasp with tip of fingers
- 2219/39514 . . . Stability of grasped objects
- 2219/39515 . . . Grapple object, grip in compliant mode, self alignment of fingers and object
- 2219/39516 . . . Push align object against wall, detect each time distance from grip point to wall
- 2219/39517 . . . Control orientation and position of object in hand, roll between plates
- 2219/39518 . . . Rolling contact between fingers, robot arms and object
- 2219/39519 . . . Concurrent grasp, all forces converge in one point
- 2219/39521 . . . Pencil grasp, forces act in two points, along line of intersection of two planes
- 2219/39522 . . . Regulus grasp, forces do not intersect at all
- 2219/39523 . . . Set holding force as function of dimension, weight, shape, hardness, surface
- 2219/39524 . . . Power grasp, between thumb and four fingers, acting as a virtual middle finger
- 2219/39525 . . . Lateral grasp, between thumb and four fingers, acting as virtual index finger
- 2219/39526 . . . Three fingers used, thumb, index, middle finger for lateral precision
- 2219/39527 . . . Workpiece detector, sensor mounted in, near hand, gripper
- 2219/39528 . . . Measuring, gripping force sensor build into hand
- 2219/39529 . . . Force, torque sensor in wrist, end effector
- 2219/39531 . . . Several different sensors integrated into hand
- 2219/39532 . . . Gripping force sensor build into finger
- 2219/39533 . . . Measure grasping posture and pressure distribution
- 2219/39534 . . . By positioning fingers, dimension of object can be measured
- 2219/39535 . . . Measuring, test unit build into hand, end effector
- 2219/39536 . . . Planning of hand motion, grasping
- 2219/39537 . . . First slide object on table in order to be able to grasp it, grasp it
- 2219/39538 . . . Rotate object with one or more fingers, while sliding on table
- 2219/39539 . . . Plan hand shape
- 2219/39541 . . . Place fingers to reorient object while grasping
- 2219/39542 . . . Plan grasp points, grip matrix and initial grasp force
- 2219/39543 . . . Recognize object and plan hand shapes in grasping movements
- 2219/39544 . . . Fuzzy dynamic programming, generate trajectory of finger during tracking
- 2219/39545 . . . Trajectory generation for smoothly grasping moving object
- 2219/39546 . . . Map human grasps to manipulator grasps
- 2219/39547 . . . Program, plan gripping force, range and speed
- 2219/39548 . . . Enter interactively parameter for gripper, then teach movement
- 2219/39549 . . . Structure, hand has connector for power supply and control signals
- 2219/39551 . . . Pivoting gripper, so part takes always vertical orientation
- 2219/39552 . . . Stewart platform hand, parallel structured hand
- 2219/39553 . . . Dual gripper, two heads to pick up different objects
- 2219/39554 . . . Gripper is formed by flexible tube, embraces object like a finger
- 2219/39555 . . . Revolver with several grippers, hands
- 2219/39556 . . . Control system build into hand itself
- 2219/39557 . . . Vacuum gripper using mask with pattern corresponding to workpiece to be lifted
- 2219/39558 . . . Vacuum hand has selective gripper area
- 2219/39559 . . . Polyvalent gripper, to grip, assemble, manipulate
- 2219/39561 . . . Gripper with build in positioning device to align handled object
- 2219/39562 . . . Dual end effector, one as tool, the other as workhandler, revolver
- 2219/39563 . . . Hand has a center pin to pick up coils
- 2219/39564 . . . Spoon and fork, fork slides back if food delivered in mouth
- 2219/39565 . . . Two fingered microhand, each finger is a parallel, stewart platform
- 2219/39566 . . . Transparent gripper, object can always be seen by camera
- 2219/39567 . . . Use electromagnetic attraction to bring robot hand in contact with workpiece
- 2219/39568 . . . Extract, insert objects by controlling fingers, dexterous
- 2219/39569 . . . Twirl baton, rotate cylinder through center perpendicular to length
- 2219/39571 . . . Grip, grasp non rigid material, piece of cloth
- 2219/39572 . . . Task, tool manipulation
- 2219/39573 . . . Tool guidance along path
- 2219/39574 . . . Passive compliant hand, wrist
- 2219/39575 . . . Wrist, flexible wrist
- 2219/39576 . . . Magnetically levitated wrist
- 2219/39577 . . . Active electromechanical compliance for wrist
- 2219/39578 . . . Axis wrist
- 2219/40 . . . Robotics, robotics mapping to robotics vision
- 2219/40001 . . . Laser color indicates type of machining
- 2219/40002 . . . Camera, robot follows direction movement of operator head, helmet, headstick
- 2219/40003 . . . Move end effector so that image center is shifted to desired position
- 2219/40004 . . . Window function, only a specific region is analyzed
- 2219/40005 . . . Vision, analyse image at one station during manipulation at next station
- 2219/40006 . . . Placing, palletize, un palletize, paper roll placing, box stacking
- 2219/40007 . . . Optimize sequence of pick and place operations upon arrival of workpiece on conveyor
- 2219/40008 . . . Place a box, block in a corner
- 2219/40009 . . . Remove and replace machine part, module
- 2219/40011 . . . Lay down, laying non rigid material, handle flat textile material
- 2219/40012 . . . Pick and place by chain of three manipulators, handling part to each other

- 2219/40013 . . . Kitting, place parts from belt into tray, place tray on conveyor belt
- 2219/40014 . . . Gripping workpiece to place it in another place
- 2219/40015 . . . Soccer playing
- 2219/40016 . . . Kick a ball, leg and foot movement simulator
- 2219/40017 . . . Hockey playing, puck and paddle
- 2219/40018 . . . Ball in cup
- 2219/40019 . . . Placing and assembly, throw object correctly on table
- 2219/40021 . . . Batting, to redirect a projectile
- 2219/40022 . . . Snatching, dynamic pick, effector contacts object, moves with object
- 2219/40023 . . . Dynamic closure, remain contact by acceleration forces
- 2219/40024 . . . Catching
- 2219/40025 . . . Dynamic manipulation, throwing
- 2219/40026 . . . Juggling, tennis playing, throw and catch
- 2219/40027 . . . Preying, object capture, interception, mouse-buster
- 2219/40028 . . . Insert flexible rod, beam into hole
- 2219/40029 . . . Mount elastic ring on a cylinder
- 2219/40031 . . . Dual peg in hole
- 2219/40032 . . . Peg and hole insertion, mating and joining, remote center compliance
- 2219/40033 . . . Assembly, microassembly
- 2219/40034 . . . Disassembly, for recycling
- 2219/40035 . . . Shake grasped parts for dropping excess entangled parts back into pin
- 2219/40036 . . . Transport plates or sheets between two locations without motion inversion
- 2219/40037 . . . No incomplete containers allowed to exit on output conveyor
- 2219/40038 . . . Black list, exclude operation on workpiece when not possible, collision, error
- 2219/40039 . . . Robot mounted or sliding inside vehicle, on assembly line or for test, service
- 2219/40041 . . . Robot operates panel like car radio by pushing, turning buttons, knobs
- 2219/40042 . . . Control tilting angle of surface carried by robot
- 2219/40043 . . . Move object without swinging, no pendulum or swing motion at stop point
- 2219/40044 . . . Unfold flexible material
- 2219/40045 . . . Fill bucket, if hard rock, follow contour rock
- 2219/40046 . . . Fill bucket with sand, move horizontally, if resistance move up, move horizontally
- 2219/40047 . . . Machine overhanging sculptured surfaces
- 2219/40048 . . . Transport bar by two mobile robots on wavy road
- 2219/40049 . . . Cut material with scissors
- 2219/40051 . . . Manipulate flexible material fixed with one end to a wall
- 2219/40052 . . . Deform, bend flexible material
- 2219/40053 . . . Pick 3-D object from pile of objects
- 2219/40054 . . . Supply sheet to bending machine
- 2219/40055 . . . Wire stripping
- 2219/40056 . . . Slide an edge over an edge
- 2219/40057 . . . Contour tracking, edge following
- 2219/40058 . . . Align box, block with a surface
- 2219/40059 . . . Mount, couple and demount, decouple exchangeable mechanical modules
- 2219/40061 . . . Disconnect cable
- 2219/40062 . . . Door opening
- 2219/40063 . . . Transport dish pile and dispense material in each dish of pile
- 2219/40064 . . . Pierce, penetrate soft tissue
- 2219/40065 . . . Approach, touch and then push object
- 2219/40066 . . . Stack and align identical layers, laminates, electronic substrate layers
- 2219/40067 . . . Stack irregular packages
- 2219/40068 . . . Collective, group transport
- 2219/40069 . . . Flattening, sweeping non rigid material, take out wrinkles
- 2219/40071 . . . Relative positioning, grinding and polishing against rotating belt
- 2219/40072 . . . Exert a screwing motion
- 2219/40073 . . . Carry container with liquid, compensate liquid vibration, swinging effect
- 2219/40074 . . . Move tip of arm or carried object on surface, wall, constraint
- 2219/40075 . . . Turn crank, handle, link around fixed point
- 2219/40076 . . . Fold flexible plate, non rigid material
- 2219/40077 . . . Posicast, inverted pendulum, acrobat, balance rod
- 2219/40078 . . . Sort objects, workpieces
- 2219/40079 . . . Grasp parts from first bin, put them in reverse order in second bin
- 2219/40081 . . . Grasp part, object through hole in wall
- 2219/40082 . . . Docking, align object on end effector with target
- 2219/40083 . . . Pick up pen and robot hand writing
- 2219/40084 . . . Posicast, inverted pendulum, acrobat, balance rod, control unactuated joint, dof
- 2219/40085 . . . Point with tip always to same remote target point
- 2219/40086 . . . Slide, tumble, pivot object on surface with fingers of manipulator, grasplless
- 2219/40087 . . . Align hand on workpiece to pick up workpiece, peg and hole
- 2219/40088 . . . Task is push, slide box
- 2219/40089 . . . Tele-programming, transmit task as a program, plus extra info needed by robot
- 2219/40091 . . . Tele-programming by graphical simulation
- 2219/40092 . . . Tele-programming by direct instruction on new object, using vision and force sensors
- 2219/40093 . . . Use known task for similar, like object, inform system of that likeness
- 2219/40094 . . . By changing knowledge base directly
- 2219/40095 . . . Modify tasks due to modular tooling, other fixture configuration, environment
- 2219/40096 . . . Modify tasks due to use of different manipulator
- 2219/40097 . . . Select stations with mouse to create process steps
- 2219/40098 . . . Show grid locations with symbols of workstations
- 2219/40099 . . . Graphical user interface for robotics, visual robot user interface
- 2219/40101 . . . Generate concurrent tasks
- 2219/40102 . . . Tasks are classified in types of unit motions
- 2219/40103 . . . Show object with laser pointer, give oral command for action on, with object
- 2219/40104 . . . Reactive planner, user is integral component of planner, interactive
- 2219/40105 . . . Oop task planning, use three knowledge bases, world-, domain- for vision, plan base

- 2219/40106 . . . Feedback of online failures to offline learned knowledge base
- 2219/40107 . . . Offline task learning knowledge base, static planner controls dynamic online
- 2219/40108 . . . Generating possible sequence of steps as function of timing and conflicts
- 2219/40109 . . . Consider each part to be assembled as an agent, behaving autonomously
- 2219/40111 . . . For assembly
- 2219/40112 . . . Using graph grammars and fuzzy logic
- 2219/40113 . . . Task planning
- 2219/40114 . . . From vision detected initial and user given final state, generate tasks
- 2219/40115 . . . Translate goal to task program, use of expert system
- 2219/40116 . . . Learn by operator observation, symbiosis, show, watch
- 2219/40117 . . . Virtual mechanism, like slider to constraint movement in task space
- 2219/40118 . . . Task oriented virtual tool, developed for task, assists operator in task
- 2219/40119 . . . Virtual internal model, derive from forces on object, motion of end effector
- 2219/40121 . . . Trajectory planning in virtual space
- 2219/40122 . . . Manipulate virtual object, for trajectory planning of real object, haptic display
- 2219/40123 . . . Indicate, select features on display, remote manipulator will execute
- 2219/40124 . . . During manipulator motion, sensor feedback to adapt model in memory
- 2219/40125 . . . Overlay real time stereo image of object on existing, stored memory image argos
- 2219/40126 . . . Virtual landmarks, reference points for operator
- 2219/40127 . . . Virtual tape measure, indicate distance between end effector and destination
- 2219/40128 . . . Virtual tether, line on display connects end effector to destination point
- 2219/40129 . . . Virtual graphic 3-D pointer, manipulator commands real manipulator
- 2219/40131 . . . Virtual reality control, programming of manipulator
- 2219/40132 . . . Haptic joystick with force feedback based on accelerometer included in joystick
- 2219/40133 . . . Force sensation of slave converted to movement of chair for operator
- 2219/40134 . . . Force sensation of slave converted to vibration for operator
- 2219/40135 . . . Slave force converted to shape display, actuated by fingers, surface is force image
- 2219/40136 . . . Stereo audio and vision
- 2219/40137 . . . Force sensation feedback from simulated tool
- 2219/40138 . . . Scaled feedback of forces from slave to master and master to slave
- 2219/40139 . . . Force from slave converted to a digital display like fingers and object
- 2219/40141 . . . Pain sensation feedback, impinge air on, squeeze, vibrate, stimulate fingers
- 2219/40142 . . . Temperature sensation, thermal feedback to operator fingers
- 2219/40143 . . . Slip, texture sensation feedback, by vibration stimulation of fingers
- 2219/40144 . . . Force sensation feedback from slave
- 2219/40145 . . . Force sensation of slave converted to audio signal for operator
- 2219/40146 . . . Telepresence, teletaction, sensor feedback from slave to operator
- 2219/40147 . . . Variable time delay, through internet
- 2219/40148 . . . Predict locally machining forces from model to control remote machine
- 2219/40149 . . . Local intelligence for global planning, remote intelligence for tuning
- 2219/40151 . . . Time delay, problems caused by time delay between local and remote
- 2219/40152 . . . Deictic, using a sign language, point finger to reach, close hand to grasp
- 2219/40153 . . . Teleassistance, operator assists, controls autonomous robot
- 2219/40154 . . . Moving of objects
- 2219/40155 . . . Purpose is grasping objects
- 2219/40156 . . . Input work program as well as timing schedule
- 2219/40157 . . . Planning, event based planning, operator changes plans during execution
- 2219/40158 . . . Correlate actual image at angle with image presented to operator without angle
- 2219/40159 . . . Between operator and sensor a world modeler, local intelligence
- 2219/40161 . . . Visual display of machining, operation, remote viewing
- 2219/40162 . . . Sound display of machining operation
- 2219/40163 . . . Measuring, predictive information feedback to operator
- 2219/40164 . . . Fault recovery from task execution errors
- 2219/40165 . . . Sensor data to display depends on robot status
- 2219/40166 . . . Surface display, virtual object translated into real surface, movable rods
- 2219/40167 . . . Switch between simulated display of remote site, and actual display
- 2219/40168 . . . Simulated display of remote site, driven by operator interaction
- 2219/40169 . . . Display of actual situation at the remote site
- 2219/40171 . . . Set a common coordinate system for all remotely controlled robots
- 2219/40172 . . . Stop command transmission if no feedback signal received at remote site
- 2219/40173 . . . Stop robot if no command received within interval
- 2219/40174 . . . Robot teleoperation through internet
- 2219/40175 . . . Inclination, tilt of operator seat, chair serves as control command, like handle
- 2219/40176 . . . Encode operator actions into symbolic commands for transmission to remote
- 2219/40177 . . . Nanomanipulation
- 2219/40178 . . . Distributed top, resource availability in network
- 2219/40179 . . . Design of controller
- 2219/40181 . . . Operator can fine position in small area, free, but if contact, force feedback
- 2219/40182 . . . Master has different configuration than slave manipulator
- 2219/40183 . . . Tele-machining
- 2219/40184 . . . Compliant teleoperation, operator controls motion, system controls contact, force
- 2219/40185 . . . Decoupled coarse fine motion coordination
- 2219/40186 . . . Reachability control, permits slave to reach commanded position
- 2219/40187 . . . Indexed position control, master controls only small part of slave space

- 2219/40188 . . . Position control with scaling, master small movement, slave large movement
- 2219/40189 . . . Modes, coarse by rate controller, fine by position controller
- 2219/40191 . . . Autonomous manipulation, computer assists operator during manipulation
- 2219/40192 . . . Control modes, velocity for coarse, position for fine, hand for gripper
- 2219/40193 . . . Micromanipulation
- 2219/40194 . . . Force reflective, impedance shaping tele operation
- 2219/40195 . . . Tele-operation, computer assisted manual operation
- 2219/40196 . . . Projecting light on floor to delimit danger zone around robot
- 2219/40197 . . . Suppress, execute command depending on physical position of control panel
- 2219/40198 . . . Contact with human allowed if under pain tolerance limit
- 2219/40199 . . . Soft material covers links, arms for shock and pain attenuation
- 2219/40201 . . . Detect contact, collision with human
- 2219/40202 . . . Human robot coexistence
- 2219/40203 . . . Detect position of operator, create non material barrier to protect operator
- 2219/40204 . . . Each fault condition has a different recovery procedure
- 2219/40205 . . . Multiple arm systems
- 2219/40206 . . . Redundant serial manipulators, kinematic fault tolerance
- 2219/40207 . . . Parallel structured modules, more joints than DOF
- 2219/40208 . . . Dual redundant actuators
- 2219/40209 . . . If speed is important processors execute each different code, otherwise same code
- 2219/40211 . . . Fault tolerant, if one joint, actuator fails, others take over, reconfiguration
- 2219/40212 . . . Two-way clutch for joint, prevents movement in unallowable direction
- 2219/40213 . . . Record history, log of instructions sent from task planner to path planner
- 2219/40214 . . . Command rejection module
- 2219/40215 . . . Limit link kinetic energy to amount another element can dissipate upon impact
- 2219/40216 . . . Record image of working robot; display to detect errors
- 2219/40217 . . . Individual emergency stop lines for each part of system
- 2219/40218 . . . Check conditions before allowing unlocking of joint brake
- 2219/40219 . . . Detect contact, proximity of other manipulators
- 2219/40221 . . . Individual and common power cutoff switch for several robots
- 2219/40222 . . . Lock arm if somebody is looking into the hand
- 2219/40223 . . . If insertion force too high, alarm, stop for operator assistance
- 2219/40224 . . . If robot gets a return signal, go to initial condition position
- 2219/40225 . . . During start up, control robot with low speed, after a while gradually higher
- 2219/40226 . . . Input control signals to control system and to model, compare their outputs
- 2219/40227 . . . If one access robot fails, other pushes it out of the way
- 2219/40228 . . . If deviation of compliant tool is too large, stop and alarm
- 2219/40229 . . . Analytical redundancy, use available functional redundancy of model
- 2219/40231 . . . Safety, dual clutched freewheel for joint, if error no movement possible
- 2219/40232 . . . Lock mechanical arm if servo, cpu error, other arms remain free
- 2219/40233 . . . Portable robot
- 2219/40234 . . . Snake arm, flexi-digit robotic manipulator, a hand at each end
- 2219/40235 . . . Parallel robot, structure
- 2219/40236 . . . With opposing actuators on same joint, agonist, flexor, muscle
- 2219/40237 . . . Bus for communication with sensors
- 2219/40238 . . . Dual arm robot, one picks up one part from conveyor as other places other part in machine
- 2219/40239 . . . Common control box for several robot control boards and additional control boards
- 2219/40241 . . . Underactuated robot, has less actuators than number of DOF
- 2219/40242 . . . End effector with motor to provide a yaw, roll and pitch motion
- 2219/40243 . . . Global positioning robot
- 2219/40244 . . . Walking manipulator with integrated stewart, parallel arm
- 2219/40245 . . . Gripper on crawling device, smaller than two cm
- 2219/40246 . . . 6-DOF 3-ppsp parallel manipulator
- 2219/40247 . . . Series manipulator mounted on parallel manipulator
- 2219/40248 . . . Manipulator on slide
- 2219/40249 . . . Whole arm manipulator, grip object not with end effector but with all links
- 2219/40251 . . . Ghdrs generalized high dimensional robotic system, virtual decomposition
- 2219/40252 . . . Robot on track, rail moves only back and forth
- 2219/40253 . . . Soft arm robot, light, rubber, very compliant
- 2219/40254 . . . Serial to parallel, branching manipulator, one macro and several parallel arms
- 2219/40255 . . . End effector attached to cable for gravity balance suspension
- 2219/40256 . . . Large, heavy manipulator
- 2219/40257 . . . Flexible macro manipulator with rigid attached micromanipulator
- 2219/40258 . . . Robot can be fixed in orientation and height to ground, plurality of such points
- 2219/40259 . . . Set friction in each joint to optimal value
- 2219/40261 . . . Self reproducing, replicating fabrication machine, tools, structure, info for this
- 2219/40262 . . . Two link arm with a free, attached to base, and an active joint between links
- 2219/40263 . . . Dual use mobile detachable manipulator
- 2219/40264 . . . Human like, type robot arm
- 2219/40265 . . . Use of inflatable links, can easily be folded, compressed air for stiffness
- 2219/40266 . . . Resonant manipulator, springs cooperate with latches, motor only for lost energy
- 2219/40267 . . . Parallel manipulator, end effector connected to at least two independent links
- 2219/40268 . . . Master attached to tip of macro manipulator, controls slave micromanipulator
- 2219/40269 . . . Naturally compliant robot arm

- 2219/40271 . . . Underwater, submarine movable manipulator
- 2219/40272 . . . Manipulator on slide, track
- 2219/40273 . . . Wire manipulator, crane type manipulator with three wires
- 2219/40274 . . . Cebot segments are mobile manipulators, connected by manipulator arm self
- 2219/40275 . . . Manipulator mounted on satellite, space manipulator
- 2219/40276 . . . Aqua robot manipulator
- 2219/40277 . . . Hybrid, connect parallel manipulators in series, Stewart truss
- 2219/40278 . . . Compact, foldable manipulator
- 2219/40279 . . . Flexible arm, link
- 2219/40281 . . . Closed kinematic loop, chain mechanisms, closed linkage systems
- 2219/40282 . . . Vehicle supports manipulator and other controlled devices
- 2219/40283 . . . Reservoir with additional material on vehicle with manipulator
- 2219/40284 . . . Toolrack on vehicle with manipulator, toolchanger
- 2219/40285 . . . Variable geometry manipulator, camlock
- 2219/40286 . . . End effector with offset arm, to carry hose to feed material
- 2219/40287 . . . Workpiece manipulator and tool manipulator cooperate
- 2219/40288 . . . Integrate sensor, actuator units into a virtual manipulator
- 2219/40289 . . . Scara for coarse movement, xy table for fine movement
- 2219/40291 . . . Instead of two links, two eccentrically rotating disks for full circle working
- 2219/40292 . . . Manipulator is positioned by a crane to cover a large workpiece, extended range
- 2219/40293 . . . Gantry, portal
- 2219/40294 . . . Portable robot can be fixed, attached to different workplaces, stations
- 2219/40295 . . . Sensors at the elbow to detect obstacles
- 2219/40296 . . . Second arm can be attached to first arm, modular
- 2219/40297 . . . Macro manipulator and microhand, distributed positioning
- 2219/40298 . . . Manipulator on vehicle, wheels, mobile
- 2219/40299 . . . Holonic, made of similar modules, truss manipulator
- 2219/40301 . . . Scara, selective compliance assembly robot arm, links, arms in a plane
- 2219/40302 . . . Dynamically reconfigurable robot, adapt structure to tasks, cellular robot, cebot
- 2219/40303 . . . Arm somersaults over grid, place one hand on grid point, release other hand
- 2219/40304 . . . Modular structure
- 2219/40305 . . . Exoskeleton, human robot interaction, extenders
- 2219/40306 . . . Two or more independent robots
- 2219/40307 . . . Two, dual arm robot, arm used synchronously, or each separately, asynchronously
- 2219/40308 . . . Machine, conveyor model in library contains coop robot path
- 2219/40309 . . . Simulation of human hand motion
- 2219/40311 . . . Real time simulation
- 2219/40312 . . . OOP object oriented programming for simulation
- 2219/40313 . . . Graphic motion simulation for ergonomic analysis
- 2219/40314 . . . Simulation of program locally before remote operation
- 2219/40315 . . . Simulation with boundary graphs
- 2219/40316 . . . Simulation of human-like robot joint, restricted 3-D motion
- 2219/40317 . . . For collision avoidance and detection
- 2219/40318 . . . Simulation of reaction force and moment, force simulation
- 2219/40319 . . . Simulate contact of object and obstacle, reduce to pairs with only one contact
- 2219/40321 . . . Simulation of human arm trajectories
- 2219/40322 . . . Simulation with des, discrete event system
- 2219/40323 . . . Modeling robot environment for sensor based robot system
- 2219/40324 . . . Simulation, modeling of muscle, musculoskeletal dynamical system
- 2219/40325 . . . Learn inverse kinematic model by variation, perturbation
- 2219/40326 . . . Singular value decomposition
- 2219/40327 . . . Calculation, inverse kinematics solution using damped least squares method
- 2219/40328 . . . If joint near singularity, restore angle to start values, adapt other joints
- 2219/40329 . . . Semi-singularity, movement in one direction not possible, in opposite direction is possible
- 2219/40331 . . . Joint angle change constraint, singularity between elbow up and down
- 2219/40332 . . . Identify degenerated directions, eliminate velocity component in that direction
- 2219/40333 . . . Singularity, at least one movement not possible, kinematic redundancy
- 2219/40334 . . . By fuzzy logic supervisor
- 2219/40335 . . . By probability distribution functions pdf
- 2219/40336 . . . Optimize multiple constraints or subtasks
- 2219/40337 . . . Maximum distance criterium
- 2219/40338 . . . Task priority redundancy
- 2219/40339 . . . Avoid collision
- 2219/40341 . . . Minimize energy
- 2219/40342 . . . Minimize sum of gravitational torques of some joints
- 2219/40343 . . . Optimize local torque
- 2219/40344 . . . Configuration index, control, limits of joint movement
- 2219/40345 . . . Minor measure
- 2219/40346 . . . Compatibility index
- 2219/40347 . . . Optimize manipulator velocity ratio function
- 2219/40348 . . . Optimize condition number
- 2219/40349 . . . Optimize manipulability measure function
- 2219/40351 . . . Cooperation of hand arm, break down into two subsystems
- 2219/40352 . . . Combination of priority, basic task, tip position, and task for link movement
- 2219/40353 . . . Split robot into two virtual robot, origin of second equals tip of first
- 2219/40354 . . . Singularity detection
- 2219/40355 . . . Geometric, task independent
- 2219/40356 . . . Kinetic energy, content and distribution
- 2219/40357 . . . Compliance, design and operational issues
- 2219/40358 . . . Inertial, from dynamic models
- 2219/40359 . . . Constraint, physical limitations
- 2219/40361 . . . Category of performance criteria

- 2219/40362 . . . Elbow high or low, avoid obstacle collision with redundancy control
- 2219/40363 . . . Two independent paths planned, interpolations for same robot, e.g. wrist and TCP
- 2219/40364 . . . Position of robot platform as additional task
- 2219/40365 . . . Configuration control, select other tasks by configuration of link positions
- 2219/40366 . . . Elbow reaches its target position before the end effector
- 2219/40367 . . . Redundant manipulator
- 2219/40368 . . . Multipoint impedance control, redundant manipulator can touch several obstacles
- 2219/40369 . . . Generate all possible arm postures associated with end effector position
- 2219/40371 . . . Control trajectory to avoid joint limit as well as obstacle collision
- 2219/40372 . . . Control end effector impedance
- 2219/40373 . . . Control of trajectory in case of a limb, joint disturbance, failure
- 2219/40374 . . . Control trajectory in case of distortion of visual input
- 2219/40375 . . . Control trajectory in case of changed tool length
- 2219/40376 . . . Moving center of mass and end effector for dynamic task of lifting heavy weight
- 2219/40377 . . . Impact force on stationary end effector, move center of mass, no reaction to base
- 2219/40378 . . . Keep center of mass fixed, no counterweight, no reaction on base
- 2219/40379 . . . Manipulability
- 2219/40381 . . . Control trajectory in case of joint limit, clamping of joint
- 2219/40382 . . . Limit allowable area where robot can be taught
- 2219/40383 . . . Correction, modification program by detection type workpiece
- 2219/40384 . . . Optimize taught path by data acquisition followed by genetic algorithm
- 2219/40385 . . . Compare offline taught point with online taught point, modify rest as function of error
- 2219/40386 . . . Search around taught point until operation has succes, correct program
- 2219/40387 . . . Modify without repeating teaching operation
- 2219/40388 . . . Two channels between robot and teaching panel, rs232c and video
- 2219/40389 . . . Use robot control language also to write non robotic user, application programs
- 2219/40391 . . . Human to robot skill transfer
- 2219/40392 . . . Programming, visual robot programming language
- 2219/40393 . . . Learn natural high level command, associate its template with a plan, sequence
- 2219/40394 . . . Combine offline with online information to generate robot actions
- 2219/40395 . . . Compose movement with primitive movement segments from database
- 2219/40396 . . . Intermediate code for robots, bridge, conversion to controller
- 2219/40397 . . . Programming language for robots, universal, user oriented
- 2219/40398 . . . Opto-electronic follow-up of movement of head, eyelids, finger to control robot
- 2219/40399 . . . Selection of master-slave operation mode
- 2219/40401 . . . Convert workspace of master to workspace of slave
- 2219/40402 . . . Control button on master for quick movement, for fine slow movement
- 2219/40403 . . . Master for walk through, slave uses data for motion control and simulation
- 2219/40404 . . . Separate master controls macro and microslave manipulator
- 2219/40405 . . . Master slave position control
- 2219/40406 . . . Master slave rate control
- 2219/40407 . . . Master slave, master is replica of slave
- 2219/40408 . . . Intention learning
- 2219/40409 . . . Robot brings object near operator, operator places object in correct position
- 2219/40411 . . . Robot assists human in non-industrial environment like home or office
- 2219/40412 . . . Sensor knowledge command fusion network, data and feature and action and constraint
- 2219/40413 . . . Robot has multisensors surrounding operator, to understand intention of operator
- 2219/40414 . . . Man robot interface, exchange of information between operator and robot
- 2219/40415 . . . Semi active robot, cobot, guides surgeon, operator to planned trajectory, constraint
- 2219/40416 . . . Planning for variable length tool, laser beam as tool
- 2219/40417 . . . For cooperating manipulators
- 2219/40418 . . . Presurgical planning, on screen indicate regions to be operated on
- 2219/40419 . . . Task, motion planning of objects in contact, task level programming, not robot level
- 2219/40421 . . . Motion planning for manipulator handling sheet metal profiles
- 2219/40422 . . . Force controlled velocity motion planning, adaptive
- 2219/40423 . . . Map task space to sensor space
- 2219/40424 . . . Online motion planning, in real time, use vision to detect workspace changes
- 2219/40425 . . . Sensing, vision based motion planning
- 2219/40426 . . . Adaptive trajectory planning as function of force on end effector, bucket
- 2219/40427 . . . Integrate sensing and action in planning
- 2219/40428 . . . Using rapidly exploring random trees algorithm RRT-algorithm
- 2219/40429 . . . Stochastic, probabilistic generation of intermediate points
- 2219/40431 . . . Grid of preoptimised paths as function of target position, choose closest, fine adapt
- 2219/40432 . . . Pass states by weighted transitions
- 2219/40433 . . . Distributed, trajectory planning for each virtual arm
- 2219/40434 . . . Decompose in motion planning for swarm of robots and motion planning for object to be transported
- 2219/40435 . . . Extract minimum number of via points from a trajectory
- 2219/40436 . . . Distributed search of attainable positions, parallel computed
- 2219/40437 . . . Local, directly search robot workspace
- 2219/40438 . . . Global, compute free configuration space, connectivity graph is then searched
- 2219/40439 . . . Feasible map algorithm
- 2219/40441 . . . Probabilistic backprojection

- 2219/40442 . . . Voxel map, 3-D grid map
- 2219/40443 . . . Conditional and iterative planning
- 2219/40444 . . . Hierarchical planning, in levels
- 2219/40445 . . . Decompose n-dimension with n-links into smaller m-dimension with m-1-links
- 2219/40446 . . . Graph based
- 2219/40447 . . . Bitmap based
- 2219/40448 . . . Preprocess nodes with arm configurations, c-space and planning by connecting nodes
- 2219/40449 . . . Continuous, smooth robot motion
- 2219/40451 . . . Closest, nearest arm, robot executes task, minimum travel time
- 2219/40452 . . . Evaluation function derived from skilled, experimented operator data
- 2219/40453 . . . Maximum torque for each axis
- 2219/40454 . . . Max velocity, acceleration limit for workpiece and arm jerk rate as constraints
- 2219/40455 . . . Proximity of obstacles
- 2219/40456 . . . End effector orientation error
- 2219/40457 . . . End effector position error
- 2219/40458 . . . Grid adaptive optimization
- 2219/40459 . . . Minimum torque change model
- 2219/40461 . . . Plan for even distribution of motor load of joints
- 2219/40462 . . . Constant consumed energy, regenerate acceleration energy during deceleration
- 2219/40463 . . . Shortest distance in time, or metric, time optimal
- 2219/40464 . . . Minimum relative velocities
- 2219/40465 . . . Criteria is lowest cost function, minimum work path
- 2219/40466 . . . Plan for minimum time trajectory, at least one joint maximum torque
- 2219/40467 . . . Virtual springs, impedance method
- 2219/40468 . . . Using polytree intersection method
- 2219/40469 . . . Using fuzzy logic performance, distances are fuzzy, very close to very far
- 2219/40471 . . . Using gradient method
- 2219/40472 . . . Using exact cell decomposition
- 2219/40473 . . . Using genetic algorithm GA
- 2219/40474 . . . Using potential fields
- 2219/40475 . . . In presence of moving obstacles, dynamic environment
- 2219/40476 . . . Collision, planning for collision free path
- 2219/40477 . . . Plan path independent from obstacles, then correction for obstacles
- 2219/40478 . . . Graphic display of work area of robot, forbidden, permitted zone
- 2219/40479 . . . Use graphic display, layout of robot path, obstacles to indicate interference
- 2219/40481 . . . Search pattern according to type of assembly to be performed
- 2219/40482 . . . Before assembly arrange parts
- 2219/40483 . . . Find possible contacts
- 2219/40484 . . . Using several tethered motors, attached to powersupply cable, move over surface
- 2219/40485 . . . Generate goal regions in presence of uncertainty, interference
- 2219/40486 . . . If physical limitation, execute regrasping steps
- 2219/40487 . . . Sensing to task planning to assembly execution, integration, automatic
- 2219/40488 . . . Coarse and fine motion planning combined
- 2219/40489 . . . Assembly, polyhedra in contact
- 2219/40491 . . . Gravity stable assembly, upper part cannot fall apart
- 2219/40492 . . . Model manipulator by spheres for collision avoidance
- 2219/40493 . . . Task to parameter designer, adapts parameters of impedance model as function of sensors
- 2219/40494 . . . Neural network for object trajectory prediction, fuzzy for robot path
- 2219/40495 . . . Inverse kinematics model controls trajectory planning and servo system
- 2219/40496 . . . Hierarchical, learning, recognition level controls adaptation, servo level
- 2219/40497 . . . Collision monitor controls planner in real time to replan if collision
- 2219/40498 . . . Architecture, integration of planner and motion controller
- 2219/40499 . . . Reinforcement learning algorithm
- 2219/40501 . . . Using sub goal method of options for semi optimal path planning
- 2219/40502 . . . Configuration metrics
- 2219/40503 . . . Input design parameters of workpiece into path, trajectory planner
- 2219/40504 . . . Simultaneous trajectory and camera planning
- 2219/40505 . . . Adaptive posture planning as function of large forces
- 2219/40506 . . . Self motion topology knowledge, configuration mapping
- 2219/40507 . . . Distributed planning, offline trajectory, online motion, avoid collision
- 2219/40508 . . . Fuzzy identification of motion plans executed by operator
- 2219/40509 . . . Piano moving model
- 2219/40511 . . . Trajectory optimization, coarse for arm, medium for wrist, fine for finger
- 2219/40512 . . . Real time path planning, trajectory generation
- 2219/40513 . . . Planning of vehicle and of its manipulator arm
- 2219/40514 . . . Computed robot optimized configurations to train ann, output path in real time
- 2219/40515 . . . Integration of simulation and planning
- 2219/40516 . . . Replanning
- 2219/40517 . . . Constraint motion planning, variational dynamic programming
- 2219/40518 . . . Motion and task planning
- 2219/40519 . . . Motion, trajectory planning
- 2219/40521 . . . Alternative, allowable path substitution if arm movements not possible
- 2219/40522 . . . Display of workpiece, workspace, locus of robot tip in different planes, xy xz yz
- 2219/40523 . . . Path motion planning, path in space followed by tip of robot
- 2219/40524 . . . Replace link, joint, structure by stewart platform to model flexibility
- 2219/40525 . . . Modeling only part of links or modules
- 2219/40526 . . . Modeling of links for each possible error or only certain error
- 2219/40527 . . . Modeling, identification of link parameters
- 2219/40528 . . . Ann for learning robot contact surface shape
- 2219/40529 . . . Neural network based on distance between patterns
- 2219/40531 . . . Ann for voice recognition
- 2219/40532 . . . Ann for vision processing
- 2219/40533 . . . Generate derivative, change of vibration error
- 2219/40534 . . . Generate derivative, change of position error

2219/40535 . . .	Selective perception, retain only information needed for special task	2219/40583 . . .	Detect relative position or orientation between gripper and currently handled object
2219/40536 . . .	Signal processing for sensors	2219/40584 . . .	Camera, non-contact sensor mounted on wrist, indep from gripper
2219/40537 . . .	Detect if robot has picked up more than one piece from bin; interlocked parts	2219/40585 . . .	Chemical, biological sensors
2219/40538 . . .	Barcode reader to detect position	2219/40586 . . .	6-DOF force sensor
2219/40539 . . .	Edge detection from tactile information	2219/40587 . . .	Measure force indirectly by using deviation in position
2219/40541 . . .	Identification of contact formation, state from several force measurements	2219/40588 . . .	Three laser scanners project beam on photodiodes on end effector
2219/40542 . . .	Object dimension	2219/40589 . . .	Recognize shape, contour of tool
2219/40543 . . .	Identification and location, position of components, objects	2219/40591 . . .	At least three cameras, for tracking, general overview and underview
2219/40544 . . .	Detect proximity of object	2219/40592 . . .	Two virtual infrared range sensors
2219/40545 . . .	Relative position of wrist with respect to end effector spatial configuration	2219/40593 . . .	Push object and hold, detect moved distance
2219/40546 . . .	Motion of object	2219/40594 . . .	Two range sensors for recognizing 3-D objects
2219/40547 . . .	End effector position using accelerometers in tip	2219/40595 . . .	Camera to monitor deviation of each joint, due to bending of link
2219/40548 . . .	Compare measured distances to obstacle with model of environment	2219/40596 . . .	Encoder in each joint
2219/40549 . . .	Acceleration of end effector	2219/40597 . . .	Measure, calculate angular momentum, gyro of rotating body at end effector
2219/40551 . . .	Friction estimation for grasp	2219/40598 . . .	Measure velocity, speed of end effector
2219/40552 . . .	Joint limit	2219/40599 . . .	Force, torque sensor integrated in joint
2219/40553 . . .	Haptic object recognition	2219/40601 . . .	Reference sensors
2219/40554 . . .	Object recognition to track object on conveyor	2219/40602 . . .	Robot control test platform
2219/40555 . . .	Orientation and distance	2219/40603 . . .	Infrared stimulated ultrasonic button on end effector, two fixed receivers
2219/40556 . . .	Multisensor to detect contact errors in assembly	2219/40604 . . .	Two camera, global vision camera, end effector neighbourhood vision camera
2219/40557 . . .	Tracking a tool, compute 3-D position relative to camera	2219/40605 . . .	Two cameras, each on a different end effector to measure relative position
2219/40558 . . .	Derive hand position angle from sensed process variable, like waveform	2219/40606 . . .	Force, torque sensor in finger
2219/40559 . . .	Collision between hand and workpiece, operator	2219/40607 . . .	Fixed camera to observe workspace, object, workpiece, global
2219/40561 . . .	Contactpoint between sensor surface and the normal, geometric probing	2219/40608 . . .	Camera rotates around end effector, no calibration needed
2219/40562 . . .	Position and orientation of end effector, teach probe, track them	2219/40609 . . .	Camera to monitor end effector as well as object to be handled
2219/40563 . . .	Object detection	2219/40611 . . .	Camera to monitor endpoint, end effector position
2219/40564 . . .	Recognize shape, contour of object, extract position and orientation	2219/40612 . . .	6-DOF ultrasonic or infrared external measurement
2219/40565 . . .	Detect features of object, not position or orientation	2219/40613 . . .	Camera, laser scanner on end effector, hand eye manipulator, local
2219/40566 . . .	Measuring, determine axis of revolution surface by tactile sensing, orientation	2219/40614 . . .	Whole arm proximity sensor WHAP
2219/40567 . . .	Purpose, workpiece slip sensing	2219/40615 . . .	Integrate sensor placement, configuration with vision tracking
2219/40568 . . .	Position and force and skin acceleration and stress rate sensors	2219/40616 . . .	Sensor planning, sensor configuration, parameters as function of task
2219/40569 . . .	Force and tactile and proximity sensor	2219/40617 . . .	Agile eye, control position of camera, active vision, pan-tilt camera, follow object
2219/40571 . . .	Camera, vision combined with force sensor	2219/40618 . . .	Measure gripping force offline, calibrate gripper for gripping force
2219/40572 . . .	Camera combined with position sensor	2219/40619 . . .	Haptic, combination of tactile and proprioceptive sensing
2219/40573 . . .	Isee integrated sensor, end effector, camera, proximity, gas, temperature, force	2219/40621 . . .	Triangulation sensor
2219/40574 . . .	Laserscanner combined with tactile sensors	2219/40622 . . .	Detect orientation of workpiece during movement of end effector
2219/40575 . . .	Camera combined with tactile sensors, for 3-D	2219/40623 . . .	Track position of end effector by laser beam
2219/40576 . . .	Multisensory object recognition, surface reconstruction	2219/40624 . . .	Optical beam area sensor
2219/40577 . . .	Multisensor object recognition	2219/40625 . . .	Tactile sensor
2219/40578 . . .	Impedance, mechanical impedance measurement	2219/40626 . . .	Proprioceptive, detect relative link position, form object from hand contact
2219/40579 . . .	Mechanical impedance, from motor current and estimated velocity		
2219/40581 . . .	Touch sensing, arc sensing		
2219/40582 . . .	Force sensor in robot fixture, base		

- 2219/40627 . . . Tactile image sensor, matrix, array of tactile elements, tixels
- 2219/40628 . . . Progressive constraints
- 2219/40629 . . . Manipulation planning, consider manipulation task, path, grasping
- 2219/41 . . . Servomotor, servo controller till figures
- 2219/41001 . . . Servo problems
- 2219/41002 . . . Servo amplifier
- 2219/41003 . . . Control power amplifier with data on data bus
- 2219/41004 . . . Selection gain according to selection of speed or positioning mode
- 2219/41005 . . . Update servo gain not for each microprocessor cycle, but after a certain displacement
- 2219/41006 . . . Change gain as function of speed and position
- 2219/41007 . . . Select gain as function of gear ratio
- 2219/41008 . . . Speed gain high, position gain low in speed mode and inverse in position mode
- 2219/41009 . . . Sum output of amplifiers with different gains
- 2219/41011 . . . Adapt gain as function of followup error, model can be used
- 2219/41012 . . . Adjust feedforward gain
- 2219/41013 . . . Lower gain in high frequency region
- 2219/41014 . . . Cubic raise of gain until friction overcome, then linear raise
- 2219/41015 . . . Adjust position and speed gain of different axis
- 2219/41016 . . . Adjust gain to maintain operating bandwidth for guaranteed servo performance
- 2219/41017 . . . High gain in narrow band of frequencies centered around frequency of rotation
- 2219/41018 . . . High gain for motor control during acceleration, low during deceleration
- 2219/41019 . . . Measure time needed from first to second speed, to adapt gain to aging condition
- 2219/41021 . . . Variable gain
- 2219/41022 . . . Small gain for small movements, large gain for large movements
- 2219/41023 . . . Large pd gain initially switched to smaller pd gain afterwards
- 2219/41024 . . . High gain for low command speed, torque or position error equals or near zero
- 2219/41025 . . . Detect oscillation, unstability of servo and change gain to stabilize again
- 2219/41026 . . . Change gain as function of speed
- 2219/41027 . . . Control signal exponentially to error
- 2219/41028 . . . Select gain with memory, rom table
- 2219/41029 . . . Adjust gain as function of position error and position
- 2219/41031 . . . Raise gain at zero speed until position error or speed is zero, then normal gain
- 2219/41032 . . . Backlash
- 2219/41033 . . . Constant counter torque
- 2219/41034 . . . Two motors driven in opposite direction to take up backlash
- 2219/41035 . . . Voltage injection
- 2219/41036 . . . Position error in memory, lookup table for correction actual position
- 2219/41037 . . . With computer
- 2219/41038 . . . Compensation pulses
- 2219/41039 . . . Change compensation slowly, gradually, smooth error with filter
- 2219/41041 . . . Compensation pulses as function of direction movement
- 2219/41042 . . . Switch between rapid, quick feed and cut, slow workspeed feed backlash
- 2219/41043 . . . Memory table with motor current and corresponding correction for lost motion
- 2219/41044 . . . For several transducers a table, select table as function of transducer
- 2219/41045 . . . For several modes and feed speeds, a table, registers for several backlash
- 2219/41046 . . . Ffw compensation using adaptive inverse backlash model
- 2219/41047 . . . Recirculating ballnut, ballscrew, preloaded bearing
- 2219/41048 . . . Relieve backlash by stepping back a little and verify position
- 2219/41049 . . . Block position pulses until movement detected, automatic compensation
- 2219/41051 . . . Detect end of lost motion by detecting changing current
- 2219/41052 . . . By detecting change of velocity
- 2219/41053 . . . How to integrate position error, add to speed loop
- 2219/41054 . . . Using neural network techniques
- 2219/41055 . . . Kind of compensation such as pitch error compensation
- 2219/41056 . . . Compensation for changing stiffness, deformation of workpiece
- 2219/41057 . . . Stiffness, deformation of slide, drive
- 2219/41058 . . . For deformation of screw
- 2219/41059 . . . Play in gear, screw backlash, lost motion
- 2219/41061 . . . Backlash for linear deviations
- 2219/41062 . . . Compensation for two, three axis at the same time, crosscoupling
- 2219/41063 . . . Lineary distributing pitch error over interpolated distance, add pulses, smoothing
- 2219/41064 . . . Reference screw, simulation axis, electronic simulated axis
- 2219/41065 . . . Resolver or inductosyn correction
- 2219/41066 . . . Keep nut at constant distance from screw
- 2219/41067 . . . Correction screw
- 2219/41068 . . . Measuring and feedback
- 2219/41069 . . . With cam
- 2219/41071 . . . Backlash for non orthogonal axis
- 2219/41072 . . . Cam transmits movement to resolver
- 2219/41073 . . . Tuning potentiometers and programming them
- 2219/41074 . . . Learn, calibrate at start for indetermined position, drive until movement
- 2219/41075 . . . Calibrate at start if new screw or slide has been installed, new lookup table
- 2219/41076 . . . For each replacement of a movable part, reload pitch error correction
- 2219/41077 . . . Self tuning, test run, detect, compute optimal backlash, deformation compensation
- 2219/41078 . . . Backlash acceleration compensation when inverting, reversing direction
- 2219/41079 . . . Cross coupled backlash for two other axis on reversing third axis
- 2219/41081 . . . Approach position from same direction
- 2219/41082 . . . Timer, speed integration to control duration of backlash correction
- 2219/41083 . . . Upon reversing direction, lower, change gain
- 2219/41084 . . . Compensation speed axis with changing, reversing direction, quadrant circle

- 2219/41085 . . . Compensation pulses on inversion of direction of rotation, movement
- 2219/41086 . . . Bang bang control
- 2219/41087 . . . Determine switch point
- 2219/41088 . . . If error too large, switch over to signal identification and servo correction
- 2219/41089 . . . Align, calibrate control so that one pulse or signal represents certain movement
- 2219/41091 . . . Alignment, zeroing, nulling, set parallel to axis
- 2219/41092 . . . References, calibration positions for correction of value position counter
- 2219/41093 . . . By injection of sinusoidal signal, superposed on reference
- 2219/41094 . . . Removable interferometer, store exact position, needed drive current, temperature
- 2219/41095 . . . References, calibration positions to adapt gain of servo
- 2219/41096 . . . For several positions store dead zone in memory
- 2219/41097 . . . Align stepping motor with driven valve
- 2219/41098 . . . Automatic recalibration
- 2219/41099 . . . Calibration by going to two extremes, limits, counting pulses, storing values
- 2219/41101 . . . Stop, halt step, ac motor on certain excitation phase, after sensing a reference
- 2219/41102 . . . Analog comparator
- 2219/41103 . . . One comparator for both speed and position feedback
- 2219/41104 . . . Start fine position after coarse position stopped
- 2219/41105 . . . Coarse fine
- 2219/41106 . . . Coarse fine take over, transition, switch over
- 2219/41107 . . . Coarse by hydraulic cylinder, fine by step motor superposed on piston
- 2219/41108 . . . Controlled parameter such as gas mass flow rate
- 2219/41109 . . . Drilling rate, feed rate
- 2219/41111 . . . Vertical position and orientation with respect to vertical
- 2219/41112 . . . Control parameter such as motor controlled by a torque signal
- 2219/41113 . . . Compensation for path radius
- 2219/41114 . . . Compensation for gravity, counter balance gravity
- 2219/41115 . . . Compensation periodical disturbance, like chatter, non-circular workpiece
- 2219/41116 . . . Compensation for instability
- 2219/41117 . . . Cancel vibration during positioning of slide
- 2219/41118 . . . Drift-compensation for servo, anti-hunt
- 2219/41119 . . . Servo error compensation
- 2219/41121 . . . Eliminating oscillations, hunting motor, actuator
- 2219/41122 . . . Mechanical vibrations in servo, antihunt also safety, stray pulses, jitter
- 2219/41123 . . . Correction inertia of servo
- 2219/41124 . . . Nonlinear compensation
- 2219/41125 . . . Compensate position as function of phase lag of drive motor
- 2219/41126 . . . Compensation for current ripple of drive or transducer
- 2219/41127 . . . Compensation for temperature variations of servo
- 2219/41128 . . . Compensate vibration beam, gantry, feedback of speed of non driven end
- 2219/41129 . . . Force compensation for non linearity of system
- 2219/41131 . . . Enter manually a compensation, correction for a better positioning
- 2219/41132 . . . Motor ripple compensation
- 2219/41133 . . . Compensation non linear transfer function
- 2219/41134 . . . Ann compensates output of pd controller
- 2219/41135 . . . Avoid stray pulses, jitter, use two d-flipflops, or integrate pulse duration
- 2219/41136 . . . Compensation of position for slip of ac motor
- 2219/41137 . . . Torque compensation for levitation effect of motor
- 2219/41138 . . . Torque compensation
- 2219/41139 . . . Compensate dynamic deflection of slide, calculated with position, speed, torque deflection values
- 2219/41141 . . . Position error compensation as function of speed to compensate detection delay
- 2219/41142 . . . Compensation of servocontrol signals as function of changing supply voltage
- 2219/41143 . . . Compensation of dynamic characteristic of actuator
- 2219/41144 . . . Element used such as low pass filter to cut resonance at non needed regions
- 2219/41145 . . . Digital filter for compensation of servo loop
- 2219/41146 . . . Kalman filter
- 2219/41147 . . . Exponential filter
- 2219/41148 . . . Model, from position, speed, acceleration derive compensation
- 2219/41149 . . . Zero phase filter
- 2219/41151 . . . Finite impulse response filter
- 2219/41152 . . . Adaptive filter
- 2219/41153 . . . Infinite impulse response filter
- 2219/41154 . . . Friction, compensation for friction
- 2219/41155 . . . During reversing, inverting rotation, movement
- 2219/41156 . . . Injection of vibration anti-stick, against static friction, dither, stiction
- 2219/41157 . . . Compensation as function of speed and acceleration
- 2219/41158 . . . Use of pwm signal against friction
- 2219/41159 . . . Two step command, reference and dead zone value forward, then dead zone reverse
- 2219/41161 . . . Adaptive friction compensation
- 2219/41162 . . . Large gain at start to overcome friction, then low gain
- 2219/41163 . . . Adapt gain to friction, weight, inertia
- 2219/41164 . . . How to compensate, for example by injecting compensation signal in comparator of normal loop
- 2219/41165 . . . Compensation corrected by second servo independent from main servo
- 2219/41166 . . . Adaptive filter frequency as function of oscillation, rigidity, inertia load
- 2219/41167 . . . Control path independent of load
- 2219/41168 . . . Compensate position error by shifting projected image electronically
- 2219/41169 . . . Parallel compensation
- 2219/41171 . . . Different compensation for left and right movement
- 2219/41172 . . . Adapt coefficients of compensator to bring system into phase margin
- 2219/41173 . . . Delay of compensation output signal as function of sampling and computation time
- 2219/41174 . . . Compensator in feedback loop

- 2219/41175 . . . Derivative compensation for speed loop, added or subtracted to speed reference
- 2219/41176 . . . Compensation control, position error with data from lookup memory
- 2219/41177 . . . Repetitive control, adaptive, previous error during actual positioning
- 2219/41178 . . . Serial precompensation
- 2219/41179 . . . PI precompensation for speed loop
- 2219/41181 . . . PID precompensation for position loop
- 2219/41182 . . . PI precompensation for position loop
- 2219/41183 . . . Compensation of lag during standstill
- 2219/41184 . . . Compensation of lag during constant speed movement
- 2219/41185 . . . Send reference data in inverse order to model, filter to get inverted phase
- 2219/41186 . . . Lag
- 2219/41187 . . . Inverse, reciprocal filter, transfer function, reduce lag in contouring
- 2219/41188 . . . Compensate position error between two different axis as function of type of transducer
- 2219/41189 . . . Several axis, compensation for load for several axis at the same time
- 2219/41191 . . . Cancel vibration by positioning two slides, opposite acceleration
- 2219/41192 . . . Compensation for different response times, delay of axis
- 2219/41193 . . . Active damping of tool vibrations by cross coupling
- 2219/41194 . . . Axis error, one axis is corrected on other axis
- 2219/41195 . . . Cross coupled feedback, position change one axis effects control of other
- 2219/41196 . . . Adaptive prefiltering
- 2219/41197 . . . Adaptive postfiltering
- 2219/41198 . . . Fuzzy precompensation of pid, pd
- 2219/41199 . . . Feedforward compensation of pid
- 2219/41201 . . . Fuzzy compensation of statecontroller
- 2219/41202 . . . Structure, compensation circuit after comparator in loop
- 2219/41203 . . . Lead-phase compensation, lag-phase compensation servo
- 2219/41204 . . . Compensation circuit for input, reference, before comparator
- 2219/41205 . . . Compensation circuit in speed feedback loop
- 2219/41206 . . . Lookup table, memory with certain relationships
- 2219/41207 . . . Lookup table with position command, deviation and correction value
- 2219/41208 . . . Lookup table for load, motor torque as function of actual position error
- 2219/41209 . . . Lookup table with compensation as function of reference and feedback value
- 2219/41211 . . . For surface deviations from reference surface
- 2219/41212 . . . Gains for pid compensator as function of xy position
- 2219/41213 . . . Lookup table for load, motor torque as function of actual position
- 2219/41214 . . . Lookup table for current as function of actual position
- 2219/41215 . . . Lookup table for speed as function of actual position error
- 2219/41216 . . . Two lookup tables, for forward and reverse movement
- 2219/41217 . . . Command preshape, guidance, reference for better dynamic response, forcing feedforward
- 2219/41218 . . . Posicast, break reference into two parts, better settling time
- 2219/41219 . . . To compensate path, track error, calculate, use compensated reference
- 2219/41221 . . . Fuzzy shaping
- 2219/41222 . . . Modified command filtering
- 2219/41223 . . . Ann shaping, objective position, trajectory is shaped by ann
- 2219/41224 . . . Shaping a bang-bang input
- 2219/41225 . . . Profile generator for reference and for feedforward torque
- 2219/41226 . . . Zero vibration and zero derivative input shaper ZVD
- 2219/41227 . . . Extra insensitive input shaper, some vibration allowed
- 2219/41228 . . . Frequency of commutation updates depends on motor speed
- 2219/41229 . . . Adding a vibration, noise signal to reference signal of position, speed or acceleration
- 2219/41231 . . . Using impulse shaping filter
- 2219/41232 . . . Notch filter
- 2219/41233 . . . Feedforward simulation filter, with model
- 2219/41234 . . . Design, modeling of position controller
- 2219/41235 . . . Design, modeling of motion controller
- 2219/41236 . . . Use of sfc sequential function charts for specification
- 2219/41237 . . . Use of petrinets for verification, simulation
- 2219/41238 . . . Design with control bandwidth beyond lowest natural frequency
- 2219/41239 . . . Lyapunov direct controller design
- 2219/41241 . . . Anti-coincidence, synchronizer
- 2219/41242 . . . Pulse height modulation PHM
- 2219/41243 . . . Prevent, detect overflow of counter
- 2219/41244 . . . Dead band, zone
- 2219/41245 . . . Discrimination of direction
- 2219/41246 . . . Modulate command according to hysteresis so that ideal curve is followed
- 2219/41247 . . . Servo lock
- 2219/41248 . . . Adapting characteristics of servo
- 2219/41249 . . . Several slides along one axis
- 2219/41251 . . . Servo with spring, resilient, elastic element, twist
- 2219/41252 . . . Avoid housing vibration, slide and auxiliary slide controlled with opposite phase
- 2219/41253 . . . From measured signature, select in database corresponding servo valve type
- 2219/41254 . . . Avoid cumulative measuring, calculation errors, sum remainder
- 2219/41255 . . . Mode switch, select independent or dependent control of axis
- 2219/41256 . . . Chattering control
- 2219/41257 . . . Display of gain
- 2219/41258 . . . Single position detector for plural motors driving a single load
- 2219/41259 . . . Coupling, clutch
- 2219/41261 . . . Flexible coupling between carriage, slide and actuator, motor
- 2219/41262 . . . Binary summing of motions, by stacking or using levers
- 2219/41263 . . . Switch control mode of spindle drive as function of contouring, spindle orientation

- 2219/41264 . . . Driven by two motors
- 2219/41265 . . . To avoid backlash
- 2219/41266 . . . Coupling, clutch and brake unit
- 2219/41267 . . . Servo loop with stepping motor, see figure SE-twelve
- 2219/41268 . . . Two cascade slides controlled in opposite direction to avoid local wear
- 2219/41269 . . . Ballscrew and ball spline nut driven synchronously or independently
- 2219/41271 . . . Drive in two directions
- 2219/41272 . . . Driven by two stepmotors with different resonance frequency
- 2219/41273 . . . Hydraulic
- 2219/41274 . . . Flywheel as power buffer
- 2219/41275 . . . Two axis, x y motors controlled simultaneous, no contouring, quick move at 45-degrees
- 2219/41276 . . . Displacement as function of width, amplitude pulse to motor
- 2219/41277 . . . Separation of position drive controller and motor amplifiers
- 2219/41278 . . . Two current amplifiers, pumps for each direction of displacement, pushpull
- 2219/41279 . . . Brake
- 2219/41281 . . . Hydraulic actuated brake
- 2219/41282 . . . Magnetic brake
- 2219/41283 . . . Brake force does not load index axis, better positioning
- 2219/41284 . . . Brake by applying dc to ac motor
- 2219/41285 . . . Dynamic brake of ac, dc motor
- 2219/41286 . . . Brake motor before reversing motor
- 2219/41287 . . . Mechanical self braking
- 2219/41288 . . . Two brakes, one on motor axis, other on drive axis
- 2219/41289 . . . Motor direction controlled by relays
- 2219/41291 . . . Before switching relay, series semiconductor diminishes current to zero
- 2219/41292 . . . H-bridge, diagonal pairs of semiconductors
- 2219/41293 . . . Inverter, dc-to-ac
- 2219/41294 . . . Dc-to-ac converter
- 2219/41295 . . . Ac-to-ac converter frequency controlled
- 2219/41296 . . . Two data lines; one for drive controllers, other to communicate with central unit
- 2219/41297 . . . For cancelling magnetic field leakage generated by, e.g. voice coil motor
- 2219/41298 . . . Stepping motor and control valve and power cylinder and mechanical feedback
- 2219/41299 . . . Pneumatic drive, pressure controlled bellow extension
- 2219/41301 . . . Pilot valve, linear fluid control valve and power cylinder
- 2219/41302 . . . On off fluid valve and power cylinder
- 2219/41303 . . . Flow rate valve controls speed
- 2219/41304 . . . Pneumatic
- 2219/41305 . . . Bypass fluid flow, block it from motor
- 2219/41306 . . . Control valve with counteracting control pulses
- 2219/41307 . . . Motor drives hydraulic pump in direction needed for power cylinder
- 2219/41308 . . . Bellow formed by for linear actuators, each pressure controlled by motor
- 2219/41309 . . . Hydraulic or pneumatic drive
- 2219/41311 . . . Pilot valve with feedback of position
- 2219/41312 . . . Metering piston between switch to fluid supply and switch to power cylinder
- 2219/41313 . . . Electro rheological fluid actuator
- 2219/41314 . . . Electro rheological valve controls cylinder
- 2219/41315 . . . Feedback of position of pilot valve and of power cylinder
- 2219/41316 . . . Piezo valve
- 2219/41317 . . . Stepping motor and control valve and power cylinder
- 2219/41318 . . . Electro hydraulic drive, electric motor drives hydraulic actuator
- 2219/41319 . . . Ac, induction motor
- 2219/41321 . . . Brushless dc motor
- 2219/41322 . . . Vector, field oriented controlled motor
- 2219/41323 . . . Permanent magnetic synchronous actuator, motor
- 2219/41324 . . . Modular servo drive, simo drive
- 2219/41325 . . . Linear electric actuator for position combined with pneumatic actuator for force
- 2219/41326 . . . Step motor
- 2219/41327 . . . Linear induction motor
- 2219/41328 . . . Direct motor drive
- 2219/41329 . . . Dc motor
- 2219/41331 . . . Galvano driver
- 2219/41332 . . . Electromagnet driven core, position of core controlled
- 2219/41333 . . . Non linear solenoid actuator
- 2219/41334 . . . Electrostatic levitator
- 2219/41335 . . . Reluctance motor
- 2219/41336 . . . Voltage and frequency controlled ac motor
- 2219/41337 . . . Linear drive motor, voice coil
- 2219/41338 . . . High torque, low inertia motor, printed circuit motor
- 2219/41339 . . . Using, switch reluctance or asynchronous motor in, to stepping mode motor
- 2219/41341 . . . Ultrasonic motor
- 2219/41342 . . . Shape memory metal actuator
- 2219/41343 . . . Magnetostrictive motor
- 2219/41344 . . . Piezo, electrostrictive linear drive
- 2219/41345 . . . Micropositioner
- 2219/41346 . . . Micropositioner in x, y and theta
- 2219/41347 . . . Piezo cycloid motor
- 2219/41348 . . . Hydraulic pressure block
- 2219/41349 . . . 6-Dof combined magnetic fluidic floating motion stage 100-micrometer cube range
- 2219/41351 . . . Piezo impact force, rapid extension of small mass moves object a bit
- 2219/41352 . . . Alternative clamping dilation of piezo, caterpillar motion, inchworm
- 2219/41353 . . . Optical piezo electric element, light converted in movement
- 2219/41354 . . . Magnetic, thermal, bimetal peltier effect displacement, positioning
- 2219/41355 . . . Electro magnetic coil actuator, voice coil
- 2219/41356 . . . Variable speed transmission, Van Doorne, Reeves
- 2219/41357 . . . Belt
- 2219/41358 . . . Transmission, variable gear ratio
- 2219/41359 . . . Gearbox
- 2219/41361 . . . Differential
- 2219/41362 . . . Registration, display of servo error
- 2219/41363 . . . Excess in error, error too large, follow up error
- 2219/41364 . . . Excess in error for speed, follow up error for speed
- 2219/41365 . . . Servo error converted to frequency

2219/41366 . . .	Linearization of embedded position signals	2219/41407 . . .	Master changes resistor, slave restores value in order to follow master
2219/41367 . . .	Estimator, state observer, space state controller	2219/41408 . . .	Control of jerk, change of acceleration
2219/41368 . . .	Disturbance observer, inject disturbance, adapt controller to resulting effect	2219/41409 . . .	Update position feedback during speed control
2219/41369 . . .	Two estimators	2219/41411 . . .	Avoid integrator wind-up, saturation actuator by dead zone feedback for integral
2219/41371 . . .	Force estimation using velocity observer	2219/41412 . . .	Bandwidth of velocity loop is just below natural frequency of drive support
2219/41372 . . .	Force estimator using disturbance estimator observer	2219/41413 . . .	Forward kinematics
2219/41373 . . .	Observe position and driving signal, estimate disturbance and speed	2219/41414 . . .	Time delay control, estimate non linear dynamics, correct with time delayed input
2219/41374 . . .	Observe position and driving signal, predict, estimate disturbance signal	2219/41415 . . .	Lookup table for nonlinear function synthesis
2219/41375 . . .	Observe speed and select torque as function of position reference, to compensate torque	2219/41416 . . .	Feedback signal is doubled, reference signal is doubled plus one
2219/41376 . . .	Tool wear, flank and crater, estimation from cutting force	2219/41417 . . .	Correction signal is different as function of sign of error
2219/41377 . . .	Estimate cutting torque in real time	2219/41418 . . .	Select feedback signal between detected position of motor and of driven load
2219/41378 . . .	Estimate torque as function of speed, voltage and current	2219/41419 . . .	Resolution of feedback of incremental position decreases with velocity speed
2219/41379 . . .	Estimate torque from command torque and measured speed	2219/41421 . . .	Eliminate, diminish delay in feedback speed
2219/41381 . . .	Torque disturbance observer to estimate inertia	2219/41422 . . .	Correction stored position while motor, power off, drive - encoder not connected
2219/41382 . . .	Observe position from encoder, estimate speed with ann	2219/41423 . . .	Noise filter as function of rate of displacement, speed, for stabilisation
2219/41383 . . .	Observe current, voltage, derive position	2219/41424 . . .	Select a controller as function of large or small error
2219/41384 . . .	Force estimation using position observer	2219/41425 . . .	Feedforward of acceleration
2219/41385 . . .	Observe position from encoder, estimate speed, position with kalman filter	2219/41426 . . .	Feedforward of torque
2219/41386 . . .	System identifier adapts coefficients tables for state and observer controller	2219/41427 . . .	Feedforward of position
2219/41387 . . .	Observe reference torque, position and feedback position, estimate contact force	2219/41428 . . .	Feedforward of position and speed
2219/41388 . . .	Observe input torque and feedback position, estimate reaction torque	2219/41429 . . .	Mean value of previous feedforward values
2219/41389 . . .	Estimate torque from command torque and feedback acceleration	2219/41431 . . .	Delay position command as function of calculation time for feedforward, or order of system
2219/41391 . . .	Flux observer, flux estimated from current and voltage	2219/41432 . . .	Feedforward of current
2219/41392 . . .	Observer for each axis, link, freedom, gives greater speed	2219/41433 . . .	Advance feedforward as function of delay rising torque, for large acceleration changes
2219/41393 . . .	Synchronize observer with pulse from encoder	2219/41434 . . .	Feedforward FFW
2219/41394 . . .	Estimate speed and position error from motor current, torque	2219/41435 . . .	Adapt coefficients, parameters of feedforward
2219/41395 . . .	Observe actual position to estimate compensation torque	2219/41436 . . .	Feedforward of speed and acceleration
2219/41396 . . .	Estimate acceleration from three phase current values	2219/41437 . . .	Feedforward of speed
2219/41397 . . .	Estimate voltage control signal as function of voltage control signal and position error	2219/41438 . . .	Feedforward of speed only during deceleration
2219/41398 . . .	Estimate twist between motor and load, observe motor position and speed	2219/41439 . . .	Position error ffw for compensation of speed
2219/41399 . . .	Reduced order estimator	2219/41441 . . .	Position reference ffw for compensation speed reference and speed error
2219/41401 . . .	Estimate position from max and min speeds in open loop	2219/41442 . . .	Position reference ffw for compensation speed reference
2219/41402 . . .	Observe speed and driving signal, estimate speed	2219/41443 . . .	Position reference ffw for compensation of position
2219/41403 . . .	Machine deformation estimator as function of commanded position	2219/41444 . . .	Speed reference ffw for compensation of speed error
2219/41404 . . .	Hysteresis, bang bang feedback of velocity	2219/41445 . . .	Ffw of position and speed error to compensate torque
2219/41405 . . .	Inverse kinematic, dynamic	2219/41446 . . .	Position reference acceleration ffw for torque compensation
2219/41406 . . .	LQR linear quadratic regulator to calculate gain for several known variables	2219/41447 . . .	Position generates force ffw combined with position error
		2219/41448 . . .	Ffw friction compensation for speed error, derived from position reference
		2219/41449 . . .	Speed reference and derived position ffw to compensate delay of position control
		2219/41451 . . .	Ffw tracking controller

- 2219/41452 . . . Position reference ffw for speed error compensation
- 2219/41453 . . . Inverse, feedforward controller is inverse of closed loop system
- 2219/41454 . . . Zero phase error tracking controller zpec
- 2219/41455 . . . Servo loop with absolute digital comparator, see figure SE-one
- 2219/41456 . . . Servo loop with switch between difference of counter OR absolute digital comparator, see figure SE-two
- 2219/41457 . . . Superposition of movement
- 2219/41458 . . . Servo loop with phase counter and phase discriminator, see figure SE-four
- 2219/41459 . . . Time counter and phase discriminator
- 2219/41461 . . . Phase counter and phase discriminator, phase locked motion
- 2219/41462 . . . Servo loop with position and reference counter, see figure SE-seven
- 2219/41463 . . . Servo loop with angle comparator and angle comparator predictor, see figure SE-eight
- 2219/41464 . . . Servo loop with position decoder, see figure SE-nine
- 2219/41465 . . . Servo loop with phase comparator, see figure SE-ten
- 2219/41466 . . . Servo loop with oscillator, see figure SE-eleven
- 2219/41467 . . . Servo loop with coincidence detector, see figure SE-thirteen
- 2219/41468 . . . Servo loop with adder, see figure SE-fourteen
- 2219/41469 . . . Servo loop with counter, see figure SE-fifteen
- 2219/41471 . . . Servo loop with u-down counter, see figure SE-sixteen
- 2219/41472 . . . Servo loop with position error indicates speed step value
- 2219/41473 . . . Servo loop with position and speed loop, problems of speed loop
- 2219/41474 . . . Servo loop with absolute digital position sensor
- 2219/41475 . . . Servo loop with absolute digital position sensor for continuous path control
- 2219/41476 . . . Servo loop with analog position sensor
- 2219/41477 . . . Servo loop with analog position sensor for continuous path control
- 2219/41478 . . . Servo loop with combination of analog and digital sensor
- 2219/41479 . . . Servo loop with position loop
- 2219/41481 . . . Divide command, block in subcommands, subblocks
- 2219/42 . . . Servomotor, servo controller kind till VSS
- 2219/42001 . . . Statistical process control spc
- 2219/42002 . . . Proportional
- 2219/42003 . . . Three point, hysteresis comparator, controller
- 2219/42004 . . . PD proportional derivative
- 2219/42005 . . . Disturbance decoupling, rejection, suppression
- 2219/42006 . . . Digital event dynamic system control
- 2219/42007 . . . Nonlinear PD
- 2219/42008 . . . P regulator for position loop
- 2219/42009 . . . I regulator for speed loop
- 2219/42011 . . . PI regulator for speed loop
- 2219/42012 . . . H-infinite controller
- 2219/42013 . . . Two pd controllers, one for coarse, one for fine motion
- 2219/42014 . . . Pseudo derivative control with feedforward of gain
- 2219/42015 . . . P integrator, look at past periodic errors, fading memory, repetitive controller
- 2219/42016 . . . Dynamic impedance control, load does not influence speed, force, position
- 2219/42017 . . . Mimo controller with many inputs and outputs
- 2219/42018 . . . Pid learning controller, gains adapted as function of previous error
- 2219/42019 . . . Pi for position controller
- 2219/42021 . . . Pi for current loop
- 2219/42022 . . . Three point, hysteresis controller with variable hysteresis as function of error
- 2219/42023 . . . Non linear pi
- 2219/42024 . . . Stage controller, zpec and fuzzy smc and compensation controller
- 2219/42025 . . . Pidaf, pid with acceleration and friction compensation
- 2219/42026 . . . Pi position controller and fuzzy logic speed controller
- 2219/42027 . . . Flsps frequency locked steeping position control servo
- 2219/42028 . . . Five point, hysteresis controller
- 2219/42029 . . . Crone controller, fractional or fractal or non integer order robust controller
- 2219/42031 . . . All denominator model, the model form is expanded in denominator taylor series
- 2219/42032 . . . Differential feedback pd
- 2219/42033 . . . Kind of servo controller
- 2219/42034 . . . Pi regulator
- 2219/42035 . . . I regulator
- 2219/42036 . . . Adaptive control, adaptive nonlinear control
- 2219/42037 . . . Adaptive pi
- 2219/42038 . . . Real time adaptive control
- 2219/42039 . . . Select servo parameter set from table for fixed linear working points
- 2219/42041 . . . Adaptive pd
- 2219/42042 . . . Adaptive robust controller
- 2219/42043 . . . Adapt regulator as function of its output
- 2219/42044 . . . Adapt model as function of difference between real and calculated position
- 2219/42045 . . . Ann, error to pd, output pd to plant and also sets weights in ann
- 2219/42046 . . . Fuzzy pd controller, with position and velocity inputs
- 2219/42047 . . . Pid like fuzzy controller with position and velocity inputs
- 2219/42048 . . . Fuzzy pi control
- 2219/42049 . . . Fuzzy p
- 2219/42051 . . . Fuzzy position controller
- 2219/42052 . . . Fuzzy pi and d control
- 2219/42053 . . . Dynamic fuzzy position controller
- 2219/42054 . . . Loop, p control for position loop
- 2219/42055 . . . Pi control for speed
- 2219/42056 . . . Pi current controller
- 2219/42057 . . . Predictive fuzzy controller
- 2219/42058 . . . General predictive controller GPC
- 2219/42059 . . . Delta gpc, using derivative in time, predict over finite horizon
- 2219/42061 . . . Stochastic predictive controller spc
- 2219/42062 . . . Position and speed and current
- 2219/42063 . . . Position and speed and current and force, moment, torque
- 2219/42064 . . . Position, speed and acceleration
- 2219/42065 . . . Feedforward combined with pid feedback

- 2219/42066 . . . Position and speed and acceleration and current feedback
- 2219/42067 . . . Position and current
- 2219/42068 . . . Quasi smc, smc combined with other regulators
- 2219/42069 . . . Observer combined with pd and zero phase error tracking ffw controller
- 2219/42071 . . . Two clocks for each of the two loops
- 2219/42072 . . . Position feedback and speed feedforward, speed from data of tape
- 2219/42073 . . . Position and speed feedback, speed derived from position reference
- 2219/42074 . . . Position feedback and speed feedback, speed measured with tachometer
- 2219/42075 . . . Two position loops
- 2219/42076 . . . Hybrid, digital control sets reference, coefficients for quick analog, pid, control
- 2219/42077 . . . Position, speed or current, combined with vibration feedback
- 2219/42078 . . . Observer combined with pd
- 2219/42079 . . . P position loop, fuzzy speed loop
- 2219/42081 . . . Fuzzy position controller and smc for motor voltage control
- 2219/42082 . . . Force control in one axis, velocity control in other axis
- 2219/42083 . . . Position, speed and force feedback
- 2219/42084 . . . Hybrid, analog loop, reference compensated by digital loop
- 2219/42085 . . . Error between reference model and controller compensated with fuzzy controller
- 2219/42086 . . . Position, speed and deflection feedback
- 2219/42087 . . . Speed and force loop
- 2219/42088 . . . I parallel to non linear controller
- 2219/42089 . . . Quick but coarse loop and slow but fine loop, dexterity
- 2219/42091 . . . Loop combinations, add a second loop, cascade control
- 2219/42092 . . . Position and force control loop together
- 2219/42093 . . . Position and current, torque control loop
- 2219/42094 . . . Speed then pressure or force loop
- 2219/42095 . . . First closed loop, then open loop
- 2219/42096 . . . Add, subtract i part of speed feedback as function of sign speed error
- 2219/42097 . . . Dual mode servo, slow and precise, quick and coarse movement
- 2219/42098 . . . First open, then closed loop to correct setpoint of open loop
- 2219/42099 . . . Slow coarse loop followed by fine quick loop
- 2219/42101 . . . Coarse position with microprocessor, fine with hardware centering, tracking
- 2219/42102 . . . Coarse 8-bit positioning in closed loop, fine 10-bit in open loop
- 2219/42103 . . . Switch from pi, if large error to disturbance mode control if small error
- 2219/42104 . . . Loop switch, speed loop then position loop, mode switch
- 2219/42105 . . . Switch from pid to bang-bang to energy dissipation as function of speed, error
- 2219/42106 . . . Speed regulation starts only in braking range, less processor time needed
- 2219/42107 . . . Always position loop, first open loop for speed, then also closed loop speed
- 2219/42108 . . . Open loop for positioning, closed loop for calibration
- 2219/42109 . . . Coarse is speed loop, fine is position loop
- 2219/42111 . . . Change from pd, if small error, to bangbang if large error
- 2219/42112 . . . Switch between motion and stall mode, if speed is below certain value
- 2219/42113 . . . Position closed loop or open loop pressure control
- 2219/42114 . . . Loop mode, dual mode incremental coarse, analog fine
- 2219/42115 . . . Switch from continuous drive to pwm, near stop or out of acceleration period
- 2219/42116 . . . Switch from pid to pd or pd to pid
- 2219/42117 . . . Speed mode then stepping mode
- 2219/42118 . . . Breaking of control loop, closing open control loop
- 2219/42119 . . . Switch between motion and stall mode if actuator voltage current below limit
- 2219/42121 . . . Switch from bang-bang control to dead beat, finite time settling control
- 2219/42122 . . . First open loop, then closed loop
- 2219/42123 . . . Position loop then force, current loop
- 2219/42124 . . . Change over between two controllers, transfer error signal
- 2219/42125 . . . Switch from pi to p or to pd-controller
- 2219/42126 . . . Bumpless, smooth transfer between two control modes
- 2219/42127 . . . Timing, switch over on detection of marker on spindle
- 2219/42128 . . . Servo characteristics, drive parameters, during test move
- 2219/42129 . . . Teach, learn position table, model, for each reference a motor control output
- 2219/42131 . . . Speed model created by entering estimated speed at references
- 2219/42132 . . . Correct, modify position table, model if detected error too large
- 2219/42133 . . . Position references as function of time, correlated speed, acceleration in memory, signature
- 2219/42134 . . . Fuzzy logic tuning of controller as function of error
- 2219/42135 . . . Fuzzy model reference learning controller, synthesis, tune rule base automatically
- 2219/42136 . . . Fuzzy feedback adapts parameters model
- 2219/42137 . . . Automatic tune fuzzy controller
- 2219/42138 . . . Network tunes controller
- 2219/42139 . . . Tune fuzzy controller by three attributes: rise time, overshoot, settling time
- 2219/42141 . . . Filter error learning
- 2219/42142 . . . Fuzzy control learning of starting friction coefficient
- 2219/42143 . . . offline optimization of fuzzy controller
- 2219/42144 . . . Online tuning of fuzzy controller by ann
- 2219/42145 . . . Coarse tune with genetic algorithm, fine with gradient descent, hill climbing
- 2219/42146 . . . In each position, upper, lower drive current needed to move more, less, store mean
- 2219/42147 . . . Tune with genetic algorithm
- 2219/42148 . . . Position references as function of time, correlated noise, temperature in memory
- 2219/42149 . . . During learning relation between control and controlled signal, open loop
- 2219/42151 . . . Learn dynamics of servomotor system by ann

- 2219/42152 . . . Learn, self, auto tuning, calibrating, environment adaptation, repetition
- 2219/42153 . . . Inverse dynamics model idm, computed torque method
- 2219/42154 . . . Model itself controlled by position and speed loop
- 2219/42155 . . . Model
- 2219/42156 . . . Forward dynamics model fdm
- 2219/42157 . . . Reference model uses only output and input measurements
- 2219/42158 . . . Fuzzy model of cutting process of milling machine
- 2219/42159 . . . ARMA, AR autoregressive for poles, MA moving average model for zeros, in combination
- 2219/42161 . . . One model for load, one model for motor inertia
- 2219/42162 . . . Model reference adaptive control MRAC, correction fictive-real error, position
- 2219/42163 . . . Simulator
- 2219/42164 . . . Compensation of integration time of model
- 2219/42165 . . . Compensation of gain of speed control circuit for model
- 2219/42166 . . . Criterion is minimum jerk
- 2219/42167 . . . Minimum torque change
- 2219/42168 . . . Measuring of needed force for servo
- 2219/42169 . . . Decoder
- 2219/42171 . . . Velocity profile, variable gain, multiplication factors, rom ram
- 2219/42172 . . . Special code
- 2219/42173 . . . Acceleration deceleration
- 2219/42174 . . . Memory with position profile and force limits
- 2219/42175 . . . Velocity, speed points, profile and corresponding acceleration, delta v
- 2219/42176 . . . Motion profile
- 2219/42177 . . . Configuration memory for step motor
- 2219/42178 . . . Reduce cable connection by pre-memorized positions
- 2219/42179 . . . Normalize velocity profile, calculate real velocity from additional parameters
- 2219/42181 . . . Rom contains sin and cos table to drive step motor
- 2219/42182 . . . Memory is Rom for servo control
- 2219/42183 . . . Memory is Ram
- 2219/42184 . . . Master slave with feedforward for compensation of contour error
- 2219/42185 . . . Master slave with contour controller
- 2219/42186 . . . Master slave, motion proportional to axis
- 2219/42187 . . . Position mirror, axis, display, back of seat as function of position of seat, other axis
- 2219/42188 . . . Slave controlled as function of reference and actual position and derived speed of master
- 2219/42189 . . . Motion look up table as function of cam angle
- 2219/42191 . . . Adjust proportionality factor to optimize slave axis movement
- 2219/42192 . . . Each axis drive has own queue of commands, executed in synchronism
- 2219/42193 . . . Select between limit switches as function of current position and destination
- 2219/42194 . . . Derive position from command speed, integrate speed
- 2219/42195 . . . Position a stop, move workpiece against stop to cut stock, bar
- 2219/42196 . . . Follow dynamically contour warped surface with tool
- 2219/42197 . . . Brake as function of machining load, to keep total load on tool constant, avoid oscillation
- 2219/42198 . . . Step motor driven by step size and step duration data
- 2219/42199 . . . Fine position with gauge, coarse with limit switch, transducer
- 2219/42201 . . . Deriving speed from commanded position
- 2219/42202 . . . Square of distance
- 2219/42203 . . . Using a counter and a limit switch
- 2219/42204 . . . Absolute positions
- 2219/42205 . . . With potentiometer
- 2219/42206 . . . Block, stop pulses in one axis, not in other axis
- 2219/42207 . . . Generate points between start and end position, linear interpolation
- 2219/42208 . . . Set position of proximity switch
- 2219/42209 . . . Two slides, fine and quick, coarse and slow, piggyback, multirate positioner
- 2219/42211 . . . Command position by time value, proportional to total displacement
- 2219/42212 . . . Rotation over, selection of smallest, shortest angle, distance
- 2219/42213 . . . Position overshoot, axis still moves after stop
- 2219/42214 . . . Near desired position, control actuator by pulse in each clock, otherwise continuously
- 2219/42215 . . . Stop machine in a predetermined position
- 2219/42216 . . . Changing position range, stroke, between closed and fully open
- 2219/42217 . . . Time optimal position control
- 2219/42218 . . . Coarse and fine position control combined, each by ann
- 2219/42219 . . . Slow positioning with low pass, concurrent quick with high pass part of command
- 2219/42221 . . . Control position by equilibrium between spring and actuator force
- 2219/42222 . . . Compare reflected image from object with reference image, adjust object
- 2219/42223 . . . Number and frequency of pwm signals define mean position in time
- 2219/42224 . . . Process received reference to adapt it to range of servo
- 2219/42225 . . . Coarse and fine position control combined, added, superposed
- 2219/42226 . . . If deviation, return to desired position after a delay if within position range
- 2219/42227 . . . Using incremental control actuator
- 2219/42228 . . . Stop motor where torque will be maximum
- 2219/42229 . . . Shut off control, system, power on detection of zero or neutral position
- 2219/42231 . . . Detent, stop lock, current through motor in stop, locked, hold, blocked position
- 2219/42232 . . . Select, switch between long, extended and short range to position
- 2219/42233 . . . Pwm signal to low pass filter, compared to feedback position, if equal stop motor
- 2219/42234 . . . Regression ann to map position error to pulse width
- 2219/42235 . . . Adaptive pulsing, augment time duration until movement detected
- 2219/42236 . . . Use of a certain number of ac periods
- 2219/42237 . . . Pwm pulse width modulation, pulse to position modulation ppm

- 2219/42238 . . . Control motor position with direction signal and pwm signal for position
- 2219/42239 . . . Adaptive pulsing, take into account next cycle, command
- 2219/42241 . . . Select minimum value of two reference values
- 2219/42242 . . . Reference generator for position
- 2219/42243 . . . Enter velocity in reference generator, delivers position signals
- 2219/42244 . . . Enter acceleration, jerk, generator outputs acceleration, speed, position by integration
- 2219/42245 . . . Reference generates upper and lower range value at both sides of reference
- 2219/42246 . . . Add compensation to reference value
- 2219/42247 . . . Remote reference transmitted to servo
- 2219/42248 . . . Command reference limited, clipped, only between upper and lower values
- 2219/42249 . . . Relative positioning
- 2219/42251 . . . Control position of beam in coordination with xy slide
- 2219/42252 . . . Position beam to keep centerline
- 2219/42253 . . . Double resolution for one pulse of computer
- 2219/42254 . . . Resolution one axis different from resolution other axis
- 2219/42255 . . . Acceleration, deceleration time is a multiple of sampling time
- 2219/42256 . . . Sampling the signal
- 2219/42257 . . . Sampling time in fixed relation to timer interrupt
- 2219/42258 . . . Two sampling frequencies, for online measurements, for offline calculations
- 2219/42259 . . . Variable sampling rate as function of thermal displacement
- 2219/42261 . . . Two sampling frequencies, one for motion, one for stillstand
- 2219/42262 . . . Variable sampling rate as function of position error
- 2219/42263 . . . Different sample rates, multiple sample rates for the different loops
- 2219/42264 . . . Slow down sampling if power down is detected
- 2219/42265 . . . Sampling rate for sending reference values equals interpolation rate
- 2219/42266 . . . Variable sampling rate, slow at low velocity
- 2219/42267 . . . Stability analysis
- 2219/42268 . . . Safety, excess in error
- 2219/42269 . . . Inject, superpose test signal on reference, monitor functionality servo
- 2219/42271 . . . Monitor parameters, conditions servo for maintenance, lubrication, repair purposes
- 2219/42272 . . . Total movement is divided in several zones with different protection parameters
- 2219/42273 . . . On restart, power up, overload replace reference with feedback signal, free rotate
- 2219/42274 . . . On power failure keep last servoposition by cutting off air supply
- 2219/42275 . . . Alarm if working cycle fraction with values exceeding nominal exceeds threshold
- 2219/42276 . . . Action, on power failure, close pilot valve entirely by return spring
- 2219/42277 . . . If no position command in a period, servo to rest position, shut off power
- 2219/42278 . . . If direction bad, change direction sign or phase sequence automatically
- 2219/42279 . . . Allow temporary motor overload if temperature still under maximum, heat inertia
- 2219/42281 . . . If estimated temperature rise of motor is too high, inhibit motor
- 2219/42282 . . . If displacement rate of actuator exceeds limit, lower it
- 2219/42283 . . . Motor only actuated if hardware and software permission and control signal together
- 2219/42284 . . . Stop and brake motor
- 2219/42285 . . . Stop axis contour controlled
- 2219/42286 . . . Speed, ramp controlled slow down of motor
- 2219/42287 . . . On feedback failure, use profile stored in memory during learning
- 2219/42288 . . . Limit, stop drive current if axis obstructed, blocked, force against stop
- 2219/42289 . . . Avoid overload servo motor, actuator limit servo torque
- 2219/42291 . . . Regenerate faulty feedback by last measurement after detection excess error
- 2219/42292 . . . If speed detection fails, regenerate speed from position signal
- 2219/42293 . . . Regenerate faulty feedback by using previous value, substitute
- 2219/42294 . . . Software monitoring of time delay of feedback pulses, feedback failure
- 2219/42295 . . . Detect augmenting torque of drive motor
- 2219/42296 . . . Detect diminishing torque of drive motor, below low limit
- 2219/42297 . . . Detect phase lag of driving motor
- 2219/42298 . . . Measure backlash, time difference between point A to point B and from B to A, if too large
- 2219/42299 . . . Measure current during first acceleration command
- 2219/42301 . . . Detect correct connection of servomotor to powersupply
- 2219/42302 . . . Detect insufficient acceleration, diminishing speed
- 2219/42303 . . . Detect no speeding up of motor
- 2219/42304 . . . Load, torque threshold as function of speed
- 2219/42305 . . . Detect loss of pulse step motor
- 2219/42306 . . . Excess in error, compare reference with feedback
- 2219/42307 . . . Compare actual feedback with predicted, simulated value to detect run away
- 2219/42308 . . . Watchdog or integrator to detect no change or excess in feedback
- 2219/42309 . . . Excess in speed
- 2219/42311 . . . Store working torque profiles as function of time, position, compare with real torque
- 2219/42312 . . . Compare feedback with upper and lower limit, store result as 0-1 if in tolerance
- 2219/42313 . . . Excess in error for speed and different sign of position and speed feedback
- 2219/42314 . . . Warning signals are send when excess in error for speed, acceleration, amplitude
- 2219/42315 . . . Two, double counter to check measurement
- 2219/42316 . . . Additional hardware to detect which part of feedback is defect, failed
- 2219/42317 . . . Redundant, two actuators
- 2219/42318 . . . Using two, more, redundant measurements or scales to detect bad function
- 2219/42319 . . . What kind of actuator failure

- 2219/42321 . . . Wrong direction or sign of measured value, eventually stop
- 2219/42322 . . . Emit dummy pulses, detect loss of pulses, feedback failure, wire brake, short
- 2219/42323 . . . Detect wire break, short circuit of feedback
- 2219/42324 . . . Axis breaking, between motor and slide, table
- 2219/42325 . . . Stalling of drive motor, overload
- 2219/42326 . . . Protection servo for saturation of amplifier
- 2219/42327 . . . Detect ballscrew wear
- 2219/42328 . . . Detect bearing, clamp wear
- 2219/42329 . . . Defective measurement, sensor failure
- 2219/42331 . . . Bad parameter configuration for spindle, gear ratio, encoder resolution
- 2219/42332 . . . Detect failure of servo controller
- 2219/42333 . . . Synchronization by opposite correction for both axis
- 2219/42334 . . . Synchronous tracking servo for biaxial positioning tables, contouring
- 2219/42335 . . . If one slave axis out of synchronisation, synchronise all other axes to that one
- 2219/42336 . . . To synchronize axis, adapt gain of each axis as function of max, min, average gain
- 2219/42337 . . . Tracking control
- 2219/42338 . . . Position tracking control
- 2219/42339 . . . Speed tracking control
- 2219/42341 . . . Force tracking control
- 2219/42342 . . . Path, trajectory tracking control
- 2219/42343 . . . Optimum, adaptive sliding mode controller
- 2219/42344 . . . Chattering alleviation control, chattering about switching surface
- 2219/42345 . . . VSTC variable structure tracking control
- 2219/42346 . . . Fuzzy sliding mode control fsmc
- 2219/42347 . . . Switch to a saturation control signal if deviation from switch line is too large
- 2219/42348 . . . Slimsoc sliding mode self organizing controller
- 2219/42349 . . . Sliding mode control with perturbation estimation smcpe
- 2219/42351 . . . PIVSC proportional integral compensated vsc
- 2219/42352 . . . Sliding mode controller SMC, select other gain
- 2219/42353 . . . Variable structure system, control VSS VSC
- 2219/43 . . . Speed, acceleration, deceleration control ADC
- 2219/43001 . . . Speed, feed, infeed, acceleration, stopping problems
- 2219/43002 . . . Acceleration, deceleration for forward, backward reciprocating movement
- 2219/43003 . . . Acceleration deceleration in presence of backlash, dynamic backlash
- 2219/43004 . . . Decelerate to follow desired velocity
- 2219/43005 . . . Corner distance variables to keep path when programmed speed changes
- 2219/43006 . . . Acceleration, deceleration control
- 2219/43007 . . . Acceleration from rest
- 2219/43008 . . . Deceleration and stopping
- 2219/43009 . . . Acceleration deceleration for each block of data, segment
- 2219/43011 . . . Shorter time by adjusting corner speed, avoid zero speed when engage corner
- 2219/43012 . . . Profile is defined by series of bits, for each actuator, sensor
- 2219/43013 . . . Ramp signal from division of sum of registers
- 2219/43014 . . . Calculate inertia ratio from full acceleration and full deceleration trial
- 2219/43015 . . . Calculate square root x
- 2219/43016 . . . Acceleration, deceleration as function of feed rate override
- 2219/43017 . . . Acceleration is larger than deceleration to compensate for friction
- 2219/43018 . . . Compensation, correction of acceleration, deceleration time
- 2219/43019 . . . Compensate acceleration for sudden change in load, shockless
- 2219/43021 . . . At several positions detect acceleration error, compensate for it
- 2219/43022 . . . Compensate for friction as function of position
- 2219/43023 . . . Switch from acceleration to deceleration if mid stroke speed not reached
- 2219/43024 . . . Parabolic velocity profile, linear acceleration, keep energy dissipation minimal
- 2219/43025 . . . Acceleration, deceleration is polynomial, derivative is zero on stop position
- 2219/43026 . . . Predict deceleration start from measured characteristics and actual performance
- 2219/43027 . . . Parabolic acceleration, deceleration trajectory at start, stop
- 2219/43028 . . . Switching points for trapezoidal form are stored in memory
- 2219/43029 . . . Acceleration larger than deceleration for safe stopping at slow speed
- 2219/43031 . . . Feed speed reduction dependent on tool surface
- 2219/43032 . . . Non symmetric acceleration profile
- 2219/43033 . . . Sinusoidal acceleration profile
- 2219/43034 . . . Form of profile, ramp, trapezoid, S-curve, exponential
- 2219/43035 . . . Vertical start and stop phase
- 2219/43036 . . . Velocity profile with given starting and stopping speed vector
- 2219/43037 . . . Position, speed as function of position is trapezoid
- 2219/43038 . . . Parabolic acceleration, constant speed, parabolic deceleration as function of position
- 2219/43039 . . . Time, exponential acceleration, constant speed, exponential deceleration as function of time
- 2219/43041 . . . Prediction, look ahead deceleration control, calculate start deceleration
- 2219/43042 . . . Convolution of speed curve with torque curve
- 2219/43043 . . . Normal and maximum deceleration mode, switch as function of position deviation, error
- 2219/43044 . . . Drive and brake alternative to decelerate and stop
- 2219/43045 . . . Max torque, acceleration, then variable, then reverse, variable then max deceleration
- 2219/43046 . . . Determine time constant from command speed and needed max acceleration torque
- 2219/43047 . . . If speed below reference, small acceleration, if above, large deceleration
- 2219/43048 . . . Step change in reference, soft start, smoothing reference
- 2219/43049 . . . Digital convolution for velocity profile, also successive convolution
- 2219/43051 . . . Translate generic motion description into acceleration profiles
- 2219/43052 . . . Set for each block time constant and speed target
- 2219/43053 . . . Slow acceleration, rapid deceleration
- 2219/43054 . . . Take up gear backlash during deceleration
- 2219/43055 . . . Same acceleration deceleration pattern for position and velocity loop

- 2219/43056 . . . Asynchronous acceleration between slow, fast axes, rotational, linear axes
- 2219/43057 . . . Adjust acceleration, speed until maximum allowable moment for axis
- 2219/43058 . . . Limitation of acceleration, permissible, tolerable acceleration
- 2219/43059 . . . Accelerate, decelerate all axis as function of max, min, average speed axis
- 2219/43061 . . . Maximum acceleration deceleration lookup table as function of distance
- 2219/43062 . . . Maximum acceleration, limit
- 2219/43063 . . . Acceleration deceleration as function of maximum allowable speed
- 2219/43064 . . . Brake, decelerate at least one axis at maximum
- 2219/43065 . . . Limitation of jerk
- 2219/43066 . . . Max centrifugal acceleration, especially for cmm
- 2219/43067 . . . Reach maximum speed at zero acceleration
- 2219/43068 . . . Adapt acceleration as function of load, developed heat in motor
- 2219/43069 . . . Measure acceleration, derive limit torque, adapt acceleration
- 2219/43071 . . . Open closing acceleration deceleration control
- 2219/43072 . . . Position controlled opening profile
- 2219/43073 . . . Time controlled opening profile
- 2219/43074 . . . Control speed, acceleration so as to follow desired speed profile
- 2219/43075 . . . Two modes, one normal and one for obstruction by objects
- 2219/43076 . . . Switch from acceleration to constant speed as function of detected speed limit
- 2219/43077 . . . Limit switch starts braking, stop, no braking, low torque movement until end
- 2219/43078 . . . Near end position limit switch, brake by reversing, then slow until end limit
- 2219/43079 . . . Acceleration, deceleration controlled by switches along path
- 2219/43081 . . . Set parameters of profile generator, creep distance and speed, flight time
- 2219/43082 . . . Near end position limit switch, lower speed and brake
- 2219/43083 . . . Structure, step motor
- 2219/43084 . . . Acceleration deceleration circuit implemented in software, algorithm
- 2219/43085 . . . Acceleration-deceleration circuit before interpolator
- 2219/43086 . . . Acceleration-deceleration circuit after interpolator
- 2219/43087 . . . Stop valves to stop fluid flow of hydraulic drive cylinder
- 2219/43088 . . . Select out of plurality of acceleration profiles
- 2219/43089 . . . Rom, ram with speed and acceleration
- 2219/43091 . . . Ram with optimum motion curve
- 2219/43092 . . . Torque curve, wave stored in rom, ram
- 2219/43093 . . . Speed pattern, table together with timing data in ram
- 2219/43094 . . . Acceleration and deceleration together with their respective time
- 2219/43095 . . . Maximum speed and acceleration deceleration time constant as function of position
- 2219/43096 . . . Position, trajectory and speed stored in ram
- 2219/43097 . . . Table, rom, ram speed table
- 2219/43098 . . . Change ADC time constant during start and end of interpolation
- 2219/43099 . . . Select acceleration deceleration time constants as function of weight, load, position
- 2219/43101 . . . Change time constants acceleration, deceleration as function of feed rate override
- 2219/43102 . . . Time constant acceleration, deceleration as function of machining conditions
- 2219/43103 . . . Switch adc time constants as function of type of axis, spindle feed or position axis
- 2219/43104 . . . Minimize time constant based on operation program
- 2219/43105 . . . ADC time constants as function of type of axis rotational or linear
- 2219/43106 . . . Time constant acceleration, deceleration as function of temperature of motor
- 2219/43107 . . . Correction acceleration and deceleration as function of speed, time constants in rom
- 2219/43108 . . . Delay stop command as function of error between reference and multiple of increments
- 2219/43109 . . . Adaptive stopping with correction for both directions
- 2219/43111 . . . Measure time needed from first to second speed, to adapt position command
- 2219/43112 . . . Using feedforward prediction of position
- 2219/43113 . . . Give stop order a certain number of motor rotations before end stop
- 2219/43114 . . . Detect position, speed or time of object between begin and end, adapt motion
- 2219/43115 . . . Adaptive stopping
- 2219/43116 . . . Calculate overshoot from supply voltage change, adapt motion
- 2219/43117 . . . Torque compensation as function of position reference, feedback of speed and position
- 2219/43118 . . . Adjust position reference as function of position reference, feedback of speed and position
- 2219/43119 . . . Adapt robot motion to machine speed as function of error from programmed speed
- 2219/43121 . . . Axis speed as function of probing signal during probing of workpiece
- 2219/43122 . . . Adapt speed, feed as function of duration of transmission of instruction
- 2219/43123 . . . Speed of cutter as function of position of feeler, probe
- 2219/43124 . . . Adapt speed as function of material, thickness, depth, volume, width, uniform surface quality
- 2219/43125 . . . Speed as function of size of chuck, diameter tool
- 2219/43126 . . . Pivoting speed of workpiece as function of inverse of work, machining time needed
- 2219/43127 . . . As a function of, select reference velocity as function of gear ratio
- 2219/43128 . . . Feed as function of number of press operations
- 2219/43129 . . . Speed as function of curvature, in curves, corners smaller than in straight line
- 2219/43131 . . . Adapt speed as function of lag, follow up error
- 2219/43132 . . . Rotation speed as function of minimum wave energy, toolwear, first learn for different speeds
- 2219/43133 . . . Delay movement start as function of lag, follow up error
- 2219/43134 . . . Feed or speed as function of magnetic characteristic, code, form of tool
- 2219/43135 . . . Reduce path speed near centre of axis

- 2219/43136 . . . Lower speed of indexing motor if door to turret lathe is open
- 2219/43137 . . . Constant path speed for combined rotational and linear movement
- 2219/43138 . . . Set speed by controlling position of pulley of variable transmission
- 2219/43139 . . . VCO variable frequency oscillator or two oscillators with different frequency
- 2219/43141 . . . Surface, path, tangential speed
- 2219/43142 . . . Control relative speed between two spindles
- 2219/43143 . . . ADC ramp and velocities are set by potentiometers which control digital valve
- 2219/43144 . . . Accelerate one slide and decelerate other slide to keep speed constant
- 2219/43145 . . . Machine first with low spindle speed, then with high speed, avoid chatter
- 2219/43146 . . . Control of speed, velocity of movement of tool as function of power of tool
- 2219/43147 . . . Control power of tool as function of speed, velocity of movement
- 2219/43148 . . . Rapid return, retract stroke
- 2219/43149 . . . Rapid approach, then slow, then pressure for clamping, bonding
- 2219/43151 . . . Rapid feed in, slow work speed during entering material, then high work speed
- 2219/43152 . . . Feed in, transfer line, rapid traverse to work, grip speed
- 2219/43153 . . . Control depth of feed in by timer
- 2219/43154 . . . Quick feed in to workpiece without gauging, then normal feed with gauging
- 2219/43155 . . . Rapid speed for approach then slow speed for working
- 2219/43156 . . . Feed rate
- 2219/43157 . . . Feed rate
- 2219/43158 . . . Feedrate override
- 2219/43159 . . . Feedrate override only for x y, not for z or only for z and not for x y
- 2219/43161 . . . Second, independent feedrate override
- 2219/43162 . . . Motion control, movement speed combined with position
- 2219/43163 . . . Based on unit motions, primitive b-spline motions, time shifted and weighted
- 2219/43164 . . . Independent, uncoordinated motion control of several motors to initialise
- 2219/43165 . . . Superposition of special effects motion on normal motion
- 2219/43166 . . . Simulation of mechanical gear
- 2219/43167 . . . Distributed motion control
- 2219/43168 . . . Motion profile planning for point to point control
- 2219/43169 . . . Motor drives a mechanical cam
- 2219/43171 . . . Correction servo and constant velocity motor as input to differential, sum motion
- 2219/43172 . . . Change velocities on the fly during a motion
- 2219/43173 . . . Synchronize motion with scenery, sound
- 2219/43174 . . . Simulating cam motion mechanism
- 2219/43175 . . . Motion in several blocks, for each part in open and part in closed loop
- 2219/43176 . . . Scale velocity profile
- 2219/43177 . . . Single cycle positioning, start, move, stop for single rotation
- 2219/43178 . . . Filter resonance frequency from acceleration pattern, derive new speed pattern
- 2219/43179 . . . Speed changes gradually from constant value to zero
- 2219/43181 . . . Reaching reference position by spiraling speed reference
- 2219/43182 . . . Speed control with feedback and as reference the programmed value
- 2219/43183 . . . Speed control, input is the reference, but no feedback
- 2219/43184 . . . From desired speed, derive delta positions during equal intervals
- 2219/43185 . . . Speed invariant motions, path accuracy independent of speed
- 2219/43186 . . . Pulses from handle, knob, hand wheel control speed
- 2219/43187 . . . Vector speed, ratio between axis, without feedback
- 2219/43188 . . . Vector speed with feedback
- 2219/43189 . . . Sum of squares
- 2219/43191 . . . Approximation
- 2219/43192 . . . Brake while driving to obtain very low speed, step wise movement, then stop
- 2219/43193 . . . Variable slope speed steps as function of position, pulse pump controller
- 2219/43194 . . . Speed steps, switch over as function of position
- 2219/43195 . . . Using a tri-phase motor and a step motor
- 2219/43196 . . . Using two motors
- 2219/43197 . . . Two axis at the same time
- 2219/43198 . . . Coupling and step motor
- 2219/43199 . . . Safety, limitation of feedrate
- 2219/43201 . . . Limit speed to allowable speed for all axis
- 2219/43202 . . . If collision danger, speed is low, slow motion
- 2219/43203 . . . Limitation of speed, permissible, allowable, maximum speed
- 2219/43204 . . . Different, dynamic current limits as function of speed
- 2219/43205 . . . General tape speed controls speed of axis
- 2219/43206 . . . Tape speed controls speed of axis
- 2219/45 . . . Nc applications
- 2219/45001 . . . Antenna orientation
- 2219/45002 . . . To application field of control
- 2219/45003 . . . Harvester
- 2219/45004 . . . Mining
- 2219/45005 . . . Registration machine, chart recorder
- 2219/45006 . . . Valves
- 2219/45007 . . . Toy
- 2219/45008 . . . Theatre
- 2219/45009 . . . Glassforming
- 2219/45011 . . . To be assigned
- 2219/45012 . . . Excavator
- 2219/45013 . . . Spraying, coating, painting
- 2219/45014 . . . Elevator, lift
- 2219/45015 . . . Roller blind, shutter
- 2219/45016 . . . Radar
- 2219/45017 . . . Agriculture machine, tractor
- 2219/45018 . . . Car, auto, vehicle
- 2219/45019 . . . Balancing wheels
- 2219/45021 . . . Wheel mounting
- 2219/45022 . . . Auto seat, dentist chair, roll wheel chair
- 2219/45023 . . . Align head lamps of car
- 2219/45024 . . . Simulation car ride
- 2219/45025 . . . Position, mount glass window, sunroof in car-body

G05B

2219/45026 . . .	Circuit board, pcb	2219/45086 . . .	Brick laying, masonry robot
2219/45027 . . .	Masking, project image on wafer semiconductor, photo tracer	2219/45087 . . .	Gymnast robot, acrobat
2219/45028 . . .	Lithography	2219/45088 . . .	Riveting robot
2219/45029 . . .	Mount and solder parts on board	2219/45089 . . .	Testing robot
2219/45031 . . .	Manufacturing semiconductor wafers	2219/45091 . . .	Screwing robot, tighten or loose bolt
2219/45032 . . .	Wafer manufacture; interlock, load-lock module	2219/45092 . . .	Analysing or chemical synthesis robot, moving samples from station to station
2219/45033 . . .	Wire bonding, wire wrap	2219/45093 . . .	Tacker robot, to join panels with nails, staples
2219/45034 . . .	Adjusting, trimming circuits on printed boards	2219/45094 . . .	Milling robot
2219/45035 . . .	Printed circuit boards, also holes to be drilled in a plate	2219/45095 . . .	Office messenger
2219/45036 . . .	Waterjet cutting	2219/45096 . . .	Polishing manipulator
2219/45037 . . .	Veneer cutting	2219/45097 . . .	Cable harnessing robot
2219/45038 . . .	Cutting plotter	2219/45098 . . .	Vacuum cleaning robot
2219/45039 . . .	Slitter, scoring	2219/45099 . . .	Filament, tape winding robot
2219/45041 . . .	Laser cutting	2219/45101 . . .	Hot line work robot, to handle high voltage lines
2219/45042 . . .	Hot wire cutting, use of polystyrene or similar material	2219/45102 . . .	Concrete delivering manipulator with several links
2219/45043 . . .	EDM machine, wire cutting	2219/45103 . . .	Security, surveillance applications
2219/45044 . . .	Cutting	2219/45104 . . .	Lasrobot, welding robot
2219/45045 . . .	Maintenance, automatic storage and retrieval system	2219/45105 . . .	Fruit picker, pruner, end effector is a platform for an operator
2219/45046 . . .	Crane	2219/45106 . . .	Used in agriculture, tree trimmer, pruner
2219/45047 . . .	Sorting	2219/45107 . . .	Weed robot
2219/45048 . . .	Packaging	2219/45108 . . .	Aid, robot for aid to, assist human disabled
2219/45049 . . .	Forklift	2219/45109 . . .	Excercise, coordination, therapy, rehabilitation robot for disabled patients
2219/45051 . . .	Transfer line	2219/45111 . . .	Meal, food assistance
2219/45052 . . .	Filling vehicle with material	2219/45112 . . .	Arm movement aid
2219/45053 . . .	Coil, bobbin handling	2219/45113 . . .	Animal handling, milking robot
2219/45054 . . .	Handling, conveyor	2219/45114 . . .	Fisher line robot
2219/45055 . . .	Assembly	2219/45115 . . .	Evisceration robot, remove intestines of animal
2219/45056 . . .	Handling cases, boxes	2219/45116 . . .	Tapping human shoulder with hammer
2219/45057 . . .	Storage handling for disks or material	2219/45117 . . .	Medical, radio surgery manipulator
2219/45058 . . .	Grinding, polishing robot	2219/45118 . . .	Endoscopic, laparoscopic manipulator
2219/45059 . . .	Drilling robot	2219/45119 . . .	Telesurgery with local assistant, voice communication
2219/45061 . . .	Measuring robot	2219/45121 . . .	Operating microscope, mounted on manipulator arm
2219/45062 . . .	Surface finishing robot	2219/45122 . . .	Laser skin treatment
2219/45063 . . .	Pick and place manipulator	2219/45123 . . .	Electrogoniometer, neuronavigator, medical robot used by surgeon to operate
2219/45064 . . .	Assembly robot	2219/45124 . . .	Two spindle lathe
2219/45065 . . .	Sealing, painting robot	2219/45125 . . .	Four axis, spindle lathe
2219/45066 . . .	Inspection robot	2219/45126 . . .	Riveting machine
2219/45067 . . .	Assembly	2219/45127 . . .	Portable, hand drill
2219/45068 . . .	Cutting robot	2219/45128 . . .	Nibble machines
2219/45069 . . .	Computer controlled automata, doll	2219/45129 . . .	Boring, drilling
2219/45071 . . .	Aircraft, airplane, ship cleaning manipulator, paint stripping	2219/45131 . . .	Turret punch press
2219/45072 . . .	Sewer cleaning manipulator	2219/45132 . . .	Forging press, combined with furnace
2219/45073 . . .	Microrobot	2219/45133 . . .	Lapping
2219/45074 . . .	Edge treating robot, machine	2219/45134 . . .	Marking
2219/45075 . . .	Sewer repair	2219/45135 . . .	Welding
2219/45076 . . .	Gas, fuel refilling	2219/45136 . . .	Turning, lathe
2219/45077 . . .	Sculpturing manipulator	2219/45137 . . .	Punch, stamp, also with use die, mould
2219/45078 . . .	Window cleaning, end effector contains detection and cleaning means	2219/45138 . . .	Laser welding
2219/45079 . . .	Stripping robot, strip pieces of garments from table	2219/45139 . . .	Laser drilling
2219/45081 . . .	Tuning robot for amplifiers	2219/45141 . . .	Turret lathe
2219/45082 . . .	Sanding robot, to clean surfaces	2219/45142 . . .	Press-line
2219/45083 . . .	Manipulators, robot	2219/45143 . . .	Press-brake, bending machine
2219/45084 . . .	Service robot	2219/45144 . . .	Saw
2219/45085 . . .	Space robot	2219/45145 . . .	Milling

- 2219/45146 . . . Inertia friction welding
- 2219/45147 . . . Machining blade, airfoil
- 2219/45148 . . . Boring
- 2219/45149 . . . Micromachining to micrometer precision
- 2219/45151 . . . Deburring
- 2219/45152 . . . Forming workpiece by pressing tool against metal on model
- 2219/45153 . . . Carton forming
- 2219/45154 . . . Forming workpiece by using thermal energy, laser forming
- 2219/45155 . . . Electroforming, original form is covered with metal
- 2219/45156 . . . Grind on lathe
- 2219/45157 . . . Grind optical lens
- 2219/45158 . . . Grind sawteeth
- 2219/45159 . . . Dressing, sharpening, trueing tool
- 2219/45161 . . . Grinding machine
- 2219/45162 . . . Chamfer grinding
- 2219/45163 . . . Laser erosion, take away layer of material by burning, use oxygen, engrave
- 2219/45164 . . . Laser refurbish with laser beam and metal powder
- 2219/45165 . . . Laser machining
- 2219/45166 . . . Tomography
- 2219/45167 . . . Dentist, dental manufacture
- 2219/45168 . . . Bone prosthesis
- 2219/45169 . . . Medical, rontgen, x ray
- 2219/45171 . . . Surgery drill
- 2219/45172 . . . Prosthesis
- 2219/45173 . . . Object making, golf ball
- 2219/45174 . . . Making panels
- 2219/45175 . . . Glasses, spectacles
- 2219/45176 . . . Animation for film scenes, show
- 2219/45177 . . . Data disk drive
- 2219/45178 . . . Zoom, focus lens
- 2219/45179 . . . Optical, telescope
- 2219/45181 . . . Optical multiplexer
- 2219/45182 . . . Microscope, micromanipulator for microscope
- 2219/45183 . . . Photocopying, image scanning
- 2219/45184 . . . Filming, photography, camera
- 2219/45185 . . . Auto mirror
- 2219/45186 . . . Print on workpieces
- 2219/45187 . . . Printer
- 2219/45188 . . . Laserjet printer
- 2219/45189 . . . Plotter
- 2219/45191 . . . Spinning, web spinning
- 2219/45192 . . . Weaving
- 2219/45193 . . . Yarn manufacturing
- 2219/45194 . . . Lace, braid, knitting
- 2219/45195 . . . Sewing machines
- 2219/45196 . . . Textile, embroidery, stitching machine
- 2219/45197 . . . Prepare and machine parts, assemble parts
- 2219/45198 . . . Coiling, making springs
- 2219/45199 . . . Polish
- 2219/45201 . . . Crowned roll machining
- 2219/45202 . . . Edge finishing
- 2219/45203 . . . Screwing
- 2219/45204 . . . Die, mould making
- 2219/45205 . . . Assembly of woodframe
- 2219/45206 . . . Ultrasonic drill, mill, machining
- 2219/45207 . . . Actuator to regulate position, flow, speed, process variable
- 2219/45208 . . . Long, deep drill, with drill, bore diameter small relative to length, in pipes
- 2219/45209 . . . Measuring, indicating device having a needle
- 2219/45211 . . . Making, assembling truss structures
- 2219/45212 . . . Etching, engraving, sculpturing, carving
- 2219/45213 . . . Integrated manufacturing system ims, transfer line, machining center
- 2219/45214 . . . Gear cutting
- 2219/45215 . . . Thread cutting
- 2219/45216 . . . Tapping
- 2219/45217 . . . Notching
- 2219/45218 . . . Making cams, cones
- 2219/45219 . . . Making intermeshing helical rotors, for pump, compressor
- 2219/45221 . . . Edm, electrical discharge machining, electroerosion, ecm, chemical
- 2219/45222 . . . Cloth making
- 2219/45223 . . . Making mirror, mirror segment
- 2219/45224 . . . Electrode making
- 2219/45225 . . . Making impellers, propellers
- 2219/45226 . . . Process control
- 2219/45227 . . . Stamp making
- 2219/45228 . . . Making spheres
- 2219/45229 . . . Woodworking
- 2219/45231 . . . Stoneworking
- 2219/45232 . . . CMP chemical mechanical polishing of wafer
- 2219/45233 . . . Repairing pipelines, tubes
- 2219/45234 . . . Thin flat workpiece, sheet metal machining
- 2219/45235 . . . Dispensing adhesive, solder paste, for pcb
- 2219/45236 . . . Facing, polygon working, polyhedron machining
- 2219/45237 . . . Honing machine
- 2219/45238 . . . Tape, fiber, glue, material dispensing in layers, beads, filling, sealing
- 2219/45239 . . . Filament, coil winding
- 2219/45241 . . . Coke oven
- 2219/45242 . . . Door, panel, window operation, opening, closing
- 2219/45243 . . . Shoe, footwear making
- 2219/45244 . . . Injection molding
- 2219/45245 . . . Making key
- 2219/45246 . . . Turn cylindrical workpiece, crowned
- 2219/45247 . . . Diamond turning, tool is diamond point
- 2219/45248 . . . Turning
- 2219/47 . . . Tracing, tracking
- 2219/4701 . . . Edge detector, project line, inclined camera detects discontinuity
- 2219/4702 . . . Project several lines on surface, to detect discontinuity by camera
- 2219/4703 . . . View whole surface before edge detection, coarse scan then fine tracking
- 2219/4704 . . . Store actual edge, seam in memory before machining, compare with detected
- 2219/4705 . . . Detect edge during machining, welding, sewing
- 2219/4706 . . . Edge detector is incorporated into machine
- 2219/4707 . . . Trace groove always at bottom of groove
- 2219/4708 . . . Command codes, marks along line to control operation, velocity
- 2219/4709 . . . Command code in form of a sticker
- 2219/4711 . . . Using a pantograph
- 2219/4712 . . . Using photocell sensible to different colours

- 2219/4713 . . . Limit scanning surface by marks, stored limit, limit switches
- 2219/4714 . . . Use of help paths to go to different workpiece paths to be followed
- 2219/4715 . . . Second photocell in advance of first, to control speed or other operation
- 2219/4716 . . . Trace electric potential lines to control z motion
- 2219/4717 . . . Machine 3-D model by tracing two 2-D models
- 2219/4718 . . . Two mode switch over tracking as function of predetermined cmm probe angle
- 2219/4719 . . . Line detector with laser beam, adjustable optical axis
- 2219/49 . . . Nc machine tool, till multiple
- 2219/49001 . . . Machine tool problems
- 2219/49002 . . . Map unfolded surface on flat surface to make dies, composite objects, free form
- 2219/49003 . . . Make two halves of tool, model at the same time
- 2219/49004 . . . Modeling, making, manufacturing model to control machine, cmm
- 2219/49005 . . . Map 2-D pattern on 3-D
- 2219/49006 . . . Nc machine makes cams, model to control, or make a copy, on other machines
- 2219/49007 . . . Making, forming 3-D object, model, surface
- 2219/49008 . . . Making 3-D object with model in computer memory
- 2219/49009 . . . Model stored in a memory of a prototype
- 2219/49011 . . . Machine 2-D slices, build 3-D model, laminated object manufacturing LOM
- 2219/49012 . . . Remove material by laser beam, air, water jet to form 3-D object
- 2219/49013 . . . Deposit layers, cured by scanning laser, stereo lithography SLA, prototyping
- 2219/49014 . . . Calculate number and form of 2-D slices automatically from volume on screen
- 2219/49015 . . . Wire, strang laying, deposit fluid, welding, adhesive, hardening, solidification, fuse
- 2219/49016 . . . Desktop manufacturing [DTM]; Solid freeform machining [SFM]; Solid freeform fabrication [SFF]
- 2219/49017 . . . DTM desktop manufacturing, prototyping
- 2219/49018 . . . Laser sintering of powder in layers, selective laser sintering SLS
- 2219/49019 . . . Machine 3-D slices, to build 3-D model, stratified object manufacturing SOM
- 2219/49021 . . . Deposit layer, machine, mill layer, then new layer, SDM solid deposit manufacturing
- 2219/49022 . . . Photo masking, mask cures whole layer at one time, add wax, mill, new layer
- 2219/49023 . . . 3-D printing, layer of powder, add drops of binder in layer, new powder
- 2219/49024 . . . LEM laminated engineering materials, like lom but first cut, then stack
- 2219/49025 . . . By positioning plurality of rods, pins to form together a mold, maquette
- 2219/49026 . . . SDM shape deposition manufacturing for multimaterial layers
- 2219/49027 . . . SALD selective area laser deposition, vapor solidifies on surface
- 2219/49028 . . . Rapid freeze prototyping, selectively deposit and rapidly freeze water layer by layer
- 2219/49029 . . . Virtual rapid prototyping, create a virtual prototype, simulate rapid prototyping process
- 2219/49031 . . . Project particles, laser beam to point using two, more jets, beams, ballistic particle
- 2219/49032 . . . Bond layers with glue, solder, welding, brazing in LOM
- 2219/49033 . . . Blanks or taken from roll of metal sheet
- 2219/49034 . . . Changing design, use same prototype, add reinforcements where needed
- 2219/49035 . . . Reconstruct boundary volume from stack of layer contours, sections
- 2219/49036 . . . Use quality measures, build time, strength of material, surface approximation
- 2219/49037 . . . Electro rheological fluid to build support for overhanging parts, particle jet
- 2219/49038 . . . Support help, grid between support and prototype, separate easily
- 2219/49039 . . . Build layer of different, weaker material between support and prototype
- 2219/49041 . . . Workpiece is surrounded by softer support material during machining
- 2219/49042 . . . Remove chips from probe, tool by blowing them away
- 2219/49043 . . . Control of lubrication
- 2219/49044 . . . Control preload of spindle bearing
- 2219/49045 . . . Relieve stress of workpiece after machining by vibration table
- 2219/49046 . . . Control flatness of deformable workpiece table
- 2219/49047 . . . Remove chips by tool up down movement, pecking
- 2219/49048 . . . Control of damping of vibration of machine base
- 2219/49049 . . . Coolant serves as lubrication and also to take away swarf, chips
- 2219/49051 . . . Heat treatment of workpiece, tempering
- 2219/49052 . . . Accessory, coolant
- 2219/49053 . . . Break chips, spiral chips, interrupt momentarily in feed during two or more rotations
- 2219/49054 . . . Active damping of tool vibration
- 2219/49055 . . . Remove chips from probe, tool by vibration
- 2219/49056 . . . Control of flow of fluid or temperature as function of speed for uniform coating
- 2219/49057 . . . Controlling temperature of workpiece, tool, probe holder
- 2219/49058 . . . Division algorithm, calculate inverse ratio of cutting process from parameters
- 2219/49059 . . . Machine with constant volume in time
- 2219/49061 . . . Calculate optimum operating, machining conditions and adjust, adapt them
- 2219/49062 . . . Adaptive control AC
- 2219/49063 . . . Adaptive control constraint ACC
- 2219/49064 . . . Fuzzy adaptive control
- 2219/49065 . . . Execute learning mode first for determining adaptive control parameters
- 2219/49066 . . . Geometric adaptive control
- 2219/49067 . . . Find optimum between production rate and quality, number of points and speed
- 2219/49068 . . . Minimum cost adaptive
- 2219/49069 . . . Adaptive control optimisation ACO
- 2219/49071 . . . Cycle time reduction
- 2219/49072 . . . Action, withdraw, stop feed tool to prevent breakage or lower load
- 2219/49073 . . . Adapt machining parameters so as to keep temperature constant
- 2219/49074 . . . Control cutting speed

- 2219/49075 . . . Control depth of cut
- 2219/49076 . . . Reduce cutting speed if feed force below minimum level
- 2219/49077 . . . Control of feed and spindle, cutting speed
- 2219/49078 . . . Control of feed only
- 2219/49079 . . . Control cutting torque, force
- 2219/49081 . . . If obstruction, bad joint, move head aside and retry operation
- 2219/49082 . . . Maintain constant material removal rate
- 2219/49083 . . . If number of feed retractions exceeds a limit, repeat same instruction block
- 2219/49084 . . . Control roughness of surface
- 2219/49085 . . . CMP end point analysis, measure parameters on points to detect end of polishing process
- 2219/49086 . . . Adjust feeding speed or rotational speed of main spindle when load out of range
- 2219/49087 . . . Adjust parameter to compensate path deviation
- 2219/49088 . . . As a function of, regulate feed as function of material, tool
- 2219/49089 . . . Control feed as function of detected number of tools engaging simultaneously workpiece
- 2219/49091 . . . Control feed as function of detected diameter, cross section of workpiece
- 2219/49092 . . . Vary, change controlled parameter as function of detected power
- 2219/49093 . . . Adapt cutting speed as function of depth of cutting
- 2219/49094 . . . Feed as function of deviation of real from programmed position at fixed time intervals
- 2219/49095 . . . Of rigidity of workpiece
- 2219/49096 . . . Deviation of compliant mounted tool
- 2219/49097 . . . Material type of each layer to be drilled, to be joined
- 2219/49098 . . . As a function of machine operating speed and tool
- 2219/49099 . . . Cutting force, torque
- 2219/49101 . . . As function of tool speed
- 2219/49102 . . . Tool temperature
- 2219/49103 . . . Speed and feed
- 2219/49104 . . . Chip thickness
- 2219/49105 . . . Emitted noise of tool
- 2219/49106 . . . Feed as function of lateral movement of saw blade
- 2219/49107 . . . Optimize spindle speed as function of calculated motion error
- 2219/49108 . . . Spindle speed
- 2219/49109 . . . Control cutting speed as function of tool wire wear, measure diameter of wire
- 2219/49111 . . . Cutting speed as function of contour, path, curve
- 2219/49112 . . . Compensation alignment of cylindrical workpiece
- 2219/49113 . . . Align elements like hole and drill, centering tool, probe, workpiece
- 2219/49114 . . . Go to coarse programmed reference, detector for fine alignment
- 2219/49115 . . . Alignment by taking into account asymmetries in signal, for small offsets
- 2219/49116 . . . Align tool head with fixed line by actuating actuators along tool head slideways
- 2219/49117 . . . Alignment of surfaces to get them parallel
- 2219/49118 . . . Machine end face, control C-axis and X-axis
- 2219/49119 . . . Machine arc of circumference, as groove, cylindrical interpolation
- 2219/49121 . . . C-axis for turning, fifth axis for milling
- 2219/49122 . . . Multiclamping, to reduce dead times
- 2219/49123 . . . Simulation of clamping workpiece, modeling fixture and workpiece
- 2219/49124 . . . Determine clamping position from equipment specification and machining shape
- 2219/49125 . . . Open clamp if tool approaches clamp zone, close again afterwards
- 2219/49126 . . . Clamp piece to pallet using connectable power source
- 2219/49127 . . . Variable clamping force as function of movement, force on workpiece
- 2219/49128 . . . Determine maximum clamping force as function of allowable displacement workpiece
- 2219/49129 . . . Clamps are movable along rod to desired positions
- 2219/49131 . . . High force clamping along periphery
- 2219/49132 . . . Control fixed clamping force
- 2219/49133 . . . Variable chuck clamping force as function of spindle speed
- 2219/49134 . . . Clamp, keep positioned slide, workpiece stationary during machining
- 2219/49135 . . . Active clamping, use servo to keep in position
- 2219/49136 . . . Vacuum pads hold workpiece during machining
- 2219/49137 . . . Store working envelop, limit, allowed zone
- 2219/49138 . . . Adapt working envelop, limit, allowed zone to speed of tool
- 2219/49139 . . . Alarm if outside zone
- 2219/49141 . . . Detect near collision and slow, stop, inhibit movement tool
- 2219/49142 . . . Shut off power, stop if outside working zone
- 2219/49143 . . . Obstacle, collision avoiding control, move so that no collision occurs
- 2219/49144 . . . Limit movement on an axis by setting limits
- 2219/49145 . . . Spheres replace object, check first collision for large spheres, then small
- 2219/49146 . . . Tool changing registers geometry of tool to avoid collision
- 2219/49147 . . . Retract on collision with moving object, tool follows, yields to object
- 2219/49148 . . . Adapt working envelop, limit to size workpiece
- 2219/49149 . . . Ball end cutter interference, caused by tool shape, overcut part surface
- 2219/49151 . . . Axis related interference, remove hidden surfaces
- 2219/49152 . . . Feedhold, stop motion if machine door is open, if operator in forbidden zone
- 2219/49153 . . . Avoid collision, interference between tools moving along same axis
- 2219/49154 . . . Detect position of slide to change hover height of tool to avoid collision
- 2219/49155 . . . On collision, reverse motor over certain angle, then stop to avoid bending
- 2219/49156 . . . On collision, cut off motor, delay, again motor on, repeat to avoid bending
- 2219/49157 . . . Limitation, collision, interference, forbidden zones, avoid obstacles
- 2219/49158 . . . On near collision reduce speed
- 2219/49159 . . . Avoid pinching of persons between moving and fixed part

- 2219/49161 . . . Near end of position, lower power or speed of motor to safe value, at end normal
- 2219/49162 . . . On collision, obstruction reverse drive, accelerate, cancel inertia
- 2219/49163 . . . Stop, dwell in corner edge, allow for cooling, go on machining, better surface
- 2219/49164 . . . Corner, making corner
- 2219/49165 . . . Compensation relative movement between two commonly driven slides
- 2219/49166 . . . Compensation for measured deviation of tool path, as function of length of path
- 2219/49167 . . . Execute compensation only if workhead, module is connected
- 2219/49168 . . . Compensate feed as function of measured values and manual introduced values
- 2219/49169 . . . Compensation for temperature, bending of tool
- 2219/49171 . . . Compensate for dressing amount
- 2219/49172 . . . Compensate slide position as function of indexed workpiece spindle position error
- 2219/49173 . . . Compensation for sidewise deviation of machined workpiece
- 2219/49174 . . . Compensate position by use of separate cmm
- 2219/49175 . . . Compensate for errors in cmm, especially mirror errors, not flat enough
- 2219/49176 . . . Compensation of vibration of machine base due to slide movement
- 2219/49177 . . . Runout, eccentricity, unbalance of tool or workpiece
- 2219/49178 . . . Compensation of tool position as function of square of rotating speed of spindle
- 2219/49179 . . . Compensation for reluctance of axis motors causing surface undulation
- 2219/49181 . . . Calculation, estimation, creation of error model using measured error values
- 2219/49182 . . . Tapping, overshoot after reversal, elasticity compensation
- 2219/49183 . . . Compensation height of tool as function of horizontal position of spindle head, bending
- 2219/49184 . . . Compensation for bending of workpiece, flexible workpiece
- 2219/49185 . . . Position error compensation as function of position of slide, control bearing pressure
- 2219/49186 . . . Deflection, bending of tool
- 2219/49187 . . . Control position of steady rest to compensate bending
- 2219/49188 . . . Proportional compensation from middle to end of elongated workpiece
- 2219/49189 . . . Bending of driven table, lag between real and commanded position
- 2219/49191 . . . Bending, tilt spindle in bearings to compensate for bending
- 2219/49192 . . . Create optical reference axis always kept parallel to reference optical block
- 2219/49193 . . . Orthogonality of axis, deviation from 90-degree correction
- 2219/49194 . . . Structure error, in slide or screw
- 2219/49195 . . . Slide, guideway, robot arm deviation
- 2219/49196 . . . Screw
- 2219/49197 . . . Gear
- 2219/49198 . . . Using lookup table, map, position and corresponding quasi static error
- 2219/49199 . . . For non linear interpolation movement
- 2219/49201 . . . Variable load, slide friction, irregular machine guides
- 2219/49202 . . . For point to point positioning
- 2219/49203 . . . For linear movement
- 2219/49204 . . . Control of heat to compensate for dilatation, thermal displacement
- 2219/49205 . . . Compensate with stored values as function of machining time
- 2219/49206 . . . Compensation temperature, thermal displacement, use measured temperature
- 2219/49207 . . . Compensate thermal displacement using measured distance
- 2219/49208 . . . Preheat spindle by powering polyphase motor with monophase
- 2219/49209 . . . Compensation by using temperature feelers on slide, base, workhead
- 2219/49211 . . . Compensation dilatation using calculated temperature from velocity
- 2219/49212 . . . Using lookup table, map, position error, temperature and position
- 2219/49213 . . . Active thermal preload regulation for spindle
- 2219/49214 . . . Estimate error from heat distribution model and drive current, correct error
- 2219/49215 . . . Regulate temperature of coolant
- 2219/49216 . . . Control of temperature of processor
- 2219/49217 . . . Compensation of temperature increase by the measurement
- 2219/49218 . . . Compensation of workpiece dilatation
- 2219/49219 . . . Compensation temperature, thermal displacement
- 2219/49221 . . . Control of scale
- 2219/49222 . . . Rough cut at high speed
- 2219/49223 . . . Remove workpiece portions left uncut, unmachined by tool with suitable shape
- 2219/49224 . . . Identify and calculate uncut portions
- 2219/49225 . . . Adapt machining conditions as function of workpiece cutting resistance
- 2219/49226 . . . Cut, up or down cutting, cutting direction right, left
- 2219/49227 . . . Cutting with trailing or leading edge of tool
- 2219/49228 . . . Unidirectional or multidirectional cutting
- 2219/49229 . . . Cutter, axis change over
- 2219/49231 . . . Keep tool, probe at constant distance from workpiece surface
- 2219/49232 . . . Limit penetration of drill into backup material, support
- 2219/49233 . . . Machining depth relative to surface, constant depth
- 2219/49234 . . . Keep constant distance even if hole present, avoid collision tool with hole
- 2219/49235 . . . Control depth as function of grey level of scanned object, map of thickness
- 2219/49236 . . . Translate thickness to be removed in dwell delay, then to corresponding speed
- 2219/49237 . . . Depth, tool depth control
- 2219/49238 . . . Surface tracking, following
- 2219/49239 . . . Dimensions
- 2219/49241 . . . 2-5-D lace cutting, work in xy and increment in z, repeat
- 2219/49242 . . . 4-D
- 2219/49243 . . . 5-D
- 2219/49244 . . . 6-D
- 2219/49245 . . . 2-5-D pocket machining
- 2219/49246 . . . 3-D printing, layer of powder, add drops of binder in layer, new powder

- 2219/49247 . . . Dressing started after number of workpieces machined
- 2219/49248 . . . Dressing started if sparking out time to get correct surface is too long
- 2219/49249 . . . Dressing as function of load of grinding wheel
- 2219/49251 . . . Dress by conductive fluid between conductive grindstone and electrode
- 2219/49252 . . . Two spindle drives for common workpiece
- 2219/49253 . . . Position in space by controlling length of two, more cables, wires
- 2219/49254 . . . High speed AC, induction spindle motor
- 2219/49255 . . . Gear meshing, synchronize both with relative phase, then shift
- 2219/49256 . . . Epicyclic movement of tool
- 2219/49257 . . . Six or more linear drives to position x y z table
- 2219/49258 . . . Two y axis to control also rotation
- 2219/49259 . . . Endless belt with coupling, position tools simultaneously in both directions
- 2219/49261 . . . Direct drive, without gear
- 2219/49262 . . . Two drives at both sides of long tool
- 2219/49263 . . . Separate, auxiliary indexing motor
- 2219/49264 . . . Several x-y slides on single surface
- 2219/49265 . . . X motor moves x and y axis, y motor only y axis
- 2219/49266 . . . Two xy tables, on top and below workpiece, in between a cutting wire
- 2219/49267 . . . Three linear actuators to position vertically and rotate horizontally
- 2219/49268 . . . Four bar mechanism
- 2219/49269 . . . Single motor for different drives, switch, change gears
- 2219/49271 . . . Air bearing slide, hydraulic, electromagnetic bearing
- 2219/49272 . . . Electromagnetic bearing also used as feed in one axis or positioning in two axis
- 2219/49273 . . . Switch between continuous drive and index or stop mode
- 2219/49274 . . . Four linear actuators to position x y table
- 2219/49275 . . . Linear actuators on x y to position x y table, ballscrew drive on y to rotate
- 2219/49276 . . . Floating, air, magnetic suspension xy table, sawyer motor, xenetics
- 2219/49277 . . . Oscillating, swinging feed drive, for grinding
- 2219/49278 . . . Parallel link mechanism
- 2219/49279 . . . Nanometric xy table
- 2219/49281 . . . X y table positioned by vibration
- 2219/49282 . . . Same control for double drive or slide
- 2219/49283 . . . Frictionless rolling element
- 2219/49284 . . . Two cascaded slides, large range sits on small range, piggyback
- 2219/49285 . . . Linear control rotating movement kept constant
- 2219/49286 . . . Two rotations gives cartesian coordinates, compact construction
- 2219/49287 . . . Motor drives cam for very fine linear displacement, movement
- 2219/49288 . . . Three linear actuators to position x y table
- 2219/49289 . . . Large transmission ratio
- 2219/49291 . . . Torque, moment, drive power amplifier, movement follower
- 2219/49292 . . . Harmonic gear, transmission, strain wave gear
- 2219/49293 . . . Switch between dual, double slide or double spindle mode
- 2219/49294 . . . Motor and brake actuated together
- 2219/49295 . . . Drive spindle motor at maximum, limit torque for rapid machining time
- 2219/49296 . . . Identification workpiece by dimension, height, resistance value, but no code
- 2219/49297 . . . Spindle identification in multispindle station
- 2219/49298 . . . Probe identification
- 2219/49299 . . . Identify workpiece and align, center workpiece at the same time
- 2219/49301 . . . Identify material to be used, select between several
- 2219/49302 . . . Part, workpiece, code, tool identification
- 2219/49303 . . . Tool identification and tool offset, compensation data together
- 2219/49304 . . . Tool identification, code
- 2219/49305 . . . Store, memory on tool with control and maintenance data
- 2219/49306 . . . Derive kind of cutter from null load
- 2219/49307 . . . Learn, learn operational zone, feed, speed to avoid tool breakage
- 2219/49308 . . . Fuzzy classification of tool wear states
- 2219/49309 . . . Main and secondary machining area, main spindle and satellite spindle
- 2219/49311 . . . Select machining portion of workpiece, pivoting workpiece as function of correction needed
- 2219/49312 . . . Fixture free machining
- 2219/49313 . . . Machining about eccentric center different from rotational center of workpiece
- 2219/49314 . . . Machine with oscillating workpiece, no full rotation
- 2219/49315 . . . Machine first contour slowly, then remaining surface quickly, fast
- 2219/49316 . . . Back-off grinding, during wheel retract, by deflection workpiece, after plunge
- 2219/49317 . . . Traverse grinding, move along workpiece
- 2219/49318 . . . Grind and simultaneous gauging, dwell, measure and final feed without gauging
- 2219/49319 . . . Centerless machining, grinding, cutting
- 2219/49321 . . . Reverse movement of tool to deburr
- 2219/49322 . . . Cool to solidify material before machining it
- 2219/49323 . . . Machine long, slender workpiece
- 2219/49324 . . . Different starting point for each machining pass, to prevent dent formation
- 2219/49325 . . . Combine punching and laser machining
- 2219/49326 . . . Drill on laser machine, transfer to edm for operation on hole, adjust position
- 2219/49327 . . . Combine punch and marker, engraving for workpiece
- 2219/49328 . . . Laser machining and milling combined
- 2219/49329 . . . Combine edm and milling
- 2219/49331 . . . Laser drilling followed by laser cutting
- 2219/49332 . . . First saw rough contours in workpiece then mill rest
- 2219/49333 . . . Drilling and thread cutting by same machine
- 2219/49334 . . . Combine turning, milling, grinding or other in one setup
- 2219/49335 . . . Part, workpiece, inner, internal outer, external machining
- 2219/49336 . . . Machine two mating, matching parts, at opposite ends of spindle, simultaneously
- 2219/49337 . . . Machine holes in spherical nodes
- 2219/49338 . . . Micromachining, workpieces small, around 1-mm or less

- 2219/49339 . . . Machine simultaneous left and right, mirror part
- 2219/49341 . . . Manual pocket machining, multipasses
- 2219/49342 . . . Select between concentric and eccentric regions of a workpiece
- 2219/49343 . . . Machining point symmetrical surfaces, revolving surfaces
- 2219/49344 . . . Surface, 5-axis surface machining
- 2219/49345 . . . Smooth and polish surface at the same time
- 2219/49346 . . . 3-Axis surface machining
- 2219/49347 . . . Machine cover, first scan surface on which cover is to be placed
- 2219/49348 . . . Mill surface from underneath workpiece, easy chips, cutout material evacuation
- 2219/49349 . . . Drill both sides of workpiece at the same time, under and over workpiece
- 2219/49351 . . . 4-Axis surface machining
- 2219/49352 . . . 7-Axis surface machining
- 2219/49353 . . . Control of output power of tool, laser beam
- 2219/49354 . . . High speed cutting
- 2219/49355 . . . Machine flat surface on rotating workpiece, rotate tool inverse direction
- 2219/49356 . . . Tool with constant force against workpiece during machining
- 2219/49357 . . . Tool perpendicular to surface with varying force
- 2219/49358 . . . Facing milling, tool perpendicular to surface
- 2219/49359 . . . Cylindrical or side milling, tool tangential to surface
- 2219/49361 . . . Workpiece and tool have each own rotation speed
- 2219/49362 . . . Tool, probe at constant height to surface during machining
- 2219/49363 . . . Minimalize time for tool movement between different positions, holes
- 2219/49364 . . . Minimize number of punch strokes
- 2219/49365 . . . Minimise noncutting area, tool travel, eliminate air cutting
- 2219/49366 . . . Machine several small pieces on one sheet, break off pieces
- 2219/49367 . . . Group machines into cells to minimise intercellular travel
- 2219/49368 . . . Vision calculates errors while table already moves, result corrects movement
- 2219/49369 . . . Minimize machining time by maximizing feed, speed
- 2219/49371 . . . Variable laser spot width, small for boundary, large for rest
- 2219/49372 . . . Optimize toolpath pattern for a given cutting layer, mounting sequence
- 2219/49373 . . . Flying operation, while tool and workpiece have same speed
- 2219/49374 . . . Speed up each conveyor between two stations, at stations synchronize in phase
- 2219/49375 . . . Minimalizing machine time, number of tool change
- 2219/49376 . . . Select two machining types, milling or turning, complete machining with one tool
- 2219/49377 . . . Eliminate double cutting
- 2219/49378 . . . Tool path finding, select minimal distance
- 2219/49379 . . . Key input path, move one axis manually, other axis slave controlled by program
- 2219/49381 . . . Raster, line servo, area machining, cutting, facing
- 2219/49382 . . . Movement reciprocating
- 2219/49383 . . . Using pick feed with non reciprocating machining direction
- 2219/49384 . . . Control of oscillatory movement like filling a weld, weaving
- 2219/49385 . . . Using pick feed when machining a surface
- 2219/49386 . . . Automatic seam, weld line, finding
- 2219/49387 . . . Limiting scanning region
- 2219/49388 . . . Computer controlled movement of plotter is transferred to tool by pantograph
- 2219/49389 . . . Machine alternative both sides of rib, net machining, against deformation
- 2219/49391 . . . Adapt number of passes as function of tool wear
- 2219/49392 . . . Multipasses, segmentation of cut, paraxial cutting
- 2219/49393 . . . Machining step, fixing smallest step nibble machine, planer
- 2219/49394 . . . Stop in one point, execute other operation and return back to first point
- 2219/49395 . . . Repeating same operations for other coordinates
- 2219/49396 . . . Stepwise milling, mill by advancing larger step then retract smaller step, repeat
- 2219/49397 . . . Control of dwell time
- 2219/49398 . . . Repeat same operations on machined part until machining reaches its finishing
- 2219/50 . . . Machine tool, machine tool null till machine tool work handling
- 2219/50001 . . . Multislides, multispindles with multitool turret for each
- 2219/50002 . . . Drill more holes simultaneously, adapt distance tools as function of detected image
- 2219/50003 . . . Machine simultaneously two workpieces
- 2219/50004 . . . Multitool at the same time, priority for one tool as function of machining parameter
- 2219/50005 . . . Multiple chuck machining, chuck position change after each partial machining
- 2219/50006 . . . Two parallel spindles, bi-spindle and two tool blocks sliding on same axis
- 2219/50007 . . . Multiple polishing heads, oscillating and rotating
- 2219/50008 . . . Multiple, multi tool head, parallel machining
- 2219/50009 . . . Revolver head
- 2219/50011 . . . Two spindles drive single large tool, cooperation of spindles
- 2219/50012 . . . Multi slide and indexable multi workpiece spindles
- 2219/50013 . . . Two spindles on same line, one for workpiece, other for tool, second tool on slide
- 2219/50014 . . . Several, multi workpieces
- 2219/50015 . . . Multi cutting, twin tools contact at same time workpiece, balance cutting
- 2219/50016 . . . Turret with multiple workpiece holders, spindles, multiple fixed tools around it
- 2219/50017 . . . Two programs, two slides, data second slide related to moving origin of first
- 2219/50018 . . . Zero point floating
- 2219/50019 . . . Zero, null offset
- 2219/50021 . . . Configuration, null point on tool relative to null point on workpiece

- 2219/50022 . . . Null point on tool relative to null point of toolholder, rotationcenter
- 2219/50023 . . . Measure different null points, references of tool and store in memory
- 2219/50024 . . . Go to reference, switches and dog to decelerate and to detect origin
- 2219/50025 . . . Go to reference, switches and dog detect origin, combine with pulse from encoder
- 2219/50026 . . . Go to reference plane, cube
- 2219/50027 . . . Go to workpiece surface plane and store position
- 2219/50028 . . . Beam detects x, y deviation on surface, compensates beam of position scanner
- 2219/50029 . . . Go to pivotable, rotatable reference plane
- 2219/50031 . . . Zero setting, go to reference with gauge
- 2219/50032 . . . On one axis only, derive from inclined surface offsets for other axis
- 2219/50033 . . . Align tool, tip with a calibration mask
- 2219/50034 . . . Set search range about origin, select between different overlapping ranges
- 2219/50035 . . . Go to reference point and measure a preset force, pressure, store position
- 2219/50036 . . . Find center of circular mark, groove
- 2219/50037 . . . Use either upper or lower limit for home control
- 2219/50038 . . . Go to mechanical limit with low speed, until blocking of drive
- 2219/50039 . . . Two probe, one on turret, serves also to calibrate second probe on bed
- 2219/50041 . . . Measuring intensity of tool vibration
- 2219/50042 . . . Return to origin, reference point, zero point, homing
- 2219/50043 . . . Near zero detection
- 2219/50044 . . . For speed
- 2219/50045 . . . Combined axis jogging, following programmed shape instead of single axis
- 2219/50046 . . . Control of level, horizontal, inclination of workholder, slide
- 2219/50047 . . . Positioning, indexing
- 2219/50048 . . . Jogging
- 2219/50049 . . . Control machine as function of position, angle of workpiece
- 2219/50051 . . . Turn workpiece axis perpendicular to turn axis of lathe
- 2219/50052 . . . Orienting workpiece relative to tool
- 2219/50053 . . . Machine non circular, non-round cross section, hexagonal, rectangular
- 2219/50054 . . . Drill on skew surface
- 2219/50055 . . . Make hollow workpiece with uniform wall thickness
- 2219/50056 . . . Profile, for operation on I-, T-profiles or other elongated profiles
- 2219/50057 . . . Compensation error by probing test, machined piece, post or pre process
- 2219/50058 . . . During machining, measure previous part to compensate errors
- 2219/50059 . . . Record profile error, used for next machining pass
- 2219/50061 . . . Compensation of measuring errors due to machine with footprint
- 2219/50062 . . . Measure deviation of workpiece under working conditions, machine correction
- 2219/50063 . . . Probe, measure, verify workpiece, feedback measured values
- 2219/50064 . . . Camera inspects workpiece for errors, correction of workpiece at desired position
- 2219/50065 . . . Estimate trends from past measured values, correct before really out of tolerance
- 2219/50066 . . . Fit base pattern into detected geometrical workpiece data, create whole program
- 2219/50067 . . . Measure surface for thickness and store map in memory, machine surface
- 2219/50068 . . . Test valve, object, store parameters, machine object to get wanted performance
- 2219/50069 . . . Reject workpiece if not machinable, material to be machined too large
- 2219/50071 . . . Store actual surface in memory before machining, compare with reference surface
- 2219/50072 . . . Machine workpiece again to correct previous errors
- 2219/50073 . . . Signature analysis, store forces during test, compare with real ones during assembly
- 2219/50074 . . . Purpose, workpiece measurement to control, adapt feed of tool
- 2219/50075 . . . To adapt, control force level at which machining will be considered as finished
- 2219/50076 . . . To derive from state of surface, the need to change used, worn tool
- 2219/50077 . . . Keep position by switching over to auxiliary power supply for resolver, encoder
- 2219/50078 . . . Single battery backup for all axis, encoders, resolvers
- 2219/50079 . . . Battery backup supply switched over data, signal lines, to save cable
- 2219/50081 . . . On power loss, shut down axis using generated power from one braked axis
- 2219/50082 . . . UPS, no break to power actuator and move into safe condition
- 2219/50083 . . . Power loss, measures again loss of power
- 2219/50084 . . . Keep position, setup parameters in memory
- 2219/50085 . . . Realignment, search reference to reestablish position
- 2219/50086 . . . Microprocessor
- 2219/50087 . . . Rough, coarse and finish, fine machining
- 2219/50088 . . . Rough and finish machining simultaneously
- 2219/50089 . . . Finish allowance equals offset rough finish tool and bending work under rough
- 2219/50091 . . . Rough machining
- 2219/50092 . . . Sculptured part rough machining with the offset approach
- 2219/50093 . . . Sculptured rough machining with the contour map approach, make slices
- 2219/50094 . . . Optimize number of layers to be cut for contour map approach
- 2219/50095 . . . On tool breakage return to a reference then follow already machined path
- 2219/50096 . . . After interrupt, use tool path display to bring tool back on path
- 2219/50097 . . . After repair, dry run program until block before restart is detected
- 2219/50098 . . . After interrupt, interpolate with suitable startpoint different from stoppoint
- 2219/50099 . . . Before restart change jig, fixture with workpieces
- 2219/50101 . . . For fine machining, select tool and offset, block and restart midway

- 2219/50102 . . . Store history of operation, after power failure, restart from history, journal
- 2219/50103 . . . Restart, reverse, return along machined path, stop
- 2219/50104 . . . Before restarting program, restore machine status existing at stop time
- 2219/50105 . . . Display instructions to operator on how to restart machine
- 2219/50106 . . . Before allowing restart, check that machine condition is optimal
- 2219/50107 . . . Retract tool if end of drilling is detected
- 2219/50108 . . . Retract tool stepwise, same path, until safe boundary reached, then quick retract
- 2219/50109 . . . Soft approach, engage, retract, escape, withdraw path for tool to workpiece
- 2219/50111 . . . Retract tool along path, reengage along same path
- 2219/50112 . . . Retract tool to a point
- 2219/50113 . . . Short stroke, retract tool, safe distance from workpiece surface, hover height
- 2219/50114 . . . Select approach path as function of zone for tool slide
- 2219/50115 . . . Select complicated, combined approach path
- 2219/50116 . . . Select approach path out of plurality
- 2219/50117 . . . Select approach path as function of machining time
- 2219/50118 . . . Select as function of position of tool during cycle, optimum path
- 2219/50119 . . . Select between set of paths as function of interrupt nature
- 2219/50121 . . . Machining several workpieces with one or more tools in one setup
- 2219/50122 . . . Workpiece holder, chuck jaws, fixture setup
- 2219/50123 . . . Setup, automatic setup
- 2219/50124 . . . Automatic new setup when new program selected
- 2219/50125 . . . Configurable fixture, jig
- 2219/50126 . . . Position clamp, fixture by machining head itself
- 2219/50127 . . . Modular fixture, use of clamps and locators, the latter also for positioning
- 2219/50128 . . . Reference free part encapsulation, fixture using molten filler and cube
- 2219/50129 . . . Setup machines as function of process model, control strategy for optimum use of machines
- 2219/50131 . . . Setup as function of tool position in manufacturing center
- 2219/50132 . . . Jig, fixture
- 2219/50133 . . . With optical beam, tool crosses beam
- 2219/50134 . . . Tool pushes reference plane, or *vice versa*, reverse motion until again zero
- 2219/50135 . . . Tool touches box, sensor to give a contact signal
- 2219/50136 . . . With sensor, potentiometer to measure relative displacement
- 2219/50137 . . . Contact in probe, touch probe to detect contact, touch trigger
- 2219/50138 . . . During setup display is red, after setup display is green colour
- 2219/50139 . . . Calibration, setting tool after measurement on tool
- 2219/50141 . . . Setup tool, preset
- 2219/50142 . . . Measure parallelism of tool with respect to plane and correct
- 2219/50143 . . . Tool set up integrated, automatically transferred into control system
- 2219/50144 . . . offline setup by simulation of process, during machining, forming of other piece
- 2219/50145 . . . Tool setup manual, preset of the machine
- 2219/50146 . . . Machine construction error compensation using ann
- 2219/50147 . . . Calibrate tool heads based on calibration of first tool head
- 2219/50148 . . . Workpiece, setup of component, workpiece
- 2219/50149 . . . Find orientation workpiece which maximizes number of faces machined in one setup
- 2219/50151 . . . Orient, translate, align workpiece to fit position assumed in program
- 2219/50152 . . . Align axis cylinder, tube with rotation axis machine
- 2219/50153 . . . Mount machining unit on workpiece, move unit on it
- 2219/50154 . . . Milling center
- 2219/50155 . . . Swivel spindle head horizontally
- 2219/50156 . . . Tiltable rotary table
- 2219/50157 . . . Universal swivel spindle head, swivel in all directions
- 2219/50158 . . . Modular structure
- 2219/50159 . . . Steady rest
- 2219/50161 . . . Reverse engineering, cloning
- 2219/50162 . . . Stewart platform, hexapod construction
- 2219/50163 . . . Machine stations and control modules build as a unity to be connected in line
- 2219/50164 . . . Select a structure to make programming of free curved surface easier
- 2219/50165 . . . Axis nc machine cooperates with two axis rotary table
- 2219/50166 . . . Extended range, machine a workpiece over a long distance
- 2219/50167 . . . Adapting to copying
- 2219/50168 . . . Retrofitting
- 2219/50169 . . . Double stewart platform
- 2219/50171 . . . Machine, machining centre, center
- 2219/50172 . . . Tool holder is transparent
- 2219/50173 . . . Machine tool hang and move on rail above workpiece
- 2219/50174 . . . Machine tool y-1, y-2, z, A-axis, table x, c-axis
- 2219/50175 . . . 6-Dof manipulator associated with 1-DOF workpiece holder
- 2219/50176 . . . Table, general, for machine tool
- 2219/50177 . . . Protection for operator during operation, machining
- 2219/50178 . . . Clamp, brake gravity axis on power loss to clamp tool in position
- 2219/50179 . . . Dynamic tolerance, limit values as function of speed, type of command
- 2219/50181 . . . After stopping apply additionally a brake
- 2219/50182 . . . Skip over pieces between machining and measuring station, on tool changing
- 2219/50183 . . . Detect correct clamping of workpiece, chucks grip properly workpiece
- 2219/50184 . . . Stop feed if relative movement between drive and tool
- 2219/50185 . . . Monitoring, detect failures, control of efficiency of machine, tool life
- 2219/50186 . . . Diagnostic of spindle bearing

- 2219/50187 . . . Stop drive motor if clutch refuses, remains active, if emergency
- 2219/50188 . . . If operation, feed movement not done after maximum allowable time, emergency stop
- 2219/50189 . . . Compare position of slide with positioning, tape data
- 2219/50191 . . . Against noise
- 2219/50192 . . . If braking fails due to controller or amplifier fault, separate delayed braking
- 2219/50193 . . . Safety in general
- 2219/50194 . . . Before restarting machine, enter allowable, maximum speed corresponding to tool
- 2219/50195 . . . Emergency stop stops drives and spindle, stored program remains in memory
- 2219/50196 . . . Monitor clutch or belt drive
- 2219/50197 . . . Signature analysis, store working conditions, compare with actual
- 2219/50198 . . . Emergency stop
- 2219/50199 . . . Tool, nozzle is covered for protection in home position, if needed also heated
- 2219/50201 . . . Tool loses contact with workpiece, alarm if no cut through operation
- 2219/50202 . . . During movement of tool towards workpiece, shut down rotation, welding gun
- 2219/50203 . . . Tool, monitor condition tool
- 2219/50204 . . . Tool replacement point, tool change position without damage, clearance plane
- 2219/50205 . . . On tool breakage stop machine
- 2219/50206 . . . Tool monitoring integrated in nc control
- 2219/50207 . . . Surface finish
- 2219/50208 . . . Retrace, remachine portion of path, locus to remove start discontinuities
- 2219/50209 . . . Surface treatment, roughing surface
- 2219/50211 . . . Finish machining, spark out, rough out
- 2219/50212 . . . Giving a texture, structure to surface, like leather, wood appearance
- 2219/50213 . . . Grooving of different forms or parallel to each other, grooving cycle
- 2219/50214 . . . Refurbish, refinish, reprofile, recondition, restore, rebuild profile
- 2219/50215 . . . Move synchronously tool and anvil at both sides of plate
- 2219/50216 . . . Synchronize speed and position of several axis, spindles
- 2219/50217 . . . Synchronize, control phase angle of two spindles by auxiliary index motor
- 2219/50218 . . . Synchronize groups of axis, spindles
- 2219/50219 . . . Slave spindle is driven at half the torque of main spindle for synchronism
- 2219/50221 . . . Switch speed reference from speed to position loop of both spindles to synchronize
- 2219/50222 . . . Stop machines, actuators until others reach common synchronization point
- 2219/50223 . . . Loose synchronisation, can shift within time interval
- 2219/50224 . . . Synchronize feed and spindle speed during slow down, stopping
- 2219/50225 . . . Synchronize feed and spindle speed as function of pitch of screw, thread
- 2219/50226 . . . Synchronize feed and spindle speed in forward and reverse feed
- 2219/50227 . . . Synchronize two axis by correcting for measured pitch errors
- 2219/50228 . . . Synchronize two slides, portal gantry, raising, moving
- 2219/50229 . . . Synchronize axis by simulating several virtual axis to control real axis
- 2219/50231 . . . Synchronize engage, disengage groups of axis as function of position of simulate
- 2219/50232 . . . Synchronize change of feed and spindle speed when overriding feed speed
- 2219/50233 . . . Synchronize time-dependent with electronic cam data
- 2219/50234 . . . Synchronize two spindles, axis, electronic transmission, line shafting
- 2219/50235 . . . Select tools, slides, spindles to work synchronized, independent
- 2219/50236 . . . Tool editor for actual used tools and needed next, missing, unused tools
- 2219/50237 . . . Detect wear by comparing coded value on tool with real value, grind tool
- 2219/50238 . . . Search empty place in changer to place tool
- 2219/50239 . . . Select tool manual from tool store, with permission from NC to deblock tool
- 2219/50241 . . . Chuck, gripper, spindle changer
- 2219/50242 . . . Tool changer and revolver fixed on spindle
- 2219/50243 . . . Small buffer tool magazine, ordered tools, filled from large magazine, change time
- 2219/50244 . . . Machine integrated tool cassette
- 2219/50245 . . . Change tools, like laser head and drill having different driving needs
- 2219/50246 . . . Workpiece exchange
- 2219/50247 . . . Change to finer, more adapted tools to machine complex surface
- 2219/50248 . . . Control position of coolant nozzle as function of selected tool
- 2219/50249 . . . Tool, probe, pen changer
- 2219/50251 . . . Mobile tool magazine to replace spare or rarely used tool
- 2219/50252 . . . Replace, change tool with tracer head, probe, feeler
- 2219/50253 . . . Selection tool
- 2219/50254 . . . Change feeler or tool on different curvature of workpiece, model
- 2219/50255 . . . Tool selection sets speed machining, kind of cooling, other parameter
- 2219/50256 . . . Orienting selected tool with respect to workpiece
- 2219/50257 . . . Kind of revolver magazine
- 2219/50258 . . . Chain magazine
- 2219/50259 . . . Flat bed magazine
- 2219/50261 . . . Two tool holders to eliminate tool change time, replace and search simultaneously
- 2219/50262 . . . Change tool at minimum distance from workpiece
- 2219/50263 . . . Standby tool, tool ready for next machining step, change tool while machining
- 2219/50264 . . . Change tool during positioning movement
- 2219/50265 . . . If tool life over, continue machining only actual block, workability, then stop
- 2219/50266 . . . During tool change, workpiece immobile, then execute backward operation sequence
- 2219/50267 . . . Change tool and workpiece simultaneously, except if collision possible
- 2219/50268 . . . Measure diameter only if new tool has been inserted

- 2219/50269 . . . Minimize tool change by selecting appropriate fixture
- 2219/50271 . . . Select second tool if first tool cannot machine workpiece without moving it
- 2219/50272 . . . Change spare, used tool during machining, minimize machining time
- 2219/50273 . . . Before motor start of spindle with new tool, detect if old tool back in storage
- 2219/50274 . . . Measure new tool inserted by operator, compare with diameter needed to accept
- 2219/50275 . . . Safety, verify correct code of chosen tool, probe
- 2219/50276 . . . Detect wear or defect tool, breakage and change tool
- 2219/50277 . . . Detection tool presence in tool holder, spindle before starting motor
- 2219/50278 . . . Send offset values from tool changer before machining
- 2219/50279 . . . Adjust displacement amount of tracer as function of rough, finish machining
- 2219/50281 . . . Adjust tool for tool offset by using an axis parallel to feed axis
- 2219/50282 . . . Tool offset as function of cutting depth
- 2219/50283 . . . Tool offset for two different diameters, smoothing
- 2219/50284 . . . Tool nose correction
- 2219/50285 . . . Tool geometry compensation, keep contact of tool on desired curve
- 2219/50286 . . . Fine adjustment tool head, adjustment with respect to toolholder
- 2219/50287 . . . Tool offset as function of diameter of saw, for begin and end point of path
- 2219/50288 . . . Compensate tool offset as function of speed, needed when tool is not mounted correctly in spindle
- 2219/50289 . . . Tool offset general
- 2219/50291 . . . Multi-tool, several tools
- 2219/50292 . . . Tool offset based on two cutter contact points, admitting some overcut
- 2219/50293 . . . Radial setting of tool
- 2219/50294 . . . Tool offset length by going to a reference and recording distance
- 2219/50295 . . . Tool offset by manual input by switches
- 2219/50296 . . . Tool offset by verifying piece and registering errors
- 2219/50297 . . . Compensation of positioning error due to a-axis, b-axis tool rotation
- 2219/50298 . . . Trace with feelers of different diameter, from the two loci calculate offset
- 2219/50299 . . . Correction data stored in memory attached to tool or tool holder
- 2219/50301 . . . Correction stored on tape, together with tool identification
- 2219/50302 . . . Remachine same workpiece with same tool but diminished tool offset
- 2219/50303 . . . Resolver
- 2219/50304 . . . Correction from tape, file
- 2219/50305 . . . For every diameter a tape
- 2219/50306 . . . Tool height, axial displacement from center of circular workpiece, surface
- 2219/50307 . . . Correction by probing dimension of machined workpiece
- 2219/50308 . . . Estimate wear from machining data and conditions
- 2219/50309 . . . Correction of wear as function of dressing
- 2219/50311 . . . Compensate tool wear by grinding tool to a known position
- 2219/50312 . . . Compensation of tool wear by adapting program to profile of tool
- 2219/50313 . . . Tool offset, tool wear
- 2219/50314 . . . Search for reference, go to reference
- 2219/50315 . . . Selfcorrecting by measurement during machining
- 2219/50316 . . . Calculate as function of empirical calculated values from used tools
- 2219/50317 . . . As function of number of workpieces
- 2219/50318 . . . As function of number of cutting edges of saw, mill
- 2219/50319 . . . As function of tool geometry and machining data
- 2219/50321 . . . As function of machined volume per time unit
- 2219/50322 . . . As function of effective machining time
- 2219/50323 . . . As function of tool type
- 2219/50324 . . . As function of coolant
- 2219/50325 . . . As function of measured vibrations
- 2219/50326 . . . As function of feed forces
- 2219/50327 . . . As function of cutting forces
- 2219/50328 . . . As function of motor spindle load, current
- 2219/50329 . . . Tool offset for pockets, area machining avoiding interference with wall
- 2219/50331 . . . Electrode, wire gap compensation in edm, wire cutting
- 2219/50332 . . . Tool offset for 3-D surfaces normal to surface
- 2219/50333 . . . Temperature
- 2219/50334 . . . Tool offset, diameter correction
- 2219/50335 . . . Tool offset for straight lines
- 2219/50336 . . . Tool, probe offset for curves, surfaces, contouring
- 2219/50337 . . . Tool offset for point
- 2219/50338 . . . Tool with rom chip
- 2219/50339 . . . Select machining portion of tool according to surface of work
- 2219/50341 . . . Tool with right and left nose value, different radius
- 2219/50342 . . . Use two tools with different diameter
- 2219/50343 . . . Ball end tool, end is spherical
- 2219/50344 . . . Flat end tool, end is flat
- 2219/50345 . . . Bull nose tool, end is practical flat with rounded corners
- 2219/50346 . . . Ion ray
- 2219/50347 . . . Tool sends via electromagnetic waves actual working condition
- 2219/50348 . . . Deform tool to adapt to workpiece, bow tool with pressure
- 2219/50349 . . . Obtain normal vector of two points on surface, interpolate in between
- 2219/50351 . . . Rotate cutting tool to vary cutting tool geometry
- 2219/50352 . . . Inclination of tool as function of diameter of workpiece
- 2219/50353 . . . Tool, probe inclination, orientation to surface, posture, attitude
- 2219/50354 . . . If tool loses contact, change angle of tool with 90-degrees
- 2219/50355 . . . Tool perpendicular to a 2-D curve
- 2219/50356 . . . Tool perpendicular, normal to 3-D surface
- 2219/50357 . . . Tool tangential to path or surface

## G05B

- 2219/50358 . . . Work handling, automatic load unload workpiece
- 2219/50359 . . . Rotate workpiece pallet, workpieces on it, machine and load simultaneous
- 2219/50361 . . . Translatory workpiece pallet, translate between two stations
- 2219/50362 . . . Load unload with robot
- 2219/50363 . . . Load unload with two robots, one to load, other to unload
- 2219/50364 . . . Buffer for workpieces, pallets, trays with articles
- 2219/50365 . . . Convey workpiece downwards on pallet, to machine rotate upwards
- 2219/50366 . . . Work handling with changeable hands
- 2219/50367 . . . Several workpiece holders in a single cell
- 2219/50368 . . . Pallet with autonomous control unit
- 2219/50369 . . . Display empty supply or discharge pallet
- 2219/50371 . . . Index table holds same number of load and unload cups, alternative
- 2219/50372 . . . Load pallets manually, with visual instruction assistance
- 2219/50373 . . . If pallet is not loaded conforming to instruction, warning
- 2219/50374 . . . Cylindrical workpiece holder, for each workpiece a separate tool slide
- 2219/50375 . . . Reject or reload workpiece if misaligned, excessive error in location
- 2219/50376 . . . Workholder receives also parts to be assembled with work
- 2219/50377 . . . Two robots with common workbase slides in unison along pallets
- 2219/50378 . . . Control height gripper as function of thickness of workpiece and height of pallet
- 2219/50379 . . . Workpiece detector, sensor
- 2219/50381 . . . Load, unload workpiece while machining other one, dual table machine
- 2219/50382 . . . Position claws of first chuck relative to second chuck, to grip small workpiece
- 2219/50383 . . . Bar feeder applies torque to compensate bending of workpiece during machining
- 2219/50384 . . . Modular, exchangeable parts feeder
- 2219/50385 . . . Fast forward in idle time
- 2219/50386 . . . Feeder, feeding of workpiece, bar
- 2219/50387 . . . Two chucks, grippers, feeder bar, transfer workpiece from one to other
- 2219/50388 . . . Integrated loader, shuttle transfer
- 2219/50389 . . . Gantry loader
- 2219/50391 . . . Robot
- 2219/50392 . . . Overhead conveyor
- 2219/50393 . . . Floor conveyor, AGV automatic guided vehicle
- 2219/50394 . . . Bulk hopper
- 2219/50395 . . . Pallet magazines, transport dollies
- 2219/50396 . . . Gantry loader with two grippers, one always empty
- 2219/50397 . . . Two conveyors transporting together a workpiece to station
- 2219/50398 . . . For a single machine
- 2219/50399 . . . Between machines
- 2219/50401 . . . In line work storage system
- 2223/00** **Indexing scheme associated with group**  
**G05B 23/00**
- 2223/02 . . . Indirect monitoring, e.g. monitoring production to detect faults of a system
- 2223/04 . . . Detection of intermittent failure
- 2223/06 . . . Remote monitoring