CLASS 700, DATA PROCESSING: GENERIC CONTROL SYSTEMS OR SPECIFIC APPLICATIONS

SECTION I - CLASS DEFINITION

GENERAL STATEMENT OF THE CLASS SUBJECT MATTER

This class is structured into two main divisions: (A) Generic Control System, Apparatus or Process and (B) Specific Application, Apparatus or Process

(1) Note. In establishing Class 700, patents from pertinent subclasses in Classes 364 and 395 were directly translated into corresponding subclasses in the new class. The general structure of Class 700 parallels that of Class 364 from which it is derived and reflects the atypical location of generic subject matter (subclasses 1-89) in hierarchical superiority to specific applications (subclasses 90-306). Notes regarding patent placement are found below.

(A) This is the generic class for the combination of a data processing or calculating computer apparatus (or corresponding methods for performing data processing or calculating operations) AND a device or apparatus controlled thereby, the entirety hereinafter referred to as a "control system".

(1) Note. Control systems which claim control of or control by a particular art device or environment are classified in the "Specific Application, Apparatus or Process" area of this class. Control systems which are not so limited are classified in the "Generic Control System, Apparatus or Process" area of this class. Control systems which are limited to a particular art device or environment but also include at least one claim to the generic control are classified in the "Generic Control System, Apparatus or Process" area.

(2) Note. An example of such a control system includes a data processing or calculating computer interactively connected to an external device to sense a condition (e.g., position) of such external device. The processed data representing the sensed condition develops a control signal to be applied to such external device to perform a control function (e.g., optimization).

(3) Note. "Apparatus" as used herein does not include internal control features of a computer which are classified elsewhere.

(4) Note. Classification herein is based on control system structure or function. The search for particular details of the data processing or calculating computer structural entity is elsewhere in this class.

(5) Note. For classification herein the "Apparatus" being controlled must be only nominally recited. Control systems which are limited by the claims to a particular type of process or have a specific utility are classified in the "Specific Application, Apparatus or Process" area of this class. Control systems which recite specific steps of a process or have structural details to a particular type of apparatus are classified with the appropriate art device. For example: the claimed recitation of (a) a controlled chemical process is classified in the "Generic Control System, Apparatus or Process" area of this class, (b) a controlled distillation process is classified in the "Specific Application, Apparatus or Process" area of this class and (c) a controlled chemical process which involves a recited chemical reaction, is classified in one of the chemical classes.

(6) Note. Where there is nominal claim recitation of the device or apparatus and nominal data processor or computer structure claimed, the control system is classifiable herein only when there is no class providing for the device or apparatus.

(7) Note. Control systems which include an algorithm peculiar to a specific art by claim disclosure are excluded from this class and will be found in the class wherein the specific art is classified.

(B) This is also the generic class for data processing or calculating computer apparatus (or corresponding methods for performing data processing or calculating operations) wherein the data processing or calculating computer apparatus is designed for or utilized in a particular art device, system, process, or environment, or is utilized for the solution of a particular problem in a field

other than mathematics (arithmetic processing per se is classified elsewhere).

(1) Note. Control systems which claim control of or control by a particular art device or environment are classified in the "Specific Application, Apparatus or Process" area of this class. Control systems which are not so limited are classified in the "Generic Control System, Apparatus or Process" area of this class. Control systems which are limited to a particular art device or environment but also include at least one claim to the generic control are classified in the "Generic Control System, Apparatus or Process" area.

(2) Note. For classification herein, there must be significant claim recitation of the data processing system or calculating computer and only nominal claim recitation of any external art environment. Where significant structure of the external device is recited by the claims, classification is in the appropriate device class.

(3) Note. This and indented subclasses will accommodate devices, systems, or processes which claim a control of or a control by a particular art device or environment and do not have a generic claim to the control; see the "Generic Control" area of this class for generic control devices.

(4) Note. In view of the nature of the subject matter included herein, consideration of the classification schedule for diverse art or environment is necessary for proper search.

(C) Significantly claimed apparatus external to this class, claimed in combination with apparatus under the class definition, which perform data processing or calculation operations are classified in the class appropriate to the external device unless specifically excluded therefrom.

(D) Nominally claimed apparatus external to this class in combination with apparatus under the class definition is classified in this class unless provided for in the appropriate external class.

SECTION II - REFERENCES TO OTHER CLASSES

SEE OR SEARCH CLASS:

235, Registers, appropriate subclasses for various data bearing record controlled systems and for basic machines and associated indicating mechanisms for ascertaining the number of movements of various devices and machines, plus machines made from these basic machines alone (e.g., cash registers, voting machines), and in combination with various perfecting features, such as printers and recording means.

307, Electrical Transmission or Interconnection Systems, appropriate subclasses for electrical transmission or interconnection systems.

340, Communications: Electrical, appropriate subclasses for residual electrical communication systems.

341, Coded Data Generation or Conversion, appropriate subclasses for electrical pulse and digit code converters.

342, Communications: Directive Radio Wave Systems and Devices (e.g., Radar, Radio Navigation), appropriate subclasses for directive wave systems which may include object detection or tracking.

345, Computer Graphics Processing, Operator Interface Processing and Selective Visual Display Systems, appropriate subclasses for the selective control of two or more light generating or light controlling display elements in accordance with a received image signal, and particularly subclasses 418 through 475 for computer graphics processing.

348, Television, appropriate subclasses, particularly subclasses 169 through 172 for television systems which may include object detection or tracking.

356, Optics: Measuring and Testing, appropriate subclasses for optical measuring systems which may include object detection or tracking.

358, Facsimile and Static Presentation Processing, subclass 1.1 1.18 for static data presentation processing.

360, Dynamic Magnetic Information Storage or Retrieval, appropriate subclasses, for record carriers and systems wherein information is stored and retrieved by interaction with a medium and there is relative motion between a medium and a transducer, for example, magnetic disk drive devices and control thereof, per se.

365, Static Information Storage and Retrieval, appropriate subclasses for addressable static singular storage elements or plural singular storage elements of the same type.

369, Dynamic Information Storage or Retrieval, appropriate subclasses for record carriers and systems wherein information is stored and retrieved by interaction with a medium and there is relative motion between a medium and a transducer.

370, Multiplex Communications, appropriate subclasses for generic multiplexing and demultiplexing systems.

375, Pulse or Digital Communications, appropriate subclasses for generic pulse or digital communication systems.

377, Electrical Pulse Counters, Pulse Dividers, or Shift Registers: Circuits and Systems, appropriate subclasses for generic circuits for pulse counting.

379, Telephonic Communications, appropriate subclasses for two-way electrical communication of intelligible audio information of arbitrary content over a link including an electrical conductor.

382, Image Analysis, appropriate subclasses for operations performed on image data with the aim of measuring a characteristic of an image, detecting variations, detecting structures such as in subclass 103 for detecting or tracking targets, transforming the image data, and for procedures for analyzing and categorizing patterns present in image data.

701, Data Processing: Vehicles, Navigation, and Relative Location, appropriate subclasses for vehicular or navigational data processing.

702, Data Processing: Measuring, Calibrating, and Testing, appropriate subclasses for measuring or testing data processing.

703, Data Processing: Structural Design, Modeling, Simulation, and Emulation, appropriate subclasses.

704, Data Processing: Speech Signal Processing, Linguistics, Language Translation and Audio Compression/Decompression, subclasses 200 through 278 for artificial intelligence systems that process speech signals.

705, Data Processing: Financial, Business Practice, Management, or Cost/Price Determination, appropriate subclasses for data processing related to business, finances, management, or cost/price determining.

706, Data Processing: Artificial Intelligence, appropriate subclasses for artificial intelligence systems that represent, apply, and acquire knowledge and subclasses 15 through 44 for neural networks and circuits.

707, Data Processing: Databases and File Management, Data Structures, or Document Processing, appropriate subclasses for database structure, database/file management, or document processing.

708, Electrical Computers: Arithmetic Processing and Calculating, appropriate subclasses for electrical arithmetic processing.

709, Electrical Computers and Digital Processing Systems: Multiple Computer or Process Coordinating, subclasses 200 through 253 for multicomputer digital data transferring systems.

710, Electrical Computers and Digital Processing Systems: Input/Output, appropriate subclasses for input/output processing (e.g., bus processing) in a computer or digital data processing system.

711, Electrical Computers and Digital Processing Systems: Memory, appropriate subclasses for storage accessing, control, or addressing in a computer or digital processing system.

712, Electrical Computers and Digital Processing Systems: Processing Architectures and Instruction Processing (e.g., Processors), appropriate subclasses for computer or digital processing system architecture or instruction processing.

713, Electrical Computers and Digital Processing Systems: Support, appropriate subclasses for computer or digital processing system support (e.g., security, power supply, and timing, etc.).

714, Error Detection/Correction and Fault Detection/Recovery, appropriate subclasses for error or fault detection or compensation in a computer or digital processing system.

716, Data Processing: Design and Analysis of Circuit or Semiconductor Mask, appropriate subclasses.

717, Data Processing: Software Development, Installation, and Management, appropriate subclasses.

901, Robots, appropriate subclasses for robotic cross-reference art collections.

SECTION III - GLOSSARY

CALCULATING OPERATION:

Arithmetic and or some limited logic operations performed upon or with signals representing numbers or values.

COMPUTER:

A machine that inputs data, processes data, stores data, and outputs data.

DATA:

Representation of information in a coded manner suitable for communication, interpretation, or processing.

DATA PROCESSING (FOR THE PURPOSE OF THIS CLASS):

A systematic operation on data in accordance with a set of rules which results in a significant change in the data.

END EFFECTOR:

A terminal on a robot arm that carries a hand, welding gun, painting nozzle, or other tool.

SUBCLASSES

1 GENERIC CONTROL SYSTEM, APPARATUS OR PROCESS:
Subject matter wherein there is a combination of a data processing or calculating computer apparatus (or corresponding method for performing data processing or calculating operation) and a device or apparatus controlled thereby, the entirety hereinafter referred to as a control system.

(1) Note. An example of such a control system includes a data processing or calculating computer interactively connected to an external device to sense a condition (e.g., position) of such external device. The processed data representing the sensed condition develops a control signal to be applied to such external device to perform a general applicability control function (e.g., optimization).

(2) Note. "Apparatus" may include a plant, manufacturing process, or facility.

(3) Note. Classification herein is based on control system structure or function. Particular details of the data processing or calculating computer structural entity is classified elsewhere.

(4) Note. For classification herein the "Apparatus" being controlled must be only nominally recited. Control systems which are limited by the claims to a particular type of process or have a specific utility are classified in the "Application" area of this class. Control systems which recite specific steps or have structural details to a particular type of process art classified with the appropriate art device. For example: The claimed recitation of (a) a chemical controlled process, (b) a distillation controlled process and (c) a chemical controlled process which involves a chemical reaction, are classified in the Generic Control" area of this class, the "Application" area of this class and in one of the chemical classes, respectively.

(5) Note. Where there is nominal claim recitation of the device or apparatus and nominal data processor or computer structure claimed, the control system is classifiable herein only when there is no class providing for the device or apparatus.

(6) Note. Control systems which include an algorithm peculiar to a specific art by claim disclosure are excluded from this class and will be found in the class wherein the specific art is classified.

(7) Note. All of the following classes listed have subclasses providing for control or regulating systems or apparatus.

SEE OR SEARCH CLASS:

53, Package Making, subclasses 52 through 76.
60, Power Plants, appropriate subclasses.
62, Refrigeration, subclass 160.
72, Metal Deforming, subclasses 6.1 through 21.6.
74, Machine Element or Mechanism, subclass 2.
83, Cutting, subclasses 72 through 76.
91, Motors: Expansible Chamber Type, appropriate subclasses.
95, Gas Separation: Processes, subclasses 1 through 24.

96, Gas Separation: Apparatus, appropriate subclasses.
100, Presses, subclasses 43 through 52.
118, Coating Apparatus, subclasses 663 through 694.
137, Fluid Handling, appropriate subclasses.
141, Fluent Material Handling, With Receiver or Receiver Coacting Means, appropriate subclasses.
162, Paper Making and Fiber Liberation, appropriate subclasses and particularly subclasses 252 through 260.
165, Heat Exchange, subclasses 200 through 303.
172, Earth Working, subclasses 2 through 12.
173, Tool Driving or Impacting, subclasses 2 through 183.
177, Weighing Scales, appropriate subclasses.
187, Elevator, Industrial Lift Truck, or Stationary Lift for Vehicle, subclasses 247 through 248.
221, Article Dispensing, subclasses 9 through 14.
222, Dispensing, subclasses 52 through 69.
227, Elongated-Member-Driving Apparatus, subclasses 2 through 7.
228, Metal Fusion Bonding, subclass 102.
234, Selective Cutting (e.g., Punching), appropriate subclasses.
236, Automatic Temperature and Humidity Regulation, appropriate subclasses.
244, Aeronautics, appropriate subclasses.
251, Valves and Valve Actuation, appropriate subclasses.
290, Prime-Mover Dynamo Plants, subclasses 7 through 44.
299, Mining or In Situ Disintegration of Hard Material, subclasses 1.05 through 1.9.
318, Electricity: Motive Power Systems, appropriate subclasses.
323, Electricity: Power Supply or Regulation Systems, appropriate subclasses.
360, Dynamic Magnetic Information Storage or Retrieval, subclasses 69 through 80.
376, Induced Nuclear Reactions: Processes, Systems, and Elements, subclasses 100 through 152 and subclasses 207-244.
399, Electrophotography, subclasses 9 through 37 for diagnostics, subclasses 38-74 for controls of the electrophotographic process, and subclass 77 for sequential control programming of machine operation.
405, Hydraulic and Earth Engineering, appropriate subclasses.
408, Cutting by Use of Rotating Axially Moving Tool, subclasses 8 through 13.
409, Gear Cutting, Milling, or Planing, appropriate subclasses.
415, Rotary Kinetic Fluid Motors or Pumps, appropriate subclasses.
416, Fluid Reaction Surfaces (i.e., Impellers), appropriate subclasses.
417, Pumps, subclasses 1 through 47.
431, Combustion, subclasses 18 through 90.
432, Heating, appropriate subclasses.
436, Chemistry: Analytical and Immunological Testing, appropriate subclasses.
451, Abrading, subclasses 2 through 3 for a condition responsive control for sandblasting.
483, Tool Changing, subclasses 4 through 6 for apparatus including a tool transfer means combined with a tool support or storage means and a programmable control system.

2 Plural processors:

This subclass is indented under 1. Subject matter where more than one processor is used in a control system and at least one of the processors is programmable.

(1) Note. Classification herein requires active participation by the plural processors in the control system.

SEE OR SEARCH THIS CLASS, SUBCLASS:

82, for control systems having plural processors where one processor (standby) will follow the operation of the other processor (active) and takeover operation of the system on failure of the active processor.

3 Master-slave:
This subclass is indented under 2. Subject matter where one processor (master) controls one or more other processors (slave).

SEE OR SEARCH CLASS:
709, Electrical Computers and Digital Processing Systems: Multiple Computer or Process Coordinating, subclasses 208 through 211 for general purpose master/slave multicomputer data transfer.
710, Electrical Computers and Digital Processing Systems: Input/Output, subclass 110 for bus master/slave control.

4 Parallel:
This subclass is indented under 2. Subject matter where the plural processors operate independently with respect to each other and are connected to a common bus.

5 Shared memory:
This subclass is indented under 4. Subject matter where the plural processors share access to a common memory.

6 Hybrid types (analog, digital):
This subclass is indented under 2. Subject matter wherein at least one processor is of a different type (e.g., analog, digital) than at least one other processor.

SEE OR SEARCH CLASS:
708, Electrical Computers: Arithmetic Processing and Calculating, subclasses 1 through 9 for an electrical hybrid calculating computer.

7 Including sequence or logic processor:
This subclass is indented under 2. Subject matter where at least one of the processors performs sequence or logic functions.

8 Cascade control:
This subclass is indented under 1. Subject matter where the output of a primary controller is utilized to adjust the set point of a secondary controller.

9 Supervisory control:
This subclass is indented under 1. Subject matter where a central or host computer is used to control plural controllers.

SEE OR SEARCH CLASS:
340, Communications: Electrical, subclasses 3.1 through 3.9 for selective electrical communication having monitoring in addition to control (e.g., supervisory).

10 Of analog controllers:
This subclass is indented under 9. Subject matter where the controllers are analog and a particular characteristic of such as set point is adjusted.

(1) Note. A controller is a device which holds a process or condition at a desired level or status as determined by comparison of the actual value with the desired value.

11 Sequential or selective:
This subclass is indented under 1. Subject matter where output signals from a data processor or computer structure are sequentially or selectively applied to control a device or apparatus in a repetitive, orderly manner according to a predetermined schedule of operation.

(1) Note. Sequencing as a basic process is essentially digital in nature, the relationship being, for example, "on", "off" or "in", "out", etc.

SEE OR SEARCH THIS CLASS, SUBCLASS:
79+, for sequential and selective control systems having a diagnostic feature.

SEE OR SEARCH CLASS:
340, Communications: Electrical, subclasses 825 through 825.98 for selective electrical communication.
718, Electrical Computers and Digital Processing Systems: Virtual Machine Task or Process Management or Task Management/Control, appropriate subclasses for computer task management or control.

12 State of condition or parameter (e.g., on/off):
This subclass is indented under 11. Subject matter where input signals representative of a particular condition of a system to be controlled are analyzed and a comparison made with the predetermined conditions in the operation schedule and corresponding output signals produced.

13 Position responsive:
This subclass is indented under 12. Subject matter where the particular system condition or parameter is position, the control output signal being produced in response to a position responsive input signal.

14 Time responsive (duration):
This subclass is indented under 12. Subject matter where the particular system condition is time related, the output signal establishing a particular state (e.g., on/off) of such condition for a prescribed interval or duration.

SEE OR SEARCH CLASS:
307, Electrical Transmission or Interconnection Systems, subclass 41 for sequential or alternating selectively connected or controlled load circuits; and subclasses 141-141.8 for switch actuation with time delay or retardation means.
340, Communications: Electrical, subclass 309.4 for timer controlled systems including sequentially actuated indicators.

15 Having display:
This subclass is indented under 14. Subject matter where a visual indication related to a controlled time interval or duration is provided (e.g., time remaining).

SEE OR SEARCH CLASS:
116, Signals and Indicators, appropriate subclasses for mechanical indication, in general.
340, Communications: Electrical, subclasses 500 through 693.12 for condition responsive indication.
345, Computer Graphics Processing, Operator Interface Processing, and Selective Visual Display Systems, appropriate subclasses for visual display systems.

16 Clock-calendar (e.g., time of day):
This subclass is indented under 14. Subject matter where the time interval or duration is related to a 24-hour day and 7-day week schedule.

17 Operator interface (e.g., display with control):
This subclass is indented under 11. Subject matter including input/output means by which an operator may communicate with the control system.

SEE OR SEARCH THIS CLASS, SUBCLASS:
83+, for control systems of a general type including an operator interface feature.

SEE OR SEARCH CLASS:
116, Signals and Indicators, appropriate subclasses for mechanical indication, in general.
340, Communications: Electrical, subclass 3.71 for selective electrical communication having monitoring in addition to control (e.g., supervisory) and including an indicator which has manual control input and subclasses 500-693.12 for condition responsive indicating.
345, Computer Graphics Processing, Operator Interface Processing, and Selective Visual Display Systems, appropriate subclasses for visual display systems.

18 Specific programming (e.g., relay or ladder logic):
This subclass is indented under 17. Subject matter where a predetermined schedule of operation may be established directly by use of relay or ladder technology.

19 Plural controlled systems, mechanisms, or elements:
This subclass is indented under 11. Subject matter where there is more than one system

being controlled, or in which there is more than one communication being controlled, or where there is control of more than one element of a controlled system.

SEE OR SEARCH CLASS:
709, Electrical Computers and Digital Processing Systems: Multiple Computer or Process Coordinating, subclasses 200 through 253 for multiple computer data transfer systems.

20 Plural controllers:
This subclass is indented under 11. Subject matter where more than one device is used to control a system.

SEE OR SEARCH CLASS:
709, Electrical Computers and Digital Processing Systems: Multiple Computer or Process Coordinating, subclasses 200 through 253 for multiple computer data transfer systems.

21 Failure protection or reliability:
This subclass is indented under 11. Subject matter where there is a means or a step for increasing a conditional probability of correctly performing a service (e.g., control) throughout a time interval, given correct performance at the beginning of the interval, or for increasing the probability of correctly performing a service at any given instant.

SEE OR SEARCH CLASS:
361, Electricity: Electrical Systems and Devices, subclasses 1 through 138 for electrical (other than pulse coded data error) fault sensing and removal.
714, Error Detection/Correction and Fault Detection/Recovery, appropriate subclasses for computer failure protection and reliability, in general.

22 Electrical power distribution:
This subclass is indented under 11. Subject matter wherein the distribution of electrical power is controlled.

SEE OR SEARCH THIS CLASS, SUBCLASS:
286 through 298, for computers used in an electrical power distribution environment other than for control.

SEE OR SEARCH CLASS:
323, Electricity: Power Supply or Regulation Systems, appropriate subclasses for power regulation and supply systems, in general.

23 Sequence program response:
This subclass is indented under 11. Subject matter where the control system responds to an encoded, ordered list of instructions.

SEE OR SEARCH CLASS:
712, Electrical Computers and Digital Processing Systems: Processing Architectures and Instruction Processing (e.g., Processors), subclasses 200 through 248 for computer programming, in general.
718, Electrical Computers and Digital Processing Systems: Virtual Machine Task or Process Management or Task Management/Control, appropriate subclasses for computer task management or control.

24 Addressing:
This subclass is indented under 23. Subject matter including one or more values which specify one or more memory locations.

SEE OR SEARCH CLASS:
340, Communications: Electrical, subclasses 3.5 through 3.55 for selective electrical communication having monitoring in addition to control (e.g., supervisory) which includes addressing.
365, Static Information Storage and Retrieval, subclasses 230.01 through 243.5 for addressing means in static memories.
711, Electrical Computers and Digital Processing Systems: Memory, subclasses 1 through 6 and subclasses 200-221 for addressing in computer systems.

25 I/O table:
This subclass is indented under 23. Subject matter having means which stores, in an array, data related to input and output of the control system.

SEE OR SEARCH CLASS:

710, Electrical Computers and Digital Processing Systems: Input/Output, subclasses 1 through 74 for input/output data processing.

26 Diagnostics or debugging:

This subclass is indented under 23. Subject matter including means to diagnose malfunctions in the control system.

SEE OR SEARCH CLASS:

714, Error Detection/Correction and Fault Detection/Recovery, subclasses 1 through 57 for computer reliability.

717, Data Processing: Software Development, Installation, and Management, subclasses 124 through 135 for analysis or debugging in a software development tool.

27 Having status indication:

This subclass is indented under 23. Subject matter having a human perceptible representation of information about the process being controlled or the controller.

SEE OR SEARCH CLASS:

116, Signals and Indicators, appropriate subclasses for mechanical indication, in general.

340, Communications: Electrical, subclasses 3.7 and 3.71 for selective electrical communication having monitoring in addition to control (e.g., supervisory) which includes an indicator and subclasses 500-693.12 for condition responsive indicating.

345, Computer Graphics Processing, Operator Interface Processing, and Selective Visual Display Systems, appropriate subclasses for visual display systems.

28 Optimization or adaptive control:

This subclass is indented under 1. Subject matter where a control seeks to optimize a system performance criterion (e.g., efficiency, consumption, or profit).

(1) Note. Also included here are adaptive systems which include means to modify governing criteria, simply or in a complex fashion to achieve better system performance, stability, speed of response sensitivity, etc. The object of an adaptive system is to provide means for establishing relatively fixed system dynamics for a control system comprising a controlled element having varying dynamics. Some adaptive systems include an optimization technique wherein the system seeks to maximize or minimize a system variable or are of the self-organizing type.

SEE OR SEARCH CLASS:

318, Electricity: Motive Power Systems, subclass 561 for positional servo adaptive or optimization control systems.

29 Having model:

This subclass is indented under 28. Subject matter which includes a mathematical model.

SEE OR SEARCH THIS CLASS, SUBCLASS:

44, where a mathematical model representative of a desired control response is used in a feed forward or predictive control system.

30 Comparison with model (e.g., model reference):

This subclass is indented under 29. Subject matter where a measured process output signal is compared with an output from the model to develop an error signal which is used to control the process.

SEE OR SEARCH CLASS:

703, Data Processing: Structural Design, Modeling, Simulation, and Emulation, subclass 2 for generic modeling by mathematical expression.

31 Having adjustment of model (e.g., update):

This subclass is indented under 29. Subject matter where the model is adjusted (e.g., updated) in response to changing conditions of the control system.

32 Specific criteria of system performance:

This subclass is indented under 28. Subject matter where a particular characteristic of a system is utilized in the optimization operation.

33 Constraint or limit (e.g., max/min):
This subclass is indented under 32. Subject matter where constraints are placed on the excursion of a system variably from a predetermined value.

SEE OR SEARCH THIS CLASS, SUBCLASS:
80, for protection or reliability features which provide an indication of the variation of a control system condition from a limit value.

SEE OR SEARCH CLASS:
702, Data Processing: Measuring, Calibrating, or Testing, subclass 82 for quality control determination where limit values of acceptable product quality are established.

34 Variable:
This subclass is indented under 33. Subject matter where the constraints or limits are adjustable.

35 Bidirectional (e.g., oscillatory):
This subclass is indented under 33. Subject matter where a control signal will travel in one direction to search out a maximum or minimum value and will reverse direction on reaching said maximum or minimum value to search out the other of the maximum or minimum value.

36 Economic (e.g., cost):
This subclass is indented under 33. Subject matter where the constraint or limit value involves an economic consideration such as minimization of cost.

37 Gain (e.g., tuning):
This subclass is indented under 32. Subject matter where the specific criteria of plant performance is system gain.

38 Having perturbation:
This subclass is indented under 28. Subject matter where the optimization is performed by disturbing the system dynamics and analyzing the system response to such disturbance.

39 Test signal:
This subclass is indented under 38. Subject matter where the disturbance is introduced into the system from an external source such as by the injection of a test signal with the system response to such disturbance being analyzed and the system dynamics adjusted to achieve an optimum.

SEE OR SEARCH CLASS:
702, Data Processing: Measuring, Calibrating, or Testing, subclasses 108 through 126 for general data processing testing systems.

40 Plural modes:
This subclass is indented under 28. Subject matter where the system automatically shifts to different modes of operation depending on system conditions.

SEE OR SEARCH THIS CLASS, SUBCLASS:
75, for control system of a general type which operates in multiple modes.

41 Proportional-Integral (P-I):
This subclass is indented under 40. Subject matter where a system will shift from proportional control to a combination of proportional and integral (reset) when there is a substantial excursion of a variable.

SEE OR SEARCH CLASS:
318, Electricity: Motive Power Systems, subclass 609 for positional servo systems which operate in a proportional-integral or reset mode.

42 Proportional-Integral-Derivative (P-I-D):
This subclass is indented under 41. Subject matter where the system will shift from proportional to a combination of proportional, integral (reset) and derivative (rate) dependent on system conditions.

(1) Note. Rate control is added to proportional-integral systems to prevent reset windup (antireset windup).

SEE OR SEARCH CLASS:
318, Electricity: Motive Power Systems, subclass 610 for positional servo systems which add rate control to a proportional-integral system to provide proportional-integral-derivative (P-I-D) operation.

43 Proportional-Derivative (P-D):
This subclass is indented under 40. Subject matter where the system shifts from proportional control to a combination of proportional and derivative control.

44 Feed-forward (e.g., predictive):
This subclass is indented under 28. Subject matter where disturbances affecting the system are anticipated and compensating signals are generated in order to negate these disturbances.

45 Combined with feedback:
This subclass is indented under 44. Subject matter where a feedback (error) signal from the controlled system is utilized to develop the feed-forward signal.

46 Rate control:
This subclass is indented under 28. Subject matter where the rate of change of a system variable or error signal is utilized to achieve optimization.

47 Trainable system (e.g., self-learning, self-organizing):
This subclass is indented under 28. Subject matter including a system which changes, or is changeable, according to the experience gained during its operation.

SEE OR SEARCH CLASS:
382, Image Analysis, subclasses 159 through 161 for trainable pattern recognition.
706, Data Processing: Artificial Intelligence, subclass 14 for adaptive artificial intelligence computer systems.

48 Neural network:
This subclass is indented under 47. Subject matter wherein the system uses parallel-distributed processors constructed in hardware or simulated in software.

SEE OR SEARCH CLASS:
382, Image Analysis, subclass 158 for a neural network structure in pattern recognition.
706, Data Processing: Artificial Intelligence, subclasses 15 through 44 for a neural network, per se.

49 Expert system:
This subclass is indented under 28. Subject matter wherein the system is comprised of at least (a) a knowledge base, (b) an inference engine, and (c) a user interface and contains both declarative knowledge (i.e., a fact about an object, event, or situation) and procedural knowledge (i.e., information about a course of action) to emulate the reasoning processes of a human expert in a particular area of expertise.

SEE OR SEARCH THIS CLASS, SUBCLASS:
104, for use of an expert system for design or planning of product manufacturing.

SEE OR SEARCH CLASS:
706, Data Processing: Artificial Intelligence, subclasses 45 through 61 for an expert system computer system.

50 Fuzzy logic:
This subclass is indented under 28. Subject matter wherein a decision mechanism uses probabilistic or statistical technique (e.g., "IF X is very large THEN...").

SEE OR SEARCH THIS CLASS, SUBCLASS:
51, for statistical process control.

SEE OR SEARCH CLASS:
326, Electronic Digital Logic Circuitry, appropriate subclasses for logic circuits, per se.
701, Data Processing: Vehicles, Navigation, and Relative Location, subclass 27 for a fuzzy logic automatic vehicle route guidance.
706, Data Processing: Artificial Intelligence, subclasses 1 through 9, subclass 52, and subclass 900 for a fuzzy logic system.

51 Statistical process control (SPC):
This subclass is indented under 28. Subject matter which monitors the performance of a process in terms of its target value and involved variability and uses statistical methods to control said process.

SEE OR SEARCH THIS CLASS, SUBCLASS:
50, for process control with fuzzy logic.

SEE OR SEARCH CLASS:
702, Data Processing: Measuring, Calibrating, or Testing, subclasses 179 through 181 for measuring or testing statistical data.

52 Parameter estimation or identification:
This subclass is indented under 28. Subject matter where the value of a variable being controlled is determined approximately.

53 Multiple input-multiple output (MIMO) system feature (e.g., decoupling):
This subclass is indented under 28. Subject matter having more than one input and more than one output.

54 Having particular compensation or stabilization feature:
This subclass is indented under 28. Subject matter which includes making a correction or regulation of a variable being controlled.

SEE OR SEARCH CLASS:
702, Data Processing: Measuring, Calibrating, or Testing, subclasses 85 through 107 for measuring and testing with compensation and particularly subclass 86 for linearization of measuring or testing.

55 Filtering:
This subclass is indented under 54. Subject matter wherein data or a signal is separated from another data or signal in accordance with a specified criteria.

SEE OR SEARCH CLASS:
708, Electrical Computers: Arithmetic Processing and Calculating, subclasses 300 through 323 for digital filtering, in general and subclass 819 for filtering using analog data processing.

56 Digital positioning (other than machine tool):
This subclass is indented under 1. Subject matter where the positioning of a control system member is controlled by a programmed digital computer utilizing numerical values, digital signals, or coded pulses which correspond to desired position of control.

(1) Note. The numerical values or digital signals comprise one or more discrete symbols which may form a code.

(2) Note. Positional servo control systems are classified elsewhere; however, the combination of a positional servo system with a programmable digital computer is classified here.

(3) Note. Positional servo control systems incorporating a nonprogrammable computer are classified elsewhere.

(4) Note. Machine tool digital positioning is classified elsewhere.

SEE OR SEARCH THIS CLASS, SUBCLASS:
159 through 195, for digital positioning as applied to machine tool control systems.

SEE OR SEARCH CLASS:
318, Electricity: Motive Power Systems, subclasses 560 through 689 for positional servo control systems.
701, Data Processing: Vehicles, Navigation, and Relative Location, subclasses 1 through 124 for vehicle positioning control systems.

57 Alignment or registration:
This subclass is indented under 56. Subject matter with means to cause precise adjustment or correction of relative position.

58 Having position marking:
This subclass is indented under 57. Subject matter having a physical indication to show a precise location.

59 Having optical sensing (e.g., image projection):
This subclass is indented under 57. Subject matter where alignment or registration is achieved by means of light detecting.

SEE OR SEARCH CLASS:
250, Radiant Energy, subclasses 200 through 239 for a photocell circuit or apparatus.
327, Miscellaneous Active Electrical Nonlinear Devices, Circuits, and Systems, subclass 187, subclasses 369-371, and subclasses 514-515 for nonlinear optical sensors (e.g., solid state).
330, Amplifiers, subclass 59 for a light controlled or activated amplifier.
331, Oscillators, subclass 66 for a light responsive oscillator.
338, Electrical Resistors, subclasses 15 through 19 for a photoconductive resistor.
340, Communications: Electrical, subclass 555 for a light responsive alarm.
353, Optics: Image Projectors, appropriate subclasses for an image projector.
358, Facsimile, appropriate subclasses for facsimile.
359, Optics: Systems (Including Communication) and Elements, appropriate subclasses for optical systems, per se.

60 Support positioning (e.g., table, stage):
This subclass is indented under 56. Subject matter where an object holder or foundation is placed in a given location or orientation.

SEE OR SEARCH CLASS:
248, Supports, appropriate subclasses for tables and supports.

61 Multiple axis motion or path control:
This subclass is indented under 56. Subject matter where there is a linear controlled change of position or orientation along more than one axis.

62 Orientation (e.g., posture, pose):
This subclass is indented under 61. Subject matter where the position of an object is rotated about one of its axes.

63 Including velocity or acceleration control:
This subclass is indented under 61. Subject matter having control of the rate of change of the position of an object or derivative thereof.

SEE OR SEARCH THIS CLASS, SUBCLASS:
188, for digital positioning including velocity or acceleration control in a computer controlled machining operation.

64 Position recording:
This subclass is indented under 61. Subject matter wherein data about a location is preserved.

SEE OR SEARCH THIS CLASS, SUBCLASS:
47+, for adaptive control systems with teaching features.

SEE OR SEARCH CLASS:
360, Dynamic Magnetic Information Storage or Retrieval, appropriate subclasses for dynamic recording upon a magnetic medium.
365, Static Information Storage and Retrieval, appropriate subclasses for static information recording.
369, Dynamic Information Storage or Retrieval, appropriate subclasses for dynamic recording, per se.

65 Operator control of remotely located element:
This subclass is indented under 56. Subject matter where a human operator controls a distant element of a device or apparatus under control.

66 Having particular position determining apparatus (e.g., portable or handheld):
This subclass is indented under 56. Subject matter having a particular means for determining a location of an element of a device or apparatus under control.

SEE OR SEARCH THIS CLASS, SUBCLASS:
59, for optical alignment sensing.

67 Plural variables:
This subclass is indented under 1. Subject matter wherein plural sensed conditions or plural signals developed from a single sensed condition are utilized to generate a control system signal.

68 Ratio:
This subclass is indented under 67. Subject matter where the quotient of the variables is used as a control signal.

69 Positional (e.g., velocity, acceleration):
This subclass is indented under 67. Subject matter where the plural variables are positional variables.

(1) Note. Plural variables derivable from a single measurement, such as velocity and acceleration, which are the first and second derivatives of position, are considered plural variables.

70 Positional with nonpositional:
This subclass is indented under 69. Subject matter where one of the variables is a position, speed, or acceleration signal and the other variable is not one of the above signals.

71 Specific compensation or stabilization feature:
This subclass is indented under 1. Subject matter where particular compensation techniques are utilized to achieve system stability.

SEE OR SEARCH CLASS:
318, Electricity: Motive Power Systems, subclasses 611 through 624 for positional servo systems with stabilizing features.

72 Lag (e.g., deadtime):
This subclass is indented under 71. Subject matter where the delay between the development and generation of a system control signal and the actual application of such control signal is compensated.

SEE OR SEARCH CLASS:
318, Electricity: Motive Power Systems, subclass 621 for positional servo systems with stabilizing features including lead or lag networks.

73 Sampled data system:
This subclass is indented under 1. Subject matter where only a sample of a signal is used in the process of deriving a control signal.

(1) Note. The "sample" may be a series of samples generated from a continuous analog signal.

74 Variable rate:
This subclass is indented under 73. Subject matter where the sampled data is not generated at a constant rate.

75 Multiple modes (e.g., digital/analog):
This subclass is indented under 1. Subject matter where the control system has more than one mode by which it can be controlled.

SEE OR SEARCH THIS CLASS, SUBCLASS:
40, for control systems operating in plural modes to perform an optimization function.

76 Manual/automatic:
This subclass is indented under 75. Subject matter where one mode of control is by a manual means and the other mode is automatic.

77 Fine/coarse:
This subclass is indented under 75. Subject matter where application of a control signal in the "coarse" mode results in a system response of a relatively large magnitude or increments of magnitude and in the "fine" mode results in a system response of a relatively small or more precise magnitude or increments of magnitude.

(1) Note. An example of such a system is a positional system wherein an element to be positioned is moved at high speeds in the "coarse" mode until it reaches a predetermined position wherein the system shifts to the "fine" mode and the element is moved at lower speeds or at smaller

positioned increments until it reaches its final destination.

SEE OR SEARCH CLASS:

318, Electricity: Motive Power Systems, subclasses 592 through 595 for positional servo systems which operate in the fine and coarse modes.

78 Having specific error signal generation (e.g., up/down counter):

This subclass is indented under 1. Subject matter where a specific apparatus or technique is utilized to develop an error signal to be applied to control a system.

79 Having protection or reliability feature:

This subclass is indented under 1. Subject matter relating to the protection and reliability of the control system.

SEE OR SEARCH CLASS:

361, Electricity: Electrical Systems and Devices, subclasses 1 through 138 for safety and protection of devices which do not include data processing.

714, Error Detection/Correction and Fault Detection/Recovery, subclasses 1 through 57 for reliability and availability including fault detecting, monitoring, locating, and recovery in a digital data processing system.

80 Warning or alarm:

This subclass is indented under 79. Subject matter where a visual or aural indication is provided in response to the detection of a variation in a control system condition from a limit value.

SEE OR SEARCH THIS CLASS, SUBCLASS:

33, for optimizing or adaptive control systems where limits or constraints are placed on the excursion of a control variable.

SEE OR SEARCH CLASS:

340, Communications: Electrical, subclasses 500 through 693.12 for condition responsive systems including alarms.

81 Self-test:

This subclass is indented under 79. Subject matter where the controlled system has provisions for internally initiating a check of system conditions.

82 Backup/standby:

This subclass is indented under 79. Subject matter where the controlled system includes a spare or backup control device which automatically assumes control of the system in response to the failure of the primary control devices.

SEE OR SEARCH CLASS:

711, Electrical Computers and Digital Processing Systems: Memory, subclasses 161 through 162 for general purpose memory accessing and control data archiving techniques in digital data processing system (i.e., for example, copying data, relocating data, etc.).

714, Error Detection/Correction and Fault Detection/Recovery, subclasses 3 through 14 for fault recovery including masking or reconfiguring, per se, in a digital data processing system.

83 Having operator control interface (e.g., control/display console):

This subclass is indented under 1. Subject matter including input/output means by which an operator may communicate with the control system.

SEE OR SEARCH THIS CLASS, SUBCLASS:

17, for sequential or selective control systems having an operator interface feature.

264, for robot control with particular operator interface.

SEE OR SEARCH CLASS:

345, Computer Graphics Processing, Operator Interface Processing, and Selective Visual Display Systems, subclasses 700 through 866 for display operator interface.

84 Keyboard:
This subclass is indented under 83. Subject matter where the particular input apparatus include manual operator actuated devices having a symbolic language meaning.

85 Positional (e.g., joystick):
This subclass is indented under 83. Subject matter where the particular input apparatus utilized by the operator provides positional control of a system variable.

86 Having preparation of program:
This subclass is indented under 1. Subject matter which includes means for initially producing a control program to which the controlled system subsequently responds.

SEE OR SEARCH THIS CLASS, SUBCLASS:
245 through 264, for robot arm control program preparation.

SEE OR SEARCH CLASS:
318, Electricity: Motive Power Systems, subclasses 568.1 through 568.25 for program or pattern-controlled positional servo systems with program recording or composing means.
717, Data Processing: Software Development, Installation, and Management, subclasses 100 through 167 for a software program development tool.
901, Robots, subclasses 3 through 5 for programming systems for computer controlled robots.

87 Editing/modifying:
This subclass is indented under 86. Subject matter including provisions for altering or modifying a previously established control program.

SEE OR SEARCH THIS CLASS, SUBCLASS:
250 through 257, for robot control with program modification.

88 Playback:
This subclass is indented under 86. Subject matter where a control system member is manually controlled through a cycle of operation during which its conditions are recorded for subsequent reproduction through the same cycle.

89 Having specific algorithm:
This subclass is indented under 1. Subject matter which includes a set of rules or processes for solving a problem.

90 SPECIFIC APPLICATION, APPARATUS OR PROCESS:
Subject matter wherein a data processing or calculating computer apparatus (or corresponding method for performing data processing or calculating operation) is designed for or utilized in a particular art device, system, process or environment, or is utilized for the solution of a particular problem in a field other than mathematics (arithmetic processing per se is classified elsewhere).

(1) Note. For classification herein, there must be significant claim recitation of the data processing system or calculating computer and only nominal claim recitation of the external art environment. Where significant structure of the external device is recited by the claims, classification is in the appropriate device class.

(2) Note. This and indented subclasses will accommodate devices, systems, or processes which claim a control of or a control by a particular art device or environment and do not have a generic claim to the control; see the "Generic Control" area of this class for generic control devices.

(3) Note. Particular structural features rather than environmental or "use" considerations is found elsewhere.

(4) Note. In view of the nature of the subject matter included herein, consideration of the classification schedule for the diverse art or environment is necessary for proper search.

SEE OR SEARCH CLASS:
235, Registers, subclasses 375 through 386 for record-sensing devices that may be combined with calculators or data processing systems and utilized for a

specific purpose; and subclasses 419-434 for record-controlled calculators wherein the calculation is performed by mechanical or electromechanical means.

705, Data Processing: Financial, Business Practice, Management, or Cost/Price Determination, subclasses 1 through 45 for a business or financial transaction data processing system.

708, Electrical Computers: Arithmetic Processing and Calculating, appropriate subclasses for electrical arithmetic processing.

91 Contest or contestant analysis, management, or monitoring (e.g., statistical analysis, handicapping, scoring)

This subclass is indented under 90. Subject matter wherein data pertaining to a competition involving physical skill or ability (e.g., an athletic event, etc.), data pertaining to a competition of strategy or chance, or data pertaining to a participant (i.e., contestant) in such a competition, is collected, characterized, or otherwise manipulated for the purpose of determining a state of, a characteristic of, or a condition of the competition or contestant.

(1) Note. This is the residual classification for this subject matter. Thus, all other possible subclasses should be excluded, with special consideration given to the areas listed below, before placement of an original in this or indented subclasses.

(2) Note. If there is recited any element or act of competition, classification in an appropriate class providing for that subject matter should be the preferred classification. For example, although this or an indented subclass provides for scoring, probability determination, or handicapping, per se, an act of or means for determining a winner, or an act of or means for wagering, etc., is considered to be a contest element or act that is significant for placement elsewhere. Also, a method or means for monitoring, for example, projectile movement about a game court, etc., should be placed in an appropriate area, elsewhere, if the projectile or any element of the game court, etc., is positively recited, even if only nominally so.

SEE OR SEARCH CLASS:

116, Signals and Indicators, particularly subclasses 222 through 225 for mechanical game type indicators.

235, Registers, particularly subclass 1 for a game counter, and subclass 61 for an odds-computing calculator.

250, Radiant Energy, appropriate subclass for use of radiant energy to detect an article, especially subclasses 200 through 239 where a photocell circuit is used.

273, Amusement Devices, Games, appropriate subclass for data processing combined with a recited element or act of competition not provided for in Classes 463 or 473. (Class 273 is in the process of being abolished, with the subject matter going to Classes 463 or 473). See especially subclass 274 for a betting or wagering board, and subclasses 138.1-138.5 for a chance device.

340, Communications: Electrical, for an electrical indicator or annunciator (e.g., scoreboard, etc.), particularly subclass 323 for game reporting, and subclasses 988-996 for a vehicle position indicator.

356, Optics: Measuring and Testing, for measuring or monitoring with visible light, particularly subclasses 3 through 22 for range or remote distance measuring.

377, Electrical Pulse Counters, Pulse Dividers, or Shift Registers: Circuits and Systems, subclass 4 for a betting totalizer, and subclass 5 for a game or sport.

463, Amusement Devices: Games, subclasses 1 through 47 for a "non-projectile" game (e.g., computer/video game), a propelled racing game, a chance game (including wagering), a puzzle, or fortune-telling subject matter including electronic data processing.

472, Amusement Devices, for a specific structure relating to an amusement device appropriate therefor.

473, Amusement Devices: Games, appropriate subclasses for a game - other than a propelled racing game or a chance device - that includes both a tangible projectile and electronic data processing.

482, Exercise Devices, appropriate subclasses and particularly subclasses 1 through 9 for specific structure relating to an exercise device appropriate therefor and having a specific electrical feature which may include a computer, computer-related circuitry, display, feedback, or software.

600, Surgery, subclasses 300 through 595 for monitoring or diagnosing a medical condition of a contestant.

705, Data Processing: Financial, Business Practice, Management, or Cost/Price Determination, subclass 14 for an automated financial or business practice or management system including a distribution or redemption of a coupon, or an incentive, or promotion program, where the coupon, incentive, or promotion is based upon a criteria other than a random or chance event.

92 Scoring:

This subclass is indented under 91. Subject matter wherein the number of points, or other grading or rating used to determine the winner of a competition, is calculated or determined from the data.

(1) Note. Scoring combined with recitation of any other contest element or competitive act should be placed in the appropriate area that provides for the element or act, even if the combined element is nominally recited. For example, scoring combined with a positively recited target, court, etc., should be placed in the appropriate class that provides for the combined element.

SEE OR SEARCH CLASS:

116, Signals and Indicators, particularly subclasses 222 through 225 for mechanical game-type scoring indicators.

235, Registers, especially subclass 1 for game counters.

340, Communications: Electrical, for an electrical indicator or annunciator (e.g., scoreboard, etc.), particularly subclass 323 for game reporting.

377, Electrical Pulse Counters, Pulse Dividers, or Shift Registers: Circuits and Systems, subclass 4 for a betting totalizer, and subclass 5 for a game or sport.

93 Probability determination or handicapping:

This subclass is indented under 91. Subject matter wherein the likelihood of an event, condition, or outcome happening in a competitive event is computed, or wherein a hindrance is given to a superior contestant-or an advantage is given to an inferior contestant-based upon data pertaining to the relative strength or weakness of the contestants.

(1) Note. Probability determination or handicapping combined with any recitation of another game element or competitive act (e.g., wagering) should be placed in the appropriate area for that subject matter.

SEE OR SEARCH CLASS:

235, Registers, subclass 61 for an odds-computing calculator.

273, Amusement Devices, Games, appropriate subclasses, for data processing combined with a recited element or act of competition not provided for in Classes 463 or 473. (Class 273 is in the process of being abolished, with the subject matter going to Classes 463 or 473). See especially subclass 274 for a betting or wagering board, subclasses 138.1138.5 for a chance device, and subclasses 292-308 for a card or tile game.

377, Electrical Pulse Counters, Pulse Dividers, or Shift Registers: Circuits and Systems, subclass 4 for a betting totalizer, and subclass 5 for a game or sport.

463, Amusement Devices: Games, subclasses 1 through 47 for a nonprojectile game (e.g., computer/video game), a propelled racing game, a chance game (including wagering), a puzzle, or fortune-telling subject matter including electronic data processing.

94 Digital audio data processing system:
This subclass is indented under 90. Subject matter wherein the particular art or field is the processing of digital data which represents an audio signal.

(1) Note. This subclass is limited solely to audio data processing systems that are not classified elsewhere.

(2) Note. An "audio signal" is an electrical signal which represents spoken or other sounds which vary with time, and may be in digital or analog form (this form implies a conversion to digital form before the digital data processing).

(3) Note. Nominal recitation of "audio" is not sufficient to afford classification herein of an invention which would be otherwise classified elsewhere.

SEE OR SEARCH CLASS:

27, Undertaking, subclass 31 for systems adapted for communication with entombed persons.

73, Measuring and Testing, subclasses 584 through 648 for measuring sound waves, especially subclass 585 for ear or hearing testing by soundwaves and subclasses 646-648 for measuring sound intensity.

84, Music, subclasses 600 through 746 for electronic musical instruments.

181, Acoustics, appropriate subclasses for mechanical audio systems.

330, Amplifiers, appropriate subclasses for amplifiers not having specific input signals or specific loads.

340, Communications: Electrical, appropriate subclasses for electrical communications, in general.

367, Communications, Electrical: Acoustic Wave Systems and Devices, subclass 132 for underwater speech transmission by an acoustic wave; subclasses 140-190 for an acoustic transducer not related to speech signal conversion.

369, Dynamic Information Storage or Retrieval, appropriate subclasses for storing and retrieving sound signals.

370, Multiplex Communications, appropriate subclasses for multiplex communications.

381, Electrical Audio Signal Processing Systems and Devices, appropriate subclasses.

455, Telecommunications, appropriate subclasses for modulated carrier wave speech communications.

505, Superconductor Technology: Apparatus, Material, Process, subclasses 150 through 239 for high temperature (Tc 30 K) superconducting devices, and particularly subclass 202 for electric communication system containing transmitter or receiver of pulse, digital, or electromagnetic radio, television, or radar waveform; and subclass 203 for electroacoustic transducer.

600, Surgery, subclass 559 for diagnostic audiometers (ear or testing by auditory stimulus).

623, Prosthesis (i.e., Artificial Body Members), Parts Thereof, or Aids and Accessories Therefor, subclass 9 for mechanical artificial larynxes.

704, Data Processing: Speech Signal Processing, Linguistics, Language Translation, and Audio Compression/ Decompression, subclasses 200 through 278 for speech signal processing using a computer, subclasses 500-502 for audio signal bandwidth compression or expansion, and subclasses 503-504 for audio signal time compression or expansion (e.g., run length coding).

95 Product assembly or manufacturing:
This subclass is indented under 90. Subject matter wherein the data processing system or calculating computer controls, monitors, or manages the sequential operations of a production process.

SEE OR SEARCH CLASS:

12, Boot and Shoe Making, subclass 142 for the process of boot and shoe making.

29, Metal Working, appropriate subclass, especially subclasses 592 through 559 for method of mechanical manufacture.

53, Package Making, appropriate subclass for an apparatus for and method of encompassing, encasing, or completely surrounding goods or materials with a cover made from sheet material stock.

56, Harvesters, appropriate subclass for a means of severing crops which grow above the surface of the ground, without disturbing the soil, and a means for gathering the same from the field after they are severed.

59, Chain, Staple, and Horseshoe Making, appropriate subclass for the manufacture as it relates to chains, staples, or horseshoes.

79, Button Making, appropriate subclass for machines or processes for making buttons.

118, Coating Apparatus, subclasses 663 through 714 for the control of an apparatus for applying or obtaining a surface coating on a base or for impregnating base materials.

142, Wood Turning, appropriate subclasses for wood turning.

144, Woodworking, subclasses 329 through 381 for woodworking processes.

156, Adhesive Bonding and Miscellaneous Chemical Manufacture, subclasses 1 through 344 for a manufacturing process or apparatus including a step of adhesively bonding parts together or the manufacture of articles of commerce in which one of the manufacturing steps includes a chemical reaction.

162, Paper Making and Fiber Liberation, subclasses 100 through 231 for the process of paper making.

163, Needle and Pin Making, subclasses 1 through 5 for needle or pin manufacturing.

216, Etching a Substrate: Processes, appropriate subclasses for the manufacturing of a substrate by etching.

234, Selective Cutting (e.g., Punching), appropriate subclass for a method or apparatus for a selective cutting process.

264, Plastic and Nonmetallic Article Shaping or Treating: Processes, appropriate subclass.

300, Brush, Broom, and Mop Making, subclass 21 for the process of manufacturing.

340, Communications: Electrical, subclasses 3.1 through 3.9 for selective electrical communication having monitoring in addition to control (e.g., supervisory).

412, Bookbinding: Process and Apparatus, subclasses 1 through 8 for the process of bookbinding.

427, Coating Processes, appropriate subclass for applying or obtaining a coating or surface.

96 Integrated system (Computer Integrated Manufacturing (CIM)):

This subclass is indented under 95. Subject matter wherein the sequential operations of multiple manufacturing processes are interconnected by a host management system (e.g., Production Integrated Processing Equipment (PIPE), cluster tools, etc.).

97 Design or planning:

This subclass is indented under 95. Subject matter wherein the calculating computer or data processing system analyzes, prioritizes, or modifies input data to arrange the sequential operations for product manufacturing or to configure a product.

SEE OR SEARCH CLASS:

703, Data Processing: Structural Design, Modeling, Simulation, and Emulation, subclass 1 for a data processing system or calculating computer designed for or utilized in structural design as it relates to mechanical engineering.

706, Data Processing: Artificial Intelligence, cross-reference art collections 919+ related to the designing of objects, plan preparation, program preparation, computer aided design (i.e., CAD), or computer aided software engineering (i.e., CASE).

716, Data Processing: Design and Analysis of Circuit or Semiconductor Mask, subclasses 1 through 18 for a data processing system or calculating computer designed for or utilized in the design and analysis of electrical components and circuits made up thereof.

98 3-D product design (e.g., solid modeling):
This subclass is indented under 97. Subject matter wherein the planned or designed structure is represented as a three dimensional image in two-dimensional space.

SEE OR SEARCH THIS CLASS, SUBCLASS:
163, for 3-D sculpturing in the machining process.

SEE OR SEARCH CLASS:
345, Computer Graphics Processing, Operator Interface Processing, and Selective Visual Display Systems, subclasses 418 through 475 and subclass 607 for three-dimensional or perspective data processing for display presentation.
359, Optics: Systems (Including Communication) and Elements, subclass 458 for stereoscopic or three-dimensional imaging.
382, Image Analysis, subclass 154 for 3-D or stereo image analysis.

99 Resource allocation:
This subclass is indented under 97. Subject matter wherein the data processing system or calculating computer control the coordination and logistics of physical objects in a manufacturing process.

SEE OR SEARCH THIS CLASS, SUBCLASS:
28 through 55, wherein a control seeks to optimize a system's performance criterion (e.g., efficiency, consumption, or profit).

SEE OR SEARCH CLASS:
705, Data Processing: Financial, Business Practice, Management, or Cost/Price Determination, subclass 8 for allocation of resources or scheduling an administrative function by an automated business or management system.

100 Job scheduling:
This subclass is indented under 99. Subject matter wherein the coordination of the physical object is controlled by a system constraint (e.g., time, machine availability, etc.).

SEE OR SEARCH CLASS:
234, Selective Cutting (e.g., Punching), subclasses 23 through 24 for a means to detect the order of occurrence of input data.

101 Priority ordering:
This subclass is indented under 100. Subject matter wherein the data processing system or calculating computer operates in a supervisory mode to order the sequential operations.

102 Job release determination:
This subclass is indented under 100. Subject matter wherein the data processing system or calculating computer monitors and controls the sequence of manufacturing operations based on task output.

103 Constraints or rules:
This subclass is indented under 97. Subject matter wherein the data processing system or calculating computer monitors and controls the sequence of manufacturing operations based on a set of operating rules or regulations.

104 Knowledge based (e.g., expert system):
This subclass is indented under 103. Subject matter wherein the data processing system or calculating computer generates, monitors, modifies, or controls the sequential manufacturing operations using historical data to infer a result.

SEE OR SEARCH THIS CLASS, SUBCLASS:
49, for an expert system (e.g., knowledge based) control system.

SEE OR SEARCH CLASS:
706, Data Processing: Artificial Intelligence, subclass 14 for adaptive systems, cross-reference art collections 902-934 for art related to the applications of artificial intelligence, in particular cross reference art collection 904 wherein artificial intelligence is used in applications related to manufacturing and machines.

105 Rework or engineering change:
This subclass is indented under 97. Subject matter wherein the data processing system or calculating computer monitors and controls the sequence of manufacturing operations based on engineering or manufacturing changes.

106 Material requirement:
This subclass is indented under 97. Subject matter wherein the data processing system or calculating computer monitors and controls the sequence of manufacturing operations based on the necessary construction components.

107 Bill of material:
This subclass is indented under 106. Subject matter wherein the data processing system or calculating computer uses or creates a list of components for use in the product manufacturing design or planning.

SEE OR SEARCH CLASS:
705, Data Processing: Financial, Business Practice, Management, or Cost/Price Determination, subclass 29 for an itemization of parts, supplies, or services (e.g., bill of materials) other than in combination with manufacturing.

108 Performance monitoring:
This subclass is indented under 95. Subject matter wherein the data processing system or calculating computer receives information on the various quantitative variables associated with the assembly process.

SEE OR SEARCH CLASS:
340, Communications: Electrical, subclasses 3.43 and 3.44 for selective electrical communication having monitoring in addition to control (e.g., supervisory) which has a fault condition detection and subclass 3.71 for selective electrical communication having monitoring in addition to control (e.g., supervisory) which includes an indicator having manual control input.
702, Data Processing: Measuring, Calibrating, or Testing, subclasses 182 through 186 for performance or efficiency evaluation.

109 Quality control:
This subclass is indented under 108. Subject matter wherein the data processing system or calculating computer performs a statistical analysis of a manufactured product or manufacturing process and compares the results to predetermined specifications or parameters.

SEE OR SEARCH THIS CLASS, SUBCLASS:
32, for a data processing system or calculating computer designed for utilizing specific criteria of system performance.

SEE OR SEARCH CLASS:
702, Data Processing: Measuring, Calibrating, or Testing, subclass 84 for quality control determination.

110 Defect analysis or recognition:
This subclass is indented under 109. Subject matter wherein the data processing system or calculating computer detects or rectifies discrepancies in the manufacturing process or manufactured product.

111 Worker or work station efficiency:
This subclass is indented under 108. Subject matter wherein the data processing system or calculating computer analyzes statistical information based on employee performance or manufacturing area.

SEE OR SEARCH CLASS:
702, Data Processing: Measuring, Calibrating, or Testing, subclasses 182 through 186 for performance or efficiency evaluation.

112 Having particular work transport control between manufacturing stations:
This subclass is indented under 95. Subject matter wherein the data processing system or calculating computer controls the movement of assembly components or manufactured goods from one location to another.

SEE OR SEARCH THIS CLASS, SUBCLASS:
228, for a particular work transport between article handling stations.

SEE OR SEARCH CLASS:

193, Conveyors, Chutes, Skids, Guides, and Ways, appropriate subclass for a device for guiding material either vertically, horizontally, or at an inclination.

198, Conveyors: Power-Driven, appropriate subclass for a power-driven conveyor for moving a load over a predetermined path or path section.

113 Mobile transport:

This subclass is indented under 112. Subject matter wherein the data processing system or calculating computer controls the movement of a nonstationary vehicle for transporting work between manufacturing stations.

SEE OR SEARCH CLASS:

701, Data Processing: Vehicles, Navigation, and Relative Location, subclasses 23 through 28 for a control system for the operation of an autonomous or unmanned vehicle.

114 Work positioning:

This subclass is indented under 95. Subject matter wherein the data processing system or calculating computer is responsible for the setup and verification of a product or part at the work station.

115 Product tracking (e.g., having product or carrier identification):

This subclass is indented under 95. Subject matter wherein the data processing system or calculating computer is capable of locating or routing a product or product component based on information associated with the product or component.

116 Having identification controlled manufacturing operation:

This subclass is indented under 115. Subject matter wherein the data processing system or calculating computer determines the appropriate assembly step according to particular information associated with the individual product component.

117 Particular manufactured product or operation:

This subclass is indented under 95. Subject matter wherein the data processing system or calculating computer controls a specific manufacturing step, condition, or workpiece.

SEE OR SEARCH CLASS:

43, Fishing, Trapping, and Vermin Destroying, subclass 42.53 for methods of making artificial bait.

44, Fuel and Related Compositions, subclass 512 for methods of making match splints or sticks.

51, Abrasive Tool Making Process, Material, or Composition, appropriate subclasses for the making of an abrading tool.

53, Package Making, appropriate subclasses for an apparatus for and method of encompassing, encasing, or completely surrounding goods or materials with a cover made from sheet material stock.

65, Glass Manufacturing, appropriate subclasses for manufacturing of glass and glass articles.

76, Metal Tools and Implements, Making, appropriate subclasses for a special machine, process, blank, or die for making a tool or implement.

79, Button Making, appropriate subclasses for machines or processes for making buttons.

83, Cutting, cross reference art collection 906 for chip making and cross reference art collection 908 for comb, rake, or other toothed article making.

86, Ammunition and Explosive-Charge Making, appropriate subclass for instruments and processes peculiarly adapted for making fixed ammunition.

131, Tobacco, subclasses 280 through 110 for cigarette or cigar making.

162, Paper Making and Fiber Liberation, appropriate subclasses for the manufacturing of paper.

300, Brush, Broom, and Mop Making, subclass 21 for the process of manufacturing.

413, Sheet Metal Container Making, subclasses 1 through 25 for methods of making a container of sheet metal.

452, Butchering, subclass 31 for automatic control of a sausage making process.

470, Threaded, Headed Fastener, or Washer Making: Process and Apparatus, subclasses 1 through 42 for the process of the assembly or manufacturing of threaded, headed fasteners, or washers.

493, Manufacturing Container or Tube From Paper; or Other Manufacturing From a Sheet or Web, appropriate subclasses for the manufacture of a paper container or tube, per se.

502, Catalyst, Solid Sorbent, or Support Therefor: Product or Process of Making, appropriate subclasses for a mixture of materials intended to catalyze a reaction or to sorb a component of a fluid or certain single materials specifically structured to catalyze a reaction or sorb a component.

118 Three-dimensional product forming:

This subclass is indented under 117. Subject matter wherein the particular product is first represented in two-dimensional space and produced such that it occupies space along the x, y, and z coordinate axis.

SEE OR SEARCH THIS CLASS, SUBCLASS:

98, for 3-D product design technique (e.g., solid modeling).

163, for 3-D sculpturing machining using nontracing prototype sensor.

SEE OR SEARCH CLASS:

264, Plastic and Nonmetallic Article Shaping or Treating: Processes, subclasses 512 through 516 for the process of producing a hollow work or a tubular article.

119 Rapid prototyping (e.g., layer-by-layer, material deposition):

This subclass is indented under 118. Subject matter wherein the particular manufactured product is formed by the successive application of a building material in a stratified manner.

120 Stereolithography:

This subclass is indented under 119. Subject matter wherein the building material is a confined volume of photocurable material successively exposed to light.

121 Integrated circuit production or semiconductor fabrication:

This subclass is indented under 117. Subject matter wherein the particular manufactured product or operation is related to the production or design of electronic circuitry mounted on a substrate.

SEE OR SEARCH CLASS:

228, Metal Fusion Bonding, subclass 123.1 for a process of metal to nonmetal bonding with separate metallic filler wherein the nonmetallic material is a semiconductor-type material, and subclasses 179.1-180.5 for the process of bonding plural joints of an electrical device (e.g., semiconductor).

257, Active Solid-State Devices (e.g., Transistors, Solid-State Diodes), appropriate subclasses, in particular subclasses 499+ for a device having integrated circuit structure with electrically isolated components.

264, Plastic and Nonmetallic Article Shaping or Treating: Processes, subclass 272.17 for the process of encapsulating a semiconductor or barrier layer device (e.g., integrated circuit, transistor, etc.).

361, Electricity: Electrical Systems and Devices, subclasses 718 through 719 and 764 for housing or mounting assemblies with diverse electrical components for an integrated circuit.

385, Optical Waveguides, subclass 14 for an optical integrated circuit.

427, Coating Processes, subclasses 96 through 99 for coating of an integrated circuit, printed circuit, or circuit board.

438, Semiconductor Device Manufacturing: Process, appropriate subclasses for methods of making semiconductor devices; see search notes therein.

505, Superconductor Technology: Apparatus, Material, Process, appropriate subclass, in particular subclasses 300 through 501 for a processes of producing or treating high temperature superconductor material or superconductor containing products or precursors thereof, subclasses 510-512 for the precursor of high temperature superconductor material or stock, per se, or process of producing the precursor and cross reference art collection 923 for the manufacture of a semiconductor device.

708, Electrical Computers: Arithmetic Processing and Calculating, subclass 190 for calculating which is effected by integrated circuits or chips, the use or specific structure or arrangement of which significantly affects or directs the handling of information.

716, Data Processing: Design and Analysis of Circuit or Semiconductor Mask, subclasses 1 through 21 for the design and analysis of integrated circuits by data processing and computer programming techniques.

122 Continuous material having indeterminate length (e.g., web, strand, strip, or sheet):

This subclass is indented under 117. Subject matter wherein the particular product is manufactured uninterrupted fashion wherein the final product has no specified linear determination.

SEE OR SEARCH CLASS:

156, Adhesive Bonding and Miscellaneous Chemical Manufacture, subclass 231 for surface bonding or assembly having direct contact transfer of an adhered lamina from a carrier to a base with formation of a lamina having continuous length by molding or casting on endless carrier.

226, Advancing Material of Indeterminate Length, subclass 9 for a control means responsive to indicia carried by an auxiliary record (e.g., tape or card) and subclasses 10-45 for a material-responsive control means.

264, Plastic and Nonmetallic Article Shaping or Treating: Processes, subclasses 45.8 through 46.3 for composite article making having an indefinite continuous length and subclasses 165-218 for molding a continuous or indefinite length body of work.

123 Material deposition or application (e.g., spraying, coating):

This subclass is indented under 122. Subject matter wherein the data processing system or calculating computer controls the application of a treating material to the workpiece.

SEE OR SEARCH THIS CLASS, SUBCLASS:

119, for rapid prototyping using a layer-by-layer material deposition process.

SEE OR SEARCH CLASS:

8, Bleaching and Dyeing; Fluid Treatment and Chemical Modification of Textiles and Fibers, subclasses 495 through 496 for coating or sizing with dyeing process.

65, Glass Manufacturing, subclass 446 for processes of manufacturing fibers, filaments, or preforms using vapor deposition.

100, Presses, subclass 45 for automatic or material triggered control of material addition, deposition, or discharging.

118, Coating Apparatus, subclasses 624 through 625 for control of deposition of coating material or selective area.

148, Metal Treatment, subclasses 95 through 714 for a process of modifying or maintaining internal physical structure or chemical properties of a metal, process of reactive coating of a metal, and process of chemical heat removing or burning of metal.

205, Electrolysis: Processes, Compositions Used Therein, and Methods of Preparing the Compositions, subclasses 82 through 84 for controlling a coating process in response to a measured or detected parameter thereof or of a characteristic of the electrolytic coating formed.

264, Plastic and Nonmetallic Article Shaping or Treating: Processes, subclass 81 for gas or vapor deposition of an article forming material onto a mold surface.

427, Coating Processes, appropriate subclasses for applying or obtaining a coating on a surface.

430, Radiation Imagery Chemistry: Process, Composition, or Product Thereof, subclass 16 for a product wherein a metal is deposited on a previously formed image, subclass 128 for a process wherein radiation sensitive material is manufactured using a vacuum deposition process, subclass 129 for a process wherein radiation sensitive material is made using an extrusion coating process, and cross-reference art collection 935 for a coating process making a radiation sensitive element.

124 Registration control:
This subclass is indented under 122. Subject matter wherein the data processing system or calculating computer insures the correct reference point of the workpiece before the next sequential step is executed.

125 Having a reference mark or pattern:
This subclass is indented under 124. Subject matter wherein the data processing system or calculating computer utilizes a predetermined position signal for identifying the execution point for the next sequential step or operation.

126 Winding:
This subclass is indented under 122. Subject matter wherein the data processing system or calculating computer controls either (1) the rotation of a machine element onto which the indeterminate length material is wrapped about, or (2) the material being wrapped about a machine element.

SEE OR SEARCH CLASS:

242, Winding, Tensioning, or Guiding, appropriate subclasses for a process or apparatus for progressively winding elongated, flexible material.

127 Sheet making (e.g., paper product):
This subclass is indented under 122. Subject matter wherein the manufactured product's width is substantially greater than its thickness.

SEE OR SEARCH CLASS:

162, Paper Making and Fiber Liberation, subclass 13 for web or article formation and subclasses 100-232 for paper making processes and products.

229, Envelopes, Wrappers, and Paperboard Boxes, appropriate subclass, in particular subclasses 67.1 through 67.4 for sheetlike articles.

493, Manufacturing Container or Tube From Paper; or Other Manufacturing From a Sheet or Web, appropriate subclasses for articles made from a sheet or web.

128 Paper machine or subsystem control:
This subclass is indented under 127. Subject matter wherein the data processing system or calculating computer controls an apparatus associated in the process of manipulating pulp or stock in order to produce a paper product.

129 Profile analyzer or controller:
This subclass is indented under 127. Subject matter wherein the data processing system or calculating computer measures or controls the transverse physical properties or characteristics (e.g., the thickness distribution, color, moisture content, etc.).

SEE OR SEARCH CLASS:

382, Image Analysis, subclass 108 for an image analysis system designed to examine the color or intensity distribution of an image object.

130 Textile:
This subclass is indented under 117. Subject matter wherein the particular product involves the manipulation of fibers into fabric.

SEE OR SEARCH CLASS:

19, Textiles: Fiber Preparation, appropriate subclasses, in particular subclass 300 for a control means responsive to a sensed condition or program.

26, Textiles: Cloth Finishing, appropriate subclasses, in particular subclasses 74 through 79 for web-condition-responsive operation control.

28, Textiles: Manufacturing, appropriate subclasses, in particular subclasses 241 through 242 and subclasses 248-251 for a control means responsive to a sensed condition.

38, Textiles: Ironing or Smoothing, appropriate subclass, in particular subclasses 1 through 68 for control of the smoothing process.

57, Textiles: Spinning, Twisting, and Twining, subclasses 1 through 362 for specific processes and control thereof.

66, Textiles: Knitting, appropriate subclasses for the manufacture of fabric structures from strands by forming loops and drawing the bights thereof through previously formed loops.

68, Textiles: Fluid Treating Apparatus, appropriate subclasses for machines, implements and accessories for fluid treatment of textile fabrics, textile fibers, and pulp.

87, Textiles: Braiding, Netting, and Lace Making, subclass 20 for a textile apparatus with automatic control.

139, Textiles: Weaving, appropriate subclasses for the manufacture of a fabric by a weaving process.

131 Pattern design:

This subclass is indented under 130. Subject matter wherein the data processing system or calculating computer is responsible for coordinating the information used in either (1) generating or applying a decorative motif to the fabric or (2) producing a guideline having specific fabric measurements.

132 For a garment:

This subclass is indented under 131. Subject matter wherein the textile product is an article of clothing or apparel.

SEE OR SEARCH CLASS:

2, Apparel, appropriate subclasses for articles of clothing.

83, Cutting, cross reference art collection 901 for apparel collar making and cross reference art collection 905 for buttonhole making.

223, Apparel Apparatus, appropriate subclasses for machines and machine methods of making, repairing, and maintaining in proper condition articles of apparel.

450, Foundation Garments, appropriate subclasses for devices which are specifically designed to fit the human body to protect, compress, support, restrain, or alter the configuration of the body torso or a portion thereof.

133 Having particular pattern producing operation (e.g., dyeing):

This subclass is indented under 131. Subject matter wherein the pattern design is generated by a specific process or technique.

SEE OR SEARCH CLASS:

8, Bleaching and Dyeing; Fluid Treatment and Chemical Modification of Textiles and Fibers, subclass 494 for a dyeing step combined with a nominal textile manufacturing step.

28, Textiles: Manufacturing, subclass 184 for pattern setting and subclasses 214-215 for pile tufting or pattern setting.

66, Textiles: Knitting, subclasses 231 through 237 for pattern system and subclasses 238-242 for a pattern storage device.

87, Textiles: Braiding, Netting, and Lace Making, subclasses 14 through 17 for a textile apparatus with a pattern mechanism.

139, Textiles: Weaving, appropriate subclasses for the manufacture of a fabric by a weaving process.

134 Pattern cutting:

This subclass is indented under 130. Subject matter wherein the data processing system or calculating computer is responsible for controlling the cutting procedure for producing a textile article having specified dimensions.

135 Pattern matching or positioning:

This subclass is indented under 130. Subject matter further comprising a means to align or position a pattern to prevent improper overlap.

136 Sewing:
This subclass is indented under 130. Subject matter wherein the data processing system or calculating computer controls the operation of uniting or ornamenting material by means of a strand inserted (stitched) in the material at spaced locations by a needle and enchained or otherwise locked in position.

SEE OR SEARCH CLASS:
12, Boot and Shoe Making, subclasses 7.7, 9.1, and 13.2 for sewing of shoes.
112, Sewing, subclasses 2 through 470.36 for sewing manufacturing devices.

137 Having particular input data (e.g., stitch):
This subclass is indented under 136. Subject matter wherein the data processing system or calculating computer further controls the physical characteristics of the sewing operation (e.g., pitch, pattern, location, etc.).

SEE OR SEARCH CLASS:
112, Sewing, subclasses 475.17 through 475.26 for stitch control.

138 Embroidering:
This subclass is indented under 136. Subject matter wherein the data processing system or calculating computer controls the sewing operation to create a design or ornamental pattern.

SEE OR SEARCH CLASS:
112, Sewing, subclasses 78 through 103 for embroidering devices.

139 Spinning or winding (e.g., yarn):
This subclass is indented under 130. Subject matter wherein the data processing system or calculating computer controls or monitors the various parameters associated with the textile machines rotational drive or filament being produced.

140 Loom control:
This subclass is indented under 130. Subject matter wherein the data processing system or calculating computer controls an apparatus performing a weaving process.

SEE OR SEARCH CLASS:
139, Textiles: Weaving, subclasses 225 through 228 and subclass 327 for control of loom.

141 Knitting:
This subclass is indented under 130. Subject matter wherein the data processing system or calculating computer controls an apparatus performing a knitting process.

SEE OR SEARCH CLASS:
66, Textiles: Knitting, appropriate subclasses for the manufacture of fabric structures from strands by forming loops and drawing the bights thereof through previously formed loops.

142 Fiber preparation:
This subclass is indented under 130. Subject matter wherein the data processing system or calculating computer controls the manipulation of raw material for fiber production.

SEE OR SEARCH CLASS:
19, Textiles: Fiber Preparation, appropriate subclasses, in particular subclass 300 for a control means responsive to a sensed condition or program.

143 Having monitoring or inspecting (e.g., abnormality detection):
This subclass is indented under 130. Subject matter wherein the data processing system or calculating computer senses or detects any irregularities or parameters outside of a specified region.

SEE OR SEARCH CLASS:
382, Image Analysis, subclasses 141 through 152 for an image analysis system designed as a part of an automated inspection system in a product manufacturing environment.
702, Data Processing: Measuring, Calibrating, or Testing, appropriate subclasses for a data processing system or calculating computer designed for or utilized in measuring, testing, or monitoring.

144 Yarn quality:
This subclass is indented under 143. Subject matter wherein the data processing system or calculating computer senses or detects any discrepancies in the integrity of the stock material's filamentary characteristics.

145 Metal:
This subclass is indented under 117. Subject matter wherein the particular product belongs to one of a category of electropositive elements.

SEE OR SEARCH CLASS:
29, Metal Working, subclasses 709 through 719 for a control means energized in response to an activator stimulated by a condition sensor.
72, Metal Deforming, subclasses 6.1 through 21.6 for a control means energized in response to an activator stimulated by a condition-sensor, subclasses 28.1-29.2 for the use of a self-regulating control system utilizing electrical or hydraulic energy, subclasses 69, 128, and 200 for modification or control of the temperature of the work, tool or machine, and subclass 441 for a means to selectably control movement of a tool.
76, Metal Tools and Implements, Making, appropriate subclasses for the manufacturing of tools and implements composed of metal.
148, Metal Treatment, subclass 195 for a process of chemical-heat removing (e.g., flame-cutting, etc.) or burning of metal having control responsive to a sensed condition of a workpiece.
164, Metal Founding, subclasses 152 through 153 for safety control means, subclasses 154.1-154.8 for a control means responsive to or actuated by means sensing or measuring a condition or variable (i.e., automatic control), and 157 for a control means responsive to an independent timing means.
413, Sheet Metal Container Making, appropriate subclass for the manufacture of a sheet metal container.

146 Casting or drawing:
This subclass is indented under 145. Subject matter wherein the data processing system or calculating computer controls the manipulation of metal either (1) by pulling or stamping or (2) by pouring molten metal into a mold to shape or form the metal.

SEE OR SEARCH CLASS:
29, Metal Working, appropriate subclasses for generic metal shaping.
164, Metal Founding, subclass 80 for casting metal introduced into a mold as a solid.

147 Control of metallurgical property:
This subclass is indented under 146. Subject matter wherein the data processing system or calculating computer controls, measures, or monitors the manufacturing process to maintain the physical properties of the metal within specified parameters.

148 Rolling:
This subclass is indented under 145. Subject matter wherein the data processing system or calculating computer controls the manipulation of a metal by changing its physical dimension by passing the metal between rotating cylindrical elements.

SEE OR SEARCH CLASS:
29, Metal Working, subclass 888.073 for rolling or die forming (e.g., drawing, punching) and subclass 527.7 for metal casting combined with rolling.
59, Chain, Staple, and Horseshoe Making, subclasses 63 through 64 for rolling machines and rolls for forming blanks or bars particularly designed for a horseshoe.
72, Metal Deforming, subclasses 365.2 through 366.2 for the process of rolling and subclasses 64-65 for metal deforming by twisting an axially moving work.
228, Metal Fusion Bonding, subclass 117 for the process of cold rolling and subclass 158 for metal rolling, per se.
413, Sheet Metal Container Making, subclass 6 for assembling a receptacle by a rolling process.

149 Having schedule adjustment:
This subclass is indented under 148. Subject matter further comprising management of the sequential operations associated with the manufacturing process.

150 Control or detection of a particular condition:
This subclass is indented under 148. Subject matter further comprising the monitoring, correction, or inspection of a specific characteristic of the metal rolling process.

SEE OR SEARCH CLASS:
702, Data Processing: Measuring, Calibrating, or Testing, subclasses 1 through 84 for measurement system in a specific environment.

151 Speed control:
This subclass is indented under 150. Subject matter wherein the controlled or detected condition is the velocity of either the rotating cylindrical element or the metal.

152 Tension control (e.g., interstrand):
This subclass is indented under 150. Subject matter wherein the controlled or detected condition is a longitudinal force which causes the metal to elongate.

153 Temperature control:
This subclass is indented under 150. Subject matter wherein the controlled or detected condition is heat or thermal energy of the metal.

154 Flatness or crown control:
This subclass is indented under 150. Subject matter wherein the controlled or detected condition is related to the planarity of the metal.

(1) Note. This subclass contains patents where both the thickness and width are contoured to further control flatness.

SEE OR SEARCH CLASS:
100, Presses, subclass 162 for concurrent pressing and conveying having roll crown control.

155 Thickness control:
This subclass is indented under 150. Subject matter wherein the controlled or detected condition is the dimension perpendicular to both the longitudinal and latitudinal directions of the metal.

156 Roll eccentricity compensation:
This subclass is indented under 155. Subject matter wherein the thickness is controlled by the correction of the curvature or ovalness of the roll.

157 Glassware forming:
This subclass is indented under 117. Subject matter wherein the data processing system or calculating computer controls a particular process associated with the manufacturing of glass.

SEE OR SEARCH CLASS:
65, Glass Manufacturing, appropriate subclasses for the manufacture of glass, per se.
505, Superconductor Technology: Apparatus, Material, Process, subclass 420 for a process of producing or treating high temperature (tc greater than 30 k) superconductor material or superconductor containing products or precursors thereof with glass forming, working, or treating.

158 IS (individual section) machine:
This subclass is indented under 157. Subject matter wherein the data processing system or calculating computer controls the operation associated with glassware forming on a subset by subset basis.

159 Machining:
This subclass is indented under 117. Subject matter wherein the area of product manufacturing involves the shaping of a solid workpiece by a machine tool.

SEE OR SEARCH CLASS:
29, Metal Working, appropriate subclasses for generic metal shaping.
72, Metal Deforming, appropriate subclasses for applying mechanical stress to a metal workpiece to alter the size or shape thereof without removing any material.

74, Machine Element or Mechanism, appropriate subclasses for miscellaneous machine subcombinations and mechanisms pertinent to machining.

82, Turning, appropriate subclasses for producing articles of predominantly circular section by contacting a cutter with a rotating workpiece or a workpiece with a rotating cutter.

83, Cutting, appropriate subclasses for cutting of a workpiece or handling the workpiece before or after the cutting thereof.

219, Electric Heating, appropriate subclasses for electrically heated metal working apparatus.

234, Selective Cutting (e.g., Punching), appropriate subclasses for operating on a workpiece by a plurality of selectively powered cutting tool pairs.

408, Cutting by Use of Rotating Axially Moving Tool, appropriate subclasses for cutting a workpiece by an implement which rotates about and travels along an axis.

409, Gear Cutting, Milling, or Planing, appropriate subclasses for machining of gears or milling or planing of a workpiece.

451, Abrading, appropriate subclasses for a process or apparatus for grinding a workpiece by a tool having a natural cutting edge (e.g., a mineral crystal) versus an artificial cutting edge (as in milling or filing).

160 Having particular tool or tool operation:
This subclass is indented under 159. Subject matter in which the type of tool or function performed by the tool is specified.

161 Tracing or duplicating:
This subclass is indented under 160. Subject matter wherein the tool reproduces a workpiece from an existing one used as a prototype.

162 Electrical discharge machining (EDM):
This subclass is indented under 160. Subject matter wherein the tool utilizes an electric arc.

SEE OR SEARCH CLASS:

219, Electric Heating, subclasses 69.1 through 70 for details of electrical discharge apparatus providing cutting or disintegrating.

163 3-D sculpturing using nontracing prototype sensor:
This subclass is indented under 160. Particular tool or tool operation wherein the data required to machine an item is obtained by a sensor in proximity to but not touching a prototype workpiece.

SEE OR SEARCH THIS CLASS, SUBCLASS:

118, for three-dimensional product forming where the product is initially represented in two-dimensional space.

164 Grinding:
This subclass is indented under 160. Subject matter wherein the tool abrasively removes portions of the workpiece.

165 Bending (e.g., press brake):
This subclass is indented under 160. Subject matter wherein the tool changes some portion of a workpiece to or from a planar condition.

166 Laser:
This subclass is indented under 160. Subject matter wherein the tool is a coherent light source.

SEE OR SEARCH CLASS:

219, Electric Heating, subclasses 121.6 through 121.86 for details of laser heating apparatus.

372, Coherent Light Generators, appropriate subclasses.

167 Of elongated material (e.g., timber, veneer, web):
This subclass is indented under 159. Subject matter wherein the workpiece has extensive length.

168 Portable (e.g., handheld):
This subclass is indented under 159. Subject matter wherein the machine tool can be conveniently carried between workpieces by an operator.

169 Supervisory control (e.g., plural tools or plural processors):
This subclass is indented under 159. Subject matter wherein multiple tools are controlled by a single data processor or a single tool is controlled by multiple data processors.

SEE OR SEARCH THIS CLASS, SUBCLASS:
9, for a central or host computer used to control plural controllers.

SEE OR SEARCH CLASS:
340, Communications: Electrical, subclasses 3.1 through 3.9 for selective electrical communication having monitoring in addition to control (e.g., supervisory).
483, Tool Changing, subclass 15 for apparatus including plural machine tools combined with means to transfer a tool and a workpiece.

170 Having particular control of a motor parameter:
This subclass is indented under 159. Subject matter wherein a specified characteristic of a machine tool power plant is regulated.

(1) Note. Such characteristics include voltage, current, power, torque, and phase.

SEE OR SEARCH CLASS:
318, Electricity: Motive Power Systems, appropriate subclasses, for parametric control in motor systems having a nominal load.

171 Material usage optimization:
This subclass is indented under 159. Subject matter for maximizing the number of finished workpieces per area or minimizing the amount of material per workpiece.

SEE OR SEARCH THIS CLASS, SUBCLASS:
28+, wherein a control seeks to optimize a system's performance criterion (e.g., efficiency, consumption, or profit).

172 Multiple mode (e.g., rough-finish, coarse-fine):
This subclass is indented under 159. Subject matter where workpiece handling occurs in a plurality of distinct sequential processing phases.

173 Adaptive (optimizing) system:
This subclass is indented under 159. Subject matter for maximizing or minimizing some aspect of a machining operation.

SEE OR SEARCH THIS CLASS, SUBCLASS:
28+, for generic adaptive control systems.

SEE OR SEARCH CLASS:
483, Tool Changing, subclasses 4 through 6 for apparatus including a tool transfer means combined with a tool support or storage means, and a programmable control system.

174 Performance monitoring:
This subclass is indented under 159. Subject matter in which the condition of some portion of a machining system is utilized to effect a control change therein.

175 Condition of tool or workpiece (e.g., tolerance, tool wear):
This subclass is indented under 174. Subject matter including evaluation of the condition of a machine tool or an item being machined.

SEE OR SEARCH CLASS:
702, Data Processing: Measuring, Calibrating, or Testing, subclasses 182 through 186 for performance or efficiency evaluation, including evaluation of the condition of a machine tool or an item being machined.

176 Offsetting:
This subclass is indented under 175. Subject matter wherein some allowance is made for variances in tool condition.

177 Protective or diagnostic feature:
This subclass is indented under 174. Subject matter which includes prevention of machining system damage or provides information regarding system faults.

(1) Note. Such damage would include injury to an operator.

178 Tool/workpiece interference prevention:
This subclass is indented under 177. Subject matter which protects against tool or workpiece collision.

179 Tool selection/change:
This subclass is indented under 159. Subject matter comprising processes of choosing an appropriate tool or exchanging multiple tools.

180 Having operator interface feature:
This subclass is indented under 159. Subject matter providing for communication between a machining system and an operator.

SEE OR SEARCH THIS CLASS, SUBCLASS:
83+, for generic data processing control systems which utilize an operator interface.

181 Specific programming format (e.g., macro):
This subclass is indented under 180. Subject matter where the operator utilizes particular software coding techniques.

SEE OR SEARCH THIS CLASS, SUBCLASS:
89, for generic data processing control systems utilizing a particular algorithm.

182 Including CAD, CAM, or CIM technique:
This subclass is indented under 180. Subject matter in which a computer aided design, computer-aided manufacturing, or computer integrated manufacturing technique provides a machining interface.

183 Preset pattern:
This subclass is indented under 180. Subject matter where previously stored workpiece shape data may be selected.

184 Machining path display:
This subclass is indented under 180. Subject matter in which a desired or actual tool route is visually conveyed to an operator.

185 Prompting technique:
This subclass is indented under 180. Subject matter where the machining system provides suggestions to an operator of future machining options.

186 Digital positioning technique:
This subclass is indented under 159. Subject matter using particular discrete valued processing to determine proper tool location.

SEE OR SEARCH THIS CLASS, SUBCLASS:
56 through 66, for digital positioning control for other than a machine tool.

187 For curve or contour:
This subclass is indented under 186. Subject matter where the positioning technique is utilized in nonlinear or nonplanar machining.

188 Including velocity or acceleration control:
This subclass is indented under 186. Subject matter including regulation of the first or second derivative of tool displacement.

189 Interpolation:
This subclass is indented under 186. Subject matter where intermediate points are generated between pairs of tool path points.

SEE OR SEARCH CLASS:
708, Electrical Computers: Arithmetic Processing and Calculating, subclass 290 for generic electrical computer interpolation.

190 Specified tool feed path at entry or withdrawal:
This subclass is indented under 186. Subject matter where tool movement is along a predetermined trajectory during approach to or retraction from a workpiece.

191 Repeated machining passes:
This subclass is indented under 190. Subject matter having a plurality of tool entry to withdrawal cycles.

192 Alignment of tool or workpiece (e.g., origin or path return):
This subclass is indented under 186. Subject matter where the spatial reference between machine tool and workpiece is controlled.

193 Positional compensation or modification:
This subclass is indented under 186. Subject matter where the tool position is adjusted in response to an undesired or desired positional deviation.

194 Coordinate transformation technique:
This subclass is indented under 159. Subject matter which includes conversion of positional locations between plural coordinate systems.

(1) Note. Such a conversion might involve, for example, spherical to rectangular coordinate transformations.

SEE OR SEARCH CLASS:
708, Electrical Computers: Arithmetic Processing and Calculating, subclass 442 for generic electrical computer coordinate conversions.

195 Having particular measuring device (e.g., probe):
This subclass is indented under 159. Subject matter which is combined with a specified measuring device.

196 Extruding:
This subclass is indented under 117. Subject matter wherein the specific manufacturing step or operation is one in which a material is heated and forced through a die to provide the required dimensions of the product.

SEE OR SEARCH CLASS:
29, Metal Working, subclasses 402.19 through 402.21 for shaping of metals; e.g., bending, extruding, turning, etc.
53, Package Making, subclass 561 for molding or extruding a container.
65, Glass Manufacturing, subclass 401 for a process of manufacturing fibers, filaments, or preforms by extruding.
72, Metal Deforming, subclasses 253.1 through 273.5 for a process to deform metal by extruding.
131, Tobacco, subclass 375 for a process of making reconstituted tobacco using extrusion.
148, Metal Treatment, subclasses 550 and 689-690 for a process wherein there is a step of extruding or drawing aluminum or an aluminum based alloy.
156, Adhesive Bonding and Miscellaneous Chemical Manufacture, subclasses 244.11 through 244.27 and 500-501 for a process of surface bonding or assembly involving casting, plastic molding, or extruding.
264, Plastic and Nonmetallic Article Shaping or Treating: Processes, appropriate subclass, in particular subclass 1.29 for optical fiber, waveguide, or preform shaping by extruding, subclass 3.3 for the use of extrusion to form sheet or rod, subclasses 13-14 for formation of solid particulate material directly from molten or liquid mass by extrusion spraying, subclass 75 for random variegated coloring during a molding process by extrusion, subclasses 540-543 including extrusion direct application of fluid pressure differential to permanently shape, distort, or sustain work including extrusion, and subclasses 176.1-211.24 for shaping continuous or indefinite length work by extrusion.
419, Powder Metallurgy Processes, subclass 67 for forming an article by uniting randomly associated metal particles by extrusion.
425, Plastic Article or Earthenware Shaping or Treating: Apparatus, subclasses 113 through 114 for a distinct means to feed, support, or manipulate preform stock and means for shaping fluent or bulk stock to form united product by extrusion, subclasses 131.1-133.5 for a means of feeding fluent stock from plural sources to a common shaping means to form composite product by an extrusion process, and subclass 516 for a preform assembly means and means for bonding of plural preforms involving preform reshaping or vulcanizing by extrusion.

426, Food or Edible Material: Processes, Compositions, and Products, subclasses 276 through 277 for shaping by extruding and subclass 516 for molding, shaping, or casting by an extruding process.

430, Radiation Imagery Chemistry: Process, Composition, or Product Thereof, subclass 129 for a process of making a radiation sensitive product by extrusion coating.

470, Threaded, Headed Fastener, or Washer Making: Process and Apparatus, subclass 16 for a process for making an externally threaded fastener (e.g., bolt) by extrusion and subclass 31 for a process of making a headed fastener (e.g., rivet) by extrusion.

493, Manufacturing Container or Tube From Paper; or Other Manufacturing From a Sheet or Web, subclass 85 and 211 for container making involving extruding, drawing, or attenuating, subclass 293 for tube making involving extruding, drawing, or attenuating and subclasses 338-339 for extruding, drawing, or attenuating in container and tube making per se.

521, Synthetic Resins or Natural Rubbers, subclasses 79 through 81 for extruding a solid polymer containing material to form a cellular product.

197 Molding:

This subclass is indented under 117. Subject matter wherein the specific manufacturing step, condition, or operation is one in which a material is shaped or formed in a hollow cavity or matrix.

SEE OR SEARCH CLASS:

29, Metal Working, appropriate subclass, in particular subclasses 848 through 849, subclass 856, subclasses 858-859, subclasses 888.047, subclasses 888.072, subclasses 890.127, and subclasses 898.049 for a method of mechanically manufacturing using a process of molding or casting.

53, Package Making, subclass 423 for forming a cover adjunct or application of a cover adjunct to a cover including casting or molding.

65, Glass Manufacturing, subclass 404 for a processes of manufacturing fibers, filaments, or preforms with the step of casting or forming a nonfiber workpiece (e.g., molding liquid preform, shaping molten glass against a forming surface, etc.).

156, Adhesive Bonding and Miscellaneous Chemical Manufacture, subclass 231 for a method of surface bonding or assembly with formation of a lamina of continuous length by molding or casting on an endless carrier, subclass 242 for a method of surface bonding or assembly with lamina formation by molding or casting, and subclasses 500-501 for a method of surface bonding or assembly with casting, plastic molding, or extruding means.

425, Plastic Article or Earthenware Shaping or Treating: Apparatus, subclass 149 for a molding pressure control means responsive to pressure at shaping area.

426, Food or Edible Material: Processes, Compositions, and Products, subclasses 512 through 517 for the process of molding, casting, or shaping food or edible material.

198 Control of curing:

This subclass is indented under 197. Subject matter wherein the specific manufacturing step or operation is one in which the preparation, preservation, or finishing of the molded material is by a chemical or physical process.

199 Vulcanization:

This subclass is indented under 198. Subject matter wherein the curing is specifically designed to increase the strength, resiliency, and freedom from stickiness and odor of (e.g., rubber) by combining with additives in the presence of heat and pressure.

200 Injection:

This subclass is indented under 197. Subject matter wherein the control of the molding process further includes control of the process associated with the flow of material under pressure.

SEE OR SEARCH CLASS:

156, Adhesive Bonding and Miscellaneous Chemical Manufacture, subclass 125 for a method of surface bonding or assembly with injection molding of outer lamina.

264, Plastic and Nonmetallic Article Shaping or Treating: Processes, subclasses 297.2 through 297.3 and subclasses 328.1-328.19 for forming plural articles including the process of introducing material under pressure into a closed mold cavity (e.g., injection molding, etc.).

201 Plural molding machines or stations:

This subclass is indented under 200. Subject matter capable of collectively managing a multitude of injection molding units or points.

202 Control of temperature:

This subclass is indented under 200. Subject matter wherein the controlled condition is the heat or thermal energy associated with the injection molding process.

203 Control of pressure:

This subclass is indented under 200. Subject matter wherein the controlled condition is a force per unit area exerted in the injection molding process.

SEE OR SEARCH CLASS:

425, Plastic Article or Earthenware Shaping or Treating: Apparatus, subclass 149 for a molding pressure control means responsive to pressure at shaping area.

204 Monitoring, inspection, or control of a particular condition:

This subclass is indented under 197. Subject matter further comprising the regulation, supervision, observation, or examination of a specific characteristic of the molding process.

SEE OR SEARCH THIS CLASS, SUBCLASS:

143, for the monitoring or inspection of a textile process.

150, for the monitoring, control, or inspection of conditions associated with the rolling of metals.

205 Control of temperature:

This subclass is indented under 204. Subject matter wherein the controlled condition is the heat or thermal energy associated with the specific characteristic of the manufacturing process.

SEE OR SEARCH CLASS:

34, Drying and Gas or Vapor Contact With Solids, subclasses 245 through 278 for a material treated by electromagnetic energy having temperature control and subclass 446 for the process of a gas or vapor in contact with a treated material having temperature or moisture control of the material, gas, or vapor.

65, Glass Manufacturing, subclass 162 for temperature or heater control responsive to a condition sensing means.

72, Metal Deforming, subclasses 69, 128, and 200 for modification or control of temperature of work, tool, or machine, or with lubrication thereof.

83, Cutting, subclasses 170 through 171 for cutting with a means to control or modify the temperature of an apparatus or work.

131, Tobacco, subclass 303 for tobacco treatment having temperature or humidity control of treating fluid.

202, Distillation: Apparatus, subclass 160 for a distillation system having automatic temperature control.

266, Metallurgical Apparatus, subclass 131 having a means for contacting a solid metalliferous material or metal object with a liquid having a means to agitate or control temperature of bath.

355, Photocopying, subclass 30 for projection printing and copying cameras having temperature control.

366, Agitating, subclass 145 for agitating including temperature control.

376, Induced Nuclear Reactions: Processes, Systems, and Elements, subclass 244 for control of temperature reactivity.

409, Gear Cutting, Milling, or Planing, subclasses 135 through 136 for milling with a means to control temperature.

425, Plastic Article or Earthenware Shaping or Treating: Apparatus, subclasses 143 through 144 for control means responsive to or actuated by means sensing or detecting a condition or material triggered having temperature control.

451, Abrading, subclasses 33 and 53 for an abrading process including temperature modification or control.

518, Chemistry: Fischer-Tropsch Processes; or Purification or Recovery of Products Thereof, subclass 712 for temperature control or regulation of the Fischer-Tropsch reaction.

206 Pressing:

This subclass is indented under 117. Subject matter wherein the manufacturing process involves a compressional force being applied to a workpiece.

SEE OR SEARCH CLASS:

12, Boot and Shoe Making, subclass 33.4 for a pressing machine associated with shoe making and subclass 57.1 for a machine having a seam pressing means.

19, Textiles: Fiber Preparation, subclass 219 for fiber preparation with auxiliary pressing and subclass 248 for restraining fibers in approximately stationary in relation to a moving apron.

38, Textiles: Ironing or Smoothing, subclasses 44 through 62 for smoothing by a roller presser and subclass 144 for pressing or smoothing processes.

65, Glass Manufacturing, subclasses 305 through 322 for a press molding machine.

69, Leather Manufactures, subclass 7 for seam pressing and subclass 8 for forming and pressing.

72, Metal Deforming, subclasses 48 through 52 for metal deforming by a tool-couple pressing together adjacent surface portions of the same work.

99, Foods and Beverages: Apparatus, subclass 349 for cooking having a material pressing means.

100, Presses, appropriate subclass, in particular subclass 4 and subclasses 43-52 for automatic or material-triggered control of a press.

162, Paper Making and Fiber Liberation, subclass 220 for an article forming process including pressing with flexible diaphragm.

223, Apparel Apparatus, subclasses 52 through 84 for forming, molding, pressing or stretching articles of apparel and similar articles.

264, Plastic and Nonmetallic Article Shaping or Treating: Processes, subclass 107 for a method of molding a solid preform, by pressing, to produce a disk-shaped record and subclass 297.4 for forming plural articles including multilayer pressing.

419, Powder Metallurgy Processes, subclass 49 for hot isostatic pressing (HIP) and subclass 68 for isostatic/hydrostatic pressing.

425, Plastic Article or Earthenware Shaping or Treating: Apparatus, subclasses 406 through 423 for a press-forming apparatus having opposed press members.

493, Manufacturing Container or Tube From Paper; or Other Manufacturing From a Sheet or Web, subclasses 142 through 144 for a work advancing during pressing.

505, Superconductor Technology: Apparatus, Material, Process, subclass 432 for a process of producing or treating high temperature superconductor material or superconductor containing products or precursors thereof including isostatic pressing.

207 Heating:

This subclass is indented under 117. Subject matter wherein an operation of a production process being controlled, monitored, or measured is related to the transfer of thermal energy.

SEE OR SEARCH THIS CLASS, SUBCLASS:

266, for chemical process control or monitoring system.

274, wherein the controlled chemical process includes a furnace or oven for

drying, burning, or baking a substance or body.

SEE OR SEARCH CLASS:

126, Stoves and Furnaces, subclasses 58 through 98 for direct heat radiating heat generators.

164, Metal Founding, subclasses 154.1 through 154.8 for metal casting apparatus including control systems.

219, Electric Heating, appropriate subclass, in particular subclasses 483 through 487 for controlling or regulating plural separate distinct heating resistance elements (i.e., one control system for all elements).

228, Metal Fusion Bonding, appropriate subclass, in particular subclasses 227 through 232 for the process of applying plural heating and subclasses 234.1-235.3 for a specific mode of heating or applying pressure.

237, Heating Systems, subclasses 2 through 12 for automatic heating control.

392, Electric Resistance Heating Devices, appropriate subclasses for an electrical resisting heating device, per se.

419, Powder Metallurgy Processes, appropriate subclasses for producing metals, alloys, or metal containing compositions in a solid or compact state from powdered or particulate material with or without heating.

432, Heating, appropriate subclass, in particular subclasses 1 through 31 for a process of heating or heater operation.

438, Semiconductor Device Manufacturing: Process, subclasses 537 through 541 and 542-569 for methods of fusing and diffusing, respectively, an electrically active dopant into a semiconductor, subclasses 660-664 for metallization of a semiconductor combined with heat treatment of the conductive layer, and subclasses 795-799 for a thermal treatment modifying the properties of a semiconductor substrate.

208 Drying:

This subclass is indented under 207. Subject matter further comprising the control, monitoring, or measurement of the moisture content associated with the heating process.

SEE OR SEARCH CLASS:

34, Drying and Gas or Vapor Contact With Solids, appropriate subclass, in particular subclasses 445 through 447 for form-supported treated article with drying parameter control.

209 Furnace:

This subclass is indented under 207. Subject matter wherein the data processing system or calculating computer is specifically designed to control an apparatus in which energy in a non-thermal form is converted to heat and supplied to the manufacturing process.

SEE OR SEARCH THIS CLASS, SUBCLASS:

211, for control of an apparatus for heating or cooking an article placed within.

274, wherein a chemical process includes a furnace or oven for drying, burning, or baking a substance or body.

SEE OR SEARCH CLASS:

65, Glass Manufacturing, subclass 134.7 for the process of rotating a furnace or chamber utilized in the glass making process, subclasses 135.6-135.8 for an electric furnace utilized in the glass making process, subclass 335 for a glass furnace with furnace charging means, and subclass 540 for a fiber making apparatus with a furnace charging means.

75, Specialized Metallurgical Processes, Compositions for Use Therein, Consolidated Metal Powder Compositions, and Loose Metal Particulate Mixtures, appropriate subclasses for a furnace used in a specialized metallurgical process.

122, Liquid Heaters and Vaporizers, subclass 33 for indirectly heating a surface using a furnace, subclass 420 for feed water heaters heated by furnace gases, subclass 422 for feed water heaters heated by furnace gases and steam, and subclass 485 for steam superheaters having a separate furnace for heating them.

126, Stoves and Furnaces, subclasses 345 through 347 for a water heater having a kettle furnace.
159, Concentrating Evaporators, subclasses 36 and 38 for a concentrating evaporator having a furnace heated open pan.
202, Distillation: Apparatus, subclass 114 for a distilling apparatus having a common heating furnace.
219, Electric Heating, subclasses 420 through 427 wherein the heating device is a crucible or furnace type device.
236, Automatic Temperature and Humidity Regulation, subclasses 10 through 11 for a hot-air furnace, per se, subclass 14 for a combined boiler and furnace controlled, subclass 15 for control of a furnace, subclass 46 for a hot air furnace with a timing element.
237, Heating Systems, subclass 48 and subclass 53 for a furnace, per se.
261, Gas and Liquid Contact Apparatus, subclass 17 for a multiple gas furnace gas-type gas and liquid contact apparatus.
373, Industrial Electric Heating Furnaces, appropriate subclasses.
392, Electric Resistance Heating Devices, subclass 351 for a floor-type furnace.
432, Heating, subclass 28 for a process of operating a furnace utilizing a heat storage mass, subclass 39 for control of a furnace using selection or load balancing of furnace exhaust heated regenerators and subclasses 90-91 for a boiler and work heating furnace, pot, or oven.

210 Multizone:
This subclass is indented under 209. Subject matter further comprising a plurality of individually controlled regions or sectors supplied by the furnace.

SEE OR SEARCH THIS CLASS, SUBCLASS:
277, for multiple zone HVAC control.

211 Oven:
This subclass is indented under 207. Subject matter wherein the data processing system or calculating computer is specifically designed to control an enclosed apparatus supplied with heat and used for cooking or heating objects placed within.

SEE OR SEARCH THIS CLASS, SUBCLASS:
209, for control of an apparatus for supplying heat to a manufacturing process.
274, wherein a chemical process includes a furnace or oven for drying, burning, or baking a substance or body.

SEE OR SEARCH CLASS:
126, Stoves and Furnaces, subclasses 19 through 22 for cooking ovens and subclass 39 for miscellaneous cooking ovens.
202, Distillation: Apparatus, subclass 101 for systems with dome ovens and subclass 248 for a coke oven type of distilling apparatus.
219, Electric Heating, subclasses 391 through 414 for an oven type combined with container, enclosure, or support for material to be heated.
236, Automatic Temperature and Humidity Regulation, subclass 46 for a domestic oven having a timing device.
432, Heating, subclasses 90 through 91 for a boiler and work heating furnace, pot, or oven.

212 Sintering, soldering, or bonding:
This subclass is indented under 207. Subject matter wherein the heating process is used for the bonding, joining, or fusion of components of a workpiece.

SEE OR SEARCH CLASS:
29, Metal Working, subclass 851 for the mechanical manufacture of an electrical device in or on a base including the sintering of the base.
65, Glass Manufacturing, subclass 416 and subclasses 427-428 for the process of manufacturing a fiber, a filament, or a preform by sintering.
75, Specialized Metallurgical Processes, Compositions for Use Therein, Consolidated Metal Powder Compositions, and Loose Metal Particulate Mixtures, subclasses 313 through 327 for compositions for or from consolidating by agglomerating, calcinating,

compacting, indurating, roasting, sintering, or solidifying from molten mass, and subclasses 751-769 for a process with heat treatment (e.g., calcinating, fusing, indurating, roasting, sintering, vaporizing, etc.).

148, Metal Treatment, subclass 528 for a process of modifying or maintaining internal physical structure or chemical properties of metal, a process of reactive coating of metal, and a process of chemical heat removing or burning of metal including brazing or soldering.

219, Electric Heating, subclasses 85.1 through 85.22 and 129 for bonding with metal by brazing or soldering and subclass 616 for bonding metal by soldering.

228, Metal Fusion Bonding, subclasses 51 through 55 for a metallic heat applicator (e.g., soldering iron, etc.), subclass 111.5 for a process of metal fusion bonding using high frequency vibratory energy with soldering or liquid phase bonding, and subclasses 262.31, 262.42, 262.45, 262.51, 262.61, 262.72, 262.8, and 262.9 for a process of brazing or soldering.

264, Plastic and Nonmetallic Article Shaping or Treating: Processes, subclasses 603 through 683 for a process involving vitrifying or sintering of a preform to make inorganic article and subclasses 125-127 for sintering or heat fusing of particles.

419, Powder Metallurgy Processes, subclasses 1 through 60 for a powder metallurgy processes with heating or sintering.

430, Radiation Imagery Chemistry: Process, Composition, or Product Thereof, subclass 198 for a process of visible imaging including the step of firing or sintering.

432, Heating, subclass 13 for a process of heating including melting, vaporizing, sintering, expanding comminuting, or classifying work material.

438, Semiconductor Device Manufacturing: Process, subclasses 106 through 127 for methods of attaching an electrode on or to a semiconductor, subclasses 537-541 for methods of fusing an electrically active dopant into a semiconductor, subclasses 660+ for metallization of a semiconductor combined with heat treatment of the conductive layer, and subclasses 795-799 for a thermal treatment modifying the properties of a semiconductor substrate.

505, Superconductor Technology: Apparatus, Material, Process, subclasses 500 through 501 for a process of producing or treating high temperature superconductor material or superconductor containing products or precursors thereof by heating, annealing, or sintering.

213 Article handling:

This subclass is indented under 90. Subject matter wherein the data processing system or calculating computer controls, monitors or inspects the manipulation of an item to change its position, orientation, or location.

SEE OR SEARCH THIS CLASS, SUBCLASS:

245 through 264 , for robotic control, per se.

SEE OR SEARCH CLASS:

186, Merchandising, subclass 58 for a movable order carrier.

198, Conveyors: Power-Driven, appropriate subclasses, in particular subclasses 301, 322, 341.01, 357, 358, 395, 401, 437, 444, 460.1, 464.1, 507, 526, 571, 639, 641, 718, 751, 761, 766, and 794 for condition responsive control of a conveyor.

209, Classifying, Separating, and Assorting Solids, appropriate subclass, in particular subclass 154 for current control, subclass 489 for automatic control associated with feeding and discharging, and subclasses 491 and 496 for automatic control of discharging, subclass 726 for classifying, separating, and assorting fluid suspension including condition responsive control.

226, Advancing Material of Indeterminate Length, appropriate subclass, in particular subclasses 10 through 45 for a device having a means to control the

advancing material in response to a detected condition.

242, Winding, Tensioning, or Guiding, appropriate subclasses for a process or apparatus for progressively winding elongated, flexible material.

318, Electricity: Motive Power Systems, subclasses 568.11 through 568.25 for a preprogrammable multifunction manipulator designed to move devices through variable programmed motions for the performance of changeable tasks on a repetitive basis without human intervention.

403, Joints and Connections, subclasses 34 through 39 for a joint or connector having an article handling or directing feature.

414, Material or Article Handling, appropriate subclass, in particular subclass 138.4 for marine loading and unloading having line tension control, subclass 161 for a chamber of a type utilized for a heating function and material charging or discharging means with a control system responsive to a condition in the chamber, subclass 231 for an apparatus particularly adapted for charging or discharging a facility comprising one or more sites for the parking of wheeled vehicles having a control system responsive to changeable operating instructions, subclass 273 for plural, static structures for supporting discrete loads and charging or discharging means with a control system responsive to changeable operating instructions, subclasses 613-614 for an elevator or hoist loading or unloading means with a mechanism for flow control, and subclass 699 for a vertically swinging load support having a control means responsive to a sensed condition.

446, Amusement Devices: Toys, subclasses 424 through 428 for a simulation of an instrument or machine for displacing or placing articles or material in a particular manner.

214 Article storing, retrieval, or arrangement (e.g., warehousing, automated library):

This subclass is indented under 213. Subject matter wherein the data processing system or calculating computer regulates or manages the movement or distribution of an item to be placed in, organized in, or removed from a location specified for supply or accumulation.

SEE OR SEARCH CLASS:

62, Refrigeration, subclass 344 for a cooled article storage compartment or cooled isolated material handler means with product receiving and storing means.

312, Supports: Cabinet Structure, subclasses 9.1 through 9.64 for a cabinet to store audio or visual recording medium.

358, Facsimile, subclass 403 for a document filing and retrieval system.

382, Image Analysis, subclasses 305 through 306 for image storage or retrieval.

414, Material or Article Handling, subclass 252 for a charging or discharging device with a vehicle storage or retrieval system responsive to a manual designation of destination.

426, Food or Edible Material: Processes, Compositions, and Products, subclasses 418 through 419 for a process of storing a solid food or edible material under a controlled condition.

215 Having an identification code:

This subclass is indented under 214. Subject matter wherein the item has an identifying mark or address for location management physically attached.

SEE OR SEARCH CLASS:

382, Image Analysis, subclass 306 for image storage or retrieval using identification indicia on a document.

216 Order filling:

This subclass is indented under 214. Subject matter wherein the data processing system or calculating computer regulates or manages the movement or distribution of an article based on a request for a specific quantity or characteristic of the article.

217 Article support load management (e.g., palletizing):

This subclass is indented under 214. Subject matter wherein the data processing system or calculating computer regulates or manages the arrangement or placement of an item upon a supporting structure.

SEE OR SEARCH CLASS:

198, Conveyors: Power-Driven, subclass 369.6 for a conveyor having rollers to shift a load vertically to a different plane.

248, Supports, subclasses 346.01 through 346.5 for a supporting base structure.

414, Material or Article Handling, subclasses 754 through 784 for an article reorienting device and subclass 798 for an article or material handling device having a movable stack support for unloading an article.

218 Particular charging or discharging apparatus:

This subclass is indented under 214. Subject matter further including a specific means to arrange or place an article in a desired location.

SEE OR SEARCH THIS CLASS, SUBCLASS:

245 through 264, for robotic control, per se.

SEE OR SEARCH CLASS:

414, Material or Article Handling, subclass 762 and subclass 765 for an article reorienting device having an article inserting or discharging means.

901, Robots, cross-reference art collections 2-13 and subclasses 31 through 39 for computer controlled handling robots.

219 Associating or disassociating plural articles:

This subclass is indented under 213. Subject matter wherein the data processing system or calculating computer regulates or manages the segregation or integration of multiple items based on similar or dissimilar characteristics.

SEE OR SEARCH CLASS:

29, Metal Working, subclasses 464 through 468 for a method of mechanical manufacture having an association of parts by an aligning means and particularly subclass 467 for the sequential association of parts on a stationary aligning means.

131, Tobacco, subclass 327 for leaf associating or disassociating in the tobacco treatment process.

209, Classifying, Separating, and Assorting Solids, appropriate subclass, in particular subclasses 509 through 707 for a method or device for sorting special items and certain methods and apparatus.

270, Sheet-Material Associating, subclasses 4 through 17 and 18-19 for the association of plural sheets or web combined with a printing process, subclasses 32-51 for associating and folding plural sheets or webs, and subclasses 52.01-58.34 for associating or disassociating plural sheets or webs.

434, Education and Demonstration, subclass 259 for a method or device for developing or testing coordination using the associating of dissimilar objects with apertures or pegs having matching size, shape, or color.

220 Inserting:

This subclass is indented under 219. Subject matter wherein the association or disassociation of plural articles further comprises the ability to place into the handled article a secondary item or article.

SEE OR SEARCH CLASS:

12, Boot and Shoe Making, subclass 15 for a machine for forcing lasts into completed or partially completed boots or shoes.

53, Package Making, subclass 115 for inserting cushioning material into a package.

65, Glass Manufacturing, subclass 139 for a means to insert wire into a manufactured glass article.

131, Tobacco, subclass 72 for a wrapping device having a plug inserting means

and subclass 94 for a process or apparatus for cigar or cigarette making including plug attaching or inserting.

156, Adhesive Bonding and Miscellaneous Chemical Manufacture, subclasses 293 through 294 for a method of surface bonding or assembly including the step of inserting lamina in a hole, aperture, or recess of other lamina, and subclass 303.1 for inserting lamina into preformed plastic body.

223, Apparel Apparatus, subclass 50 for a device for inserting a tape, thread, or cord into a garment, lace, or similar article.

264, Plastic and Nonmetallic Article Shaping or Treating: Processes, subclasses 271.1 through 279.1 for inserting a preform part into a plastic body and simultaneously reshaping the body with a mold element.

270, Sheet-Material Associating, subclasses 58.31 through 58.32 for placing sheets in a column and inserting marker sheets to indicate number of sheets in the column.

414, Material or Article Handling, subclass 762 and subclass 765 for an article reorienting device having an article inserting or discharging means.

221 Having an identification code:

This subclass is indented under 220. Subject matter wherein the inserted article has an identifying mark or address for the manipulation of said article to change its position, orientation, or location.

222 Monitoring or inspection (e.g., incomplete assembly):

This subclass is indented under 221. Subject matter wherein the insertion system is capable of supervising, examining, or detecting a condition related to the insertion process or handled article.

223 Collating or sorting:

This subclass is indented under 219. Subject matter wherein the association or disassociation of plural articles results in the separation, grouping, or sequential arrangement of the articles.

SEE OR SEARCH CLASS:

101, Printing, subclass 2 for the sorting of articles completing a printing process.

119, Animal Husbandry, subclass 216 for the sorting or grading of live fish and subclasses 712-849 for classifying, separating, or grouping animals (i.e., sorting) according to size or kind of animal.

209, Classifying, Separating, and Assorting Solids, subclasses 3.1 through 3.3 for a method of or device for sorting special items, subclasses 12.1-44.4 for plural, diverse separating operations and subclasses 509-707 for sorting special items.

348, Television, subclass 91 for a picture signal generator used to separate manufactured objects in different categories by structure or destination.

399, Electrophotography, subclass 403 for the sorting or collating of documents.

452, Butchering, subclass 184 for the sorting of a carcass or carcass portion.

224 Having an identification code:

This subclass is indented under 223. Subject matter wherein the sorted or collated article has an identifying mark or address for the manipulation of said article to change its position, orientation or location.

225 Having an identification code:

This subclass is indented under 213. Subject matter wherein the article has an identifying mark or address for the manipulation of the article to change its position, orientation or location.

226 Identification code determines article destination:

This subclass is indented under 225. Subject matter wherein the identification code defines a target location of the article.

SEE OR SEARCH CLASS:

382, Image Analysis, subclass 306 for image storage or retrieval using identification indicia that appear on the document, such as keywords, to file the document or to retrieve the document.

227 Preparation of an article for an identification code (e.g., printing, encoding):
This subclass is indented under 226. Subject matter wherein the identification code further comprises the step of impressing or stenciling a design or character upon the article.

228 Having particular transport between article handling stations:
This subclass is indented under 213. Subject matter wherein the data processing system or calculating computer controls the movement of the monitored or inspected item from one location to another.

SEE OR SEARCH THIS CLASS, SUBCLASS:
112 through 113, for a particular work transport between manufacturing stations.

229 Transport position identification:
This subclass is indented under 228. Subject matter wherein the data processing system or calculating computer functions to indicate the location of a transported item.

230 Having a conveyor:
This subclass is indented under 228. Subject matter wherein the particular transport means is an apparatus designed to move an article along a predetermined path.

SEE OR SEARCH CLASS:
193, Conveyors, Chutes, Skids, Guides, and Ways, appropriate subclasses for a device for guiding material either vertically, horizontally or at an inclination.
198, Conveyors: Power-Driven, appropriate subclasses for a conveyor, per se.
406, Conveyors: Fluid Current, subclasses 10 through 33 for a means to control a conveying fluid or movement of a load in response to a sensed condition.

231 Dispensing or vending:
This subclass is indented under 213. Subject matter wherein the data processing system or calculating computer regulates or manages the automatic allotment or discharge of an article.

SEE OR SEARCH CLASS:
221, Article Dispensing, appropriate subclasses and in particular subclasses 9 through 14 for the automatic control of an article dispensing device.
222, Dispensing, appropriate subclasses and in particular subclasses 52 through 69 for the automatic control of a dispensing device.
271, Sheet Feeding or Delivering, subclasses 3.01 through 3.13 for delivering to a stack of sheets and feeding therefrom, subclasses 8.1-171 for feeding an individual sheet from a pack of sheets, toward an operation, or with respect to a location where the individual sheet is operated upon, and subclasses 278-224 for delivering individual sheets from a work station to a receiver, stack, or some determined position.
705, Data Processing: Financial, Business Practice, Management, or Cost/Price Determination, subclasses 16 through 25 for vending combined with a cash or credit transaction.

232 Operator or payment initiated:
This subclass is indented under 231. Subject matter wherein the dispensing or vending of an article is controlled by an input signal representing either (1) an operator request or (2) remittance of a sufficient amount of compensation.

233 Customized dispensed article (e.g., operator design):
This subclass is indented under 232. Subject matter having a means to receive and store information provided by the operator to tailor the dispensed or vended article.

234 Demonstration or duplication of article (e.g., software, video):
This subclass is indented under 232. Subject matter wherein the dispensing or vending system further enables an operator to sample a particular article or dispense a copy of a particular article.

235 Printing on or of dispensed or vended article:
This subclass is indented under 232. Subject matter wherein the dispensing or vending system is capable of marking, lettering, or placing any impression on the dispensed or vended article.

SEE OR SEARCH CLASS:
101, Printing, appropriate subclasses for the production of characters or designs on surfaces by impression of types or dies or by applying coating material thereto through openings of previous portions of a pattern sheet, as in stenciling, or by impression from planographic or intaglio surfaces.
283, Printed Matter, appropriate subclasses for an article bearing indicia.

236 Data collection or reporting (e.g., sales, inventory):
This subclass is indented under 232. Subject matter wherein the dispensing or vending system manages or stores information relating to the quantity of articles dispensed or vended.

237 Authorization (e.g., password, time usage limit, personal identification number (PIN)):
This subclass is indented under 232. Subject matter wherein the dispensing or vending system allows access to the vending operation when certain conditions have been satisfied or preapproval has been given.

238 Price adjustment:
This subclass is indented under 232. Subject matter wherein the dispensing or vending system is capable of setting the operating parameter of cost.

SEE OR SEARCH CLASS:
705, Data Processing: Financial, Business Practice, Management, or Cost/Price Determination, appropriate subclasses and particularly subclasses 400 through 418 for a data processing system or calculating computer which is designed for or utilized in determining charges for goods or services, or is utilized for the solution of a problem in this area.

239 Blending or mixing:
This subclass is indented under 231. Subject matter wherein an article or a number of articles are distributed in a sequential fashion or integrated according to a predetermined formula before dispensing occurs.

240 Condition controlled dispensing (e.g., weight or volume):
This subclass is indented under 231. Subject matter wherein a specific article characteristic is the controlling variable for the regulation or management of the automatic allotment or discharge of the article.

241 Central control of plural dispensing units:
This subclass is indented under 231. Subject matter wherein a plurality of dispensing or vending devices are regulated or managed by a host computer or data processing system.

SEE OR SEARCH CLASS:
340, Communications: Electrical, subclasses 3.1 through 3.9 for selective electrical communication having monitoring in addition to control (e.g., supervisory).

242 Particular supply arrangement (e.g., plural sources or compartments):
This subclass is indented under 231. Subject matter wherein a dispensing or vending device further comprises a housing or cartridge for the particular arrangement of the dispensed or vended article.

243 Movable (e.g., rotatable):
This subclass is indented under 242. Subject matter positionable relative to the dispensing or vending device.

244 Monitoring or inspection:
This subclass is indented under 231. Subject matter wherein the data processing system or calculating computer supervises, examines, or detects a condition related to the article being vended or dispensed.

245 Robot control:
This subclass is indented under 90. Subject matter wherein a data processing or calculating computer apparatus (or corresponding methods for performing data processing or calculating

operations) (1) is designed for or utilized for controlling a robot as a unit or a robot end effector for general use, or (2) uses a specific control scheme, such as plural processors or plural robots or knowledge processing, in a computer system for controlling at least one robot.

(1) Note. This subclass and the subclasses indented hereunder do not provide for systems or methods that deal solely with creating, modifying, or using a computer program or digital data processing system for controlling a substructure of a robot other than an end effector for general use, such as controlling (1) the torque of a robot servo mechanism rather than the torque of the entire robot or (2) a robot vision system not integrally tied to the rest of the robot control. For the loci of such art, see the Search Class notes, below.

(2) Note. This subclass and the subclasses indented hereunder do not provide for systems or methods that use an unmodifiable preexisting computer program for controlling a single robot without providing additional data to the program or performing any special calculations for use by the program (e.g., mere robot position or velocity control without further data input, such as, visual input).

(3) Note. A robot as used in this and indented subclasses is an instrumented mechanism which can respond to and modify its environment with some degree of intelligence.

(4) Note. End effectors for a specific use are classified with such specific use. See the Search Class notes, below.

SEE OR SEARCH THIS CLASS, SUBCLASS:

213+, for article handling (e.g., warehousing, collating or dispensing).

SEE OR SEARCH CLASS:

177, Weighing Scales, subclasses 25.11 through 44 for computerized weighing scales.

219, Electric Heating, subclasses 124.1 through 124.5 for welding robots.

318, Electricity: Motive Power Systems, subclasses 568.1 through 568.25 for robot servo motor details (e.g., servo torque control).

382, Image Analysis, subclass 153 for robotic image analysis.

623, Prosthesis (i.e., Artificial Body Members), Parts Thereof, or Aids and Accessories Therefor, subclasses 60, 61, and 64 for artificial arms parts having structure similar to robot arm parts.

706, Data Processing: Artificial Intelligence, subclasses 45 through 61 for knowledge processing in general.

901, Robots, appropriate subclasses for robotic cross-reference art collections.

246 Combined with knowledge processing (e.g., natural language system):

This subclass is indented under 245. Subject matter wherein the system or method is combined with knowledge processing.

247 Plural controlled devices or plural nonvision controlling devices:

This subclass is indented under 245. Subject matter wherein the system or method (1) has the capability to control a second device in addition to the robot, or (2) includes at least first and second processors, both of which control the robot and neither of which solely control robot vision.

248 Plural robots:

This subclass is indented under 247. Subject matter wherein the second device is another robot.

249 Plural processors:

This subclass is indented under 247. Subject matter wherein the first and second controlling devices are processors.

250 Specific enhancing or modifying techniques (e.g., adaptive control):

This subclass is indented under 245. Subject matter comprising means or methods for altering the normal operation of a particular aspect of the robot control.

251 Coordinate transformation:
This subclass is indented under 250. Subject matter wherein the enhancement or modification deals with changing from a first coordinate system to a second coordinate system.

252 Interpolation:
This subclass is indented under 250. Subject matter wherein the enhancement or modification deals with inserting calculated intermediate points between already known points of a robot path.

SEE OR SEARCH THIS CLASS, SUBCLASS:
189, for machining interpolation.

253 Programmed data (e.g., path) modified by sensed data:
This subclass is indented under 250. Subject matter wherein the enhancement or modification deals with modifying program control of a robot based on data from sensors.

254 Compensation or calibration:
This subclass is indented under 250. Subject matter wherein the enhancement or modification deals with correcting for inherent errors in a robot or for aligning a robot.

255 Collision prevention:
This subclass is indented under 250. Subject matter wherein the enhancement or modification deals with stopping a robot from contacting a solid object in a manner that would damage the robot or the object.

256 Overload prevention:
This subclass is indented under 250. Subject matter wherein the enhancement or modification deals with stopping a robot from attempting to move a load that is beyond the capabilities of the robot.

257 Based on user input:
This subclass is indented under 250. Subject matter wherein the enhancement or modification is based on data supplied to a robot directly from a programmer.

258 Having particular sensor:
This subclass is indented under 245. Subject matter wherein the system or method is provided data by a specified type of sensor.

SEE OR SEARCH CLASS:
382, Image Analysis, appropriate subclasses for an image which is detected and significant analysis of the image is performed.

259 Vision sensor (e.g., camera, photocell):
This subclass is indented under 258. Subject matter wherein the sensor detects light.

SEE OR SEARCH CLASS:
382, Image Analysis, subclass 153 for subject matter that significantly claims the sensor gathering image data and processing that data to detect patterns, and the robot is only peripherally claimed.

260 Having control of force:
This subclass is indented under subclass 245. Subject matter wherein the system or method controls force.

261 Having control of robot torque:
This subclass is indented under subclass 260. Subject matter wherein the system or method controls or limits the torque of the robot as a unit.

262 Using particular manipulator orientation computation (e.g., vector/matrix calculation):
This subclass is indented under subclass 245. Subject matter wherein the system or method uses a specific vector or matrix calculation in order to control the directional positioning of the end effector of the robot.

263 Using Jacobian computation:
This subclass is indented under 262. Subject matter wherein the system or method uses a Jacobian computation scheme, that is, an equation representing the mathematical operation for conversion of a function in terms of one set of variables to a function in terms of a second set of variables.

264 Having particular operator interface (e.g., teaching box, digitizer, tablet, pendant, dummy arm):
This subclass is indented under 245. Subject matter including details of the operator interface.

265 Nonreactive mixing process (e.g., mixing cement, preparing solution, diluting chemical):
This subclass is indented under 90. Subject matter including a process for varying relative apportionment of at least two components to form a mixture without changing chemical properties of the components (e.g., mixing cement, preparing solution, diluting chemical, etc.).

SEE OR SEARCH THIS CLASS, SUBCLASS:
285, for fluid mixing in a flow control system.

SEE OR SEARCH CLASS:
366, Agitating, appropriate subclasses for apparatus and methods for mixing which does not include significant computer control.

266 Chemical process control or monitoring system:
This subclass is indented under 250. Subject matter under subclass 90 comprising means for regulating or observing a chemical process (e.g., reaction) for producing a chemical product.

SEE OR SEARCH THIS CLASS, SUBCLASS:
1 through 89, for data processing control systems, methods, or apparatus.

SEE OR SEARCH CLASS:
71, Chemistry: Fertilizers, appropriate subclasses.
75, Specialized Metallurgical Processes, Compositions for Use Therein, Consolidated Metal Powder Compositions, and Loose Metal Particulate Mixtures, subclasses 330 through 773 for processes, particularly subclasses 375-387 for process control responsive to a sensed condition.
118, Coating Apparatus, appropriate subclasses for coating apparatus.
201, Distillation: Processes, Thermolytic, appropriate subclasses, particularly subclass 1 for thermolytic distillation processes with measuring, testing, or inspecting.
202, Distillation: Apparatus, appropriate subclasses for distillation apparatus.
203, Distillation: Processes, Separatory, appropriate subclasses, particularly subclasses 1 through 3 for separatory distillation processes with measuring, testing, or inspecting.
204, Chemistry: Electrical and Wave Energy, appropriate subclasses.
260, Chemistry of Carbon Compounds, appropriate subclasses.
423, Chemistry of Inorganic Compounds, appropriate subclasses.
702, Data Processing: Measuring, Calibrating, or Testing, subclasses 22 through 32 for chemical analysis.

267 Titration or pH level:
This subclass is indented under 266. Subject matter wherein the chemical reaction process includes a process to determine a concentration of a dissolved substance in terms of a smallest amount of a reagent of known concentration required to bring about a given effect in reaction given a known volume of a test solution or to measure a degree of acidity or alkalinity of a solution.

268 Synthesis process:
This subclass is indented under 266. Subject matter wherein the chemical reaction process includes two or more chemical steps (i.e., reaction, separation, etc.) to build a combined product.

269 Polymerization/trimerization:
This subclass is indented under 268. Subject matter including a reduplication process in which molecules are combined to form larger molecules having repeating structure units of the combined molecules.

SEE OR SEARCH CLASS:
585, Chemistry of Hydrocarbon Compounds, subclasses 350 through 380 for alicyclic compound synthesis and subclass 401 for aromatic compound

synthesis with measuring, sensing, testing, or synthesis operation control responsive to diverse condition.

270 Distillation:
This subclass is indented under 266. Subject matter wherein the chemical reaction process includes the process of first heating a mixture to collect a resultant vapor, and then cooling and condensing the resultant vapor to form a distilled product.

SEE OR SEARCH CLASS:
201, Distillation: Processes, Thermolytic, appropriate subclasses, particularly subclass 1 for thermolytic distillation processes with measuring, testing, or inspecting.
202, Distillation: Apparatus, appropriate subclasses for distillation apparatus.
203, Distillation: Processes, Separatory, appropriate subclasses, particularly subclasses 1 through 3 for separatory distillation processes with measuring, testing, or inspecting.

271 Refinement or purification or rejuvenation:
This subclass is indented under 266. Subject matter wherein the chemical reaction process includes the process for removing impurities in a mixture or for replenishing a solution with a component that has been used up during a chemical process.

SEE OR SEARCH CLASS:
210, Liquid Purification or Separation, appropriate subclasses, particularly subclasses 141 through 142 for such apparatus or processes with program actuator.

272 Of fuel:
This subclass is indented under 271. Subject matter wherein the mixture or the solution is gasoline, oil, or any other hydrocarbon based material.

273 Separation process:
This subclass is indented under 266. Subject matter wherein the chemical reaction process includes a process for separating a mixture into its individual components.

SEE OR SEARCH CLASS:
95, Gas Separation: Processes, subclasses 1 through 24 for gas separation processes with control responsive to sensed condition.
96, Gas Separation: Apparatus, subclass 25 for electric field separation apparatus with programmed, cyclic, or time responsive control means; subclass 103 for chromatography type apparatus with programmed, cyclic, or time responsive control system; and subclass 115 for solid sorbent apparatus with programmed, cyclic, or time responsive control system.

274 Control of combustion or heating apparatus (e.g., kiln, furnace, autoclave, burner, combustion system):
This subclass is indented under 266. Subject matter comprising means for regulating a burning or heating apparatus (e.g., kiln, furnace, autoclave, burner, combustion system, etc.) for the chemical reaction process.

SEE OR SEARCH THIS CLASS, SUBCLASS:
299 through 300, for data processing systems for temperature control.

SEE OR SEARCH CLASS:
110, Furnaces, subclasses 185 through 190 for furnaces with control means responsive to a sensed condition and subclasses 191-192 for furnaces with programmed or cyclic control means.
123, Internal-Combustion Engines, appropriate subclasses.
126, Stoves and Furnaces, appropriate subclasses, particularly subclass 19.5 for combustion engine-heated cooking stoves, oven, or heating vessels.
219, Electric Heating, subclasses 200 through 553 for heating devices.

275 Mechanical control system:
This subclass is indented under 90. Subject matter comprising means for regulating a mechanical structure or process.

SEE OR SEARCH THIS CLASS, SUBCLASS:

1 through 89, for data processing control systems, methods, or apparatus.

276 HVAC control:

This subclass is indented under 275. Subject matter comprising an environmental control or an energy transfer system (i.e., heating, ventilating, air conditioning) for regulating air temperature or humidity in an occupied or an unoccupied living space within a building enclosure.

SEE OR SEARCH CLASS:

165, Heat Exchange, appropriate subclasses, particularly subclasses 200 through 303 for heat exchange with timer, programmer, time delay, or condition responsive control.

236, Automatic Temperature and Humidity Regulation, subclass 1 for heating or cooling controls, and for zone control for heating or cooling medium; and subclass 44 for humidity control.

277 Multiple zones:

This subclass is indented under 276. Subject matter wherein the air temperature or humidity in a plurality of spaces is regulated.

SEE OR SEARCH THIS CLASS, SUBCLASS:

210, for a manufacturing operation having a multizone furnace.

SEE OR SEARCH CLASS:

165, Heat Exchange, subclasses 201 through 265 for heat exchange with timer, programmer, time delay, or condition responsive control having heating or cooling capability.

236, Automatic Temperature and Humidity Regulation, subclass 1 for zone control for heating or cooling medium.

278 Specific thermally responsive controller:

This subclass is indented under 276. Subject matter comprising details of the regulating system for controlling the HVAC system (e.g., heating, venting, air conditioning).

SEE OR SEARCH CLASS:

236, Automatic Temperature and Humidity Regulation, subclass 91 for thermostatic.

337, Electricity: Electrothermally or Thermally Actuated Switches, appropriate subclasses.

279 Balancing or alignment:

This subclass is indented under 275. Subject matter comprising means for measuring, locating, or compensating imbalance effects or misaligned displacement present in an object.

SEE OR SEARCH CLASS:

701, Data Processing: Vehicles, Navigation, and Relative Location, subclasses 41 through 44 for steering control.

280 Vibration or acoustic noise control:

This subclass is indented under 275. Subject matter comprising means for canceling undesired vibrations or means for adjusting amplitude of a vibration signal.

SEE OR SEARCH CLASS:

73, Measuring and Testing, subclasses 570 through 672 for vibration measuring and testing apparatus or method.

181, Acoustics, appropriate subclasses for sound generating or modifying apparatus.

702, Data Processing: Measuring, Calibrating, or Testing, subclass 56 for vibration detection and subclasses 191-195 for measured signal processing for noise removal or suppression.

281 Control of fluid level or volume:

This subclass is indented under 275. Subject matter comprising means for maintaining a fluid supply by adjusting a height of a fluid column or cubic units of a fluid space in a container.

SEE OR SEARCH CLASS:

73, Measuring and Testing, subclasses 1.73 through 1.74 for proving or calibrating of liquid level and volume measuring device and subclasses 290-334 for liquid level or depth gauge.

137, Fluid Handling, subclasses 386 through 454 for liquid level responsive or maintaining systems.
702, Data Processing: Measuring, Calibrating, or Testing, subclass 55 for liquid level or volume determination.

282 Flow control (e.g., valve or pump control):
This subclass is indented under 275. Subject matter comprising means for regulating (e.g., diversion, cutoff, modulation) the passage or the flow capacity of a fluid.

SEE OR SEARCH THIS CLASS, SUBCLASS:
289, for adaptive valve control in a turbine or generator control system.

SEE OR SEARCH CLASS:
73, Measuring and Testing, subclasses 1.16 through 1.36 for instrument proving or calibrating of volume of flow, speed of flow, volume rate of flow, or mass rate of flow; subclasses 23.2-31.07 for gas analysis; and subclasses 53.01-64.56 for liquid analysis.
137, Fluid Handling, subclasses 2 through 12 for flow control processes by a condition or characteristic of a fluid, subclasses 47-58 for speed responsive valve control, and subclasses 803-842 for flow affected by fluid contact, energy field, or Coanda effect.
702, Data Processing: Measuring, Calibrating, or Testing, subclasses 45 through 49 for flow metering.

283 Dispensing management (e.g., spraying):
This subclass is indented under 282. Subject matter wherein means for regulating comprises means for manipulating the distribution of the fluid at an outlet (e.g., dispenser, nozzle, hose, reservoir, distributed center).

SEE OR SEARCH CLASS:
239, Fluid Sprinkling, Spraying, and Diffusing, subclasses 398 through 434.5 for combining of separately supplied fluids (i.e., plural flow paths) and subclasses 461-524 for flow deflecting or rotation controlling means.

284 Irrigation:
This subclass is indented under 283. Subject matter comprising means for selectively activating the distribution of the fluid in accordance with predetermined condition or schedule.

285 Fluid mixing:
This subclass is indented under 282. Subject matter comprising means for combining any two or more fluids.

SEE OR SEARCH THIS CLASS, SUBCLASS:
265, for nonreactive mixing process.

286 Electrical power generation or distribution system:
This subclass is indented under 90. Subject matter wherein the data processing system or calculating computer is designed for or utilized to measure and control the generation of electrical power or the distribution of electrical power through networks applicable in a power plant.

SEE OR SEARCH CLASS:
60, Power Plants, appropriate subclasses for power plant apparatus, per se.
310, Electrical Generator or Motor Structure, appropriate subclasses.
322, Electricity: Single Generator Systems, appropriate subclasses.
323, Electricity: Power Supply or Regulation Systems, appropriate subclasses.
324, Electricity: Measuring and Testing, subclasses 76.11 through 157 for measuring, testing, or sensing electricity, per se.
363, Electric Power Conversion Systems, appropriate subclasses.
702, Data Processing: Measuring, Calibrating, or Testing, subclasses 60 through 63 for a data processing system designed for or utilized in the measurement of power parameters.
705, Data Processing: Financial, Business Practice, Management, or Cost/Price Determination, subclasses 7 through 11 for operational research in a business environment and subclass 412 for cost/price determination for utility usage.

287 Turbine or generator control:
This subclass is indented under 286. Subject matter comprising means for controlling a rotary engine actuated by a current of fluid such as water, steam, or air subject to pressure, or for controlling a machine that generates electricity.

SEE OR SEARCH CLASS:
60, Power Plants, appropriate subclasses.
323, Electricity: Power Supply or Regulation Systems, appropriate subclasses.

288 Cogenerative system:
This subclass is indented under 287. Subject matter having means for using waste energy from one source to drive another, such as using heat from a gas turbine for producing steam to drive an auxiliary steam turbine.

289 Adaptive valve control:
This subclass is indented under 287. Subject matter comprising means for controlling position of a valve for admission of fluid to the turbine in response to a time varying difference signal.

(1) Note. The time variable difference signal represents, for example, a difference between a measured valve position compared to an ideal valve position, a difference between a load reference and an actual turbine load, etc.

SEE OR SEARCH THIS CLASS, SUBCLASS:
282, for flow control in a mechanical control system.

290 For turbine speed control:
This subclass is indented under 289. Subject matter in which the valve is controlled for selecting or regulating speed of the turbine.

SEE OR SEARCH THIS CLASS, SUBCLASS:
304, for a specific application of speed responsive control system.

291 Energy consumption or demand prediction or estimation:
This subclass is indented under 286. Subject matter comprising means for deriving projected energy consumption or demand data over a predetermined future interval of time to regulate a distribution of power energy to operative load.

292 System protection (e.g., circuit interrupter, circuit limiter, voltage suppressor):
This subclass is indented under 286. Subject matter including means adapted for the protection of the power generation or distribution system in response to an operating characteristic falling outside limits of normal operation of the system.

SEE OR SEARCH CLASS:
324, Electricity: Measuring and Testing, subclasses 500 through 556 for fault detecting in electric circuits and of electric components and subclasses 557-559 for insulation fault of noncircuit elements.
361, Electricity: Electrical Systems and Devices, subclasses 1 through 138 for safety and protection of systems and devices.
702, Data Processing: Measuring, Calibrating, or Testing, subclasses 58 through 59 for an electrical fault detection system without any correction, subclass 69 for signal quality in wave form analysis, and subclasses 183-185 for diagnostic analysis.
714, Error Detection/Correction and Fault Detection/Recovery, subclasses 1 through 57 for reliability and availability and subclasses 712-717 for transmission facility testing.

293 Abnormal power, current, or impedance condition:
This subclass is indented under 292. Subject matter including means for tripping a circuit breaker in response to a measured operating power, current, or impedance falling outside limits of normal operating condition.

SEE OR SEARCH CLASS:
324, Electricity: Measuring and Testing, subclasses 76.11 through 157 for measuring, testing, or sensing electricity, per se, particularly subclasses 140-142 for plural inputs and subclasses 600-727 for impedance, admittance, or other quantities repre-

sentative of electrical stimulus/ response relationships.

294 Abnormal phase, waveform, or polarity condition:
This subclass is indented under 292. Subject matter including means for tripping a circuit breaker in response to a measured or detected phase shift, waveform distortion, or polarity shift falling outside limits of normal operating condition.

SEE OR SEARCH CLASS:
324, Electricity: Measuring and Testing, subclasses 76.77 through 91 for phase comparison, subclass 133 for nonquantitative (e.g., hot line indicator, polarity tester), and subclasses 620-626 for distortion measuring, testing, or sensing.

295 Power allocation management (e.g., load adding/shedding):
This subclass is indented under 286. Subject matter comprising means for controlling power distributed to a load by selectively increasing or decreasing consuming power of the load.

296 Time based control (e.g., real time or duty cycle):
This subclass is indented under 295. Subject matter wherein the power distributed to the load is selectively controlled based on a duration control signal (e.g., control interval for load-on or load-off states, etc.) or a time schedule control signal (e.g., month, day, time of day, etc.).

297 Power supply regulation operation:
This subclass is indented under 286. Subject matter comprising means for adjusting power from a power supplier required to meet demand of load or operation of the power generation or distribution system.

(1) Note. Means for adjusting input power may include, for example, an auxiliary generator or a battery.

SEE OR SEARCH CLASS:
323, Electricity: Power Supply or Regulation Systems, subclasses 299 through 303 for input level responsive.

298 By voltage regulation:
This subclass is indented under 297. Subject matter comprising means for adjusting the level of voltage of the power supplier.

299 Specific application of temperature responsive control system:
This subclass is indented under 90. Subject matter wherein temperature of a system is regulated based on temperature measurement data.

SEE OR SEARCH THIS CLASS, SUBCLASS:
1 through 89, for data processing control systems, methods, or apparatus.
274, for data processing systems for controlling of combustion or heating apparatus (e.g., kiln, furnace).

SEE OR SEARCH CLASS:
236, Automatic Temperature and Humidity Regulation, subclass 9 for combined heater and apartment controlled, subclass 15 for furnace control and subclass 44 for humidity control.
337, Electricity: Electrothermally or Thermally Actuated Switches, subclasses 298 through 416 for thermally actuated switches.
374, Thermal Measuring and Testing, subclass 3 for thermal calibration system by immersion in liquid having controlled temperature and subclasses 33-34 for calorimetry with control of heat added to or lost from a sample container.

300 For heating or cooling:
This subclass is indented under 299. Subject matter wherein temperature of the system is controlled by adjustment to a heating or cooling device of the system.

SEE OR SEARCH CLASS:
236, Automatic Temperature and Humidity Regulation, appropriate subclasses, particularly subclass 44 for humidity control and subclass 91 for thermostatic control of heating and cooling.
237, Heating Systems, appropriate subclasses.
432, Heating, subclasses 36 through 49 for heating having condition respon-

sive control and subclasses 51-53 for heating having timing, programming, or cycling control means.

301 Specific application of pressure responsive control system:
This subclass is indented under 90. Subject matter wherein position of an object is regulated based on positional measurement data.

SEE OR SEARCH CLASS:
73, Measuring and Testing, subclasses 700 through 756 for fluid pressure gauge.
251, Valves and Valve Actuation, appropriate subclasses.
417, Pumps, appropriate subclasses.

302 Specific application of positional responsive control system:
This subclass is indented under 90. Subject matter wherein position of an object is regulated based on positional measurement data.

SEE OR SEARCH THIS CLASS, SUBCLASS:
1 through 89, for data processing control systems, method, or apparatus, particularly subclasses 56-66 for digital positioning other than machine tool.

SEE OR SEARCH CLASS:
702, Data Processing: Measuring, Calibrating, or Testing, subclasses 150 through 154 for orientation or position determination.

303 Specific application of dimensional responsive control system:
This subclass is indented under 90. Subject matter wherein dimension of an object is regulated based on dimensional measurement data.

SEE OR SEARCH THIS CLASS, SUBCLASS:
1 through 89, for data processing control systems.

SEE OR SEARCH CLASS:
33, Geometrical Instruments, appropriate subclasses, particularly subclasses 700 through 838 for distance measuring.
702, Data Processing: Measuring, Calibrating, or Testing, subclasses 155 through 172 for dimensional determination.

304 Specific application of speed responsive control system:
This subclass is indented under 90. Subject matter comprising means for regulating speed of an object based on speed measurement data.

SEE OR SEARCH THIS CLASS, SUBCLASS:
1 through 89, for data processing control systems, method, or apparatus, particularly subclass 69 for velocity or acceleration control.
290, for adaptive valve control for controlling turbine speed.

SEE OR SEARCH CLASS:
73, Measuring and Testing, subclasses 488 through 551 for speed, velocity, or acceleration measuring and testing.
324, Electricity: Measuring and Testing, subclasses 160 through 180 for electrical speed measuring.
701, Data Processing: Vehicles, Navigation, and Relative Location, subclasses 93 through 98 for vehicle speed control.

305 Specific application of weight responsive control system:
This subclass is indented under 90. Subject matter comprising means for regulating weight of system based on weight measurement data.

SEE OR SEARCH CLASS:
356, Optics: Measuring and Testing, subclass 228 for calibration of photoelectric movable scales.
702, Data Processing: Measuring, Calibrating, or Testing, subclasses 101 through 102 for calibration or correction of weighing system, subclass 128 for article count or size distribution by weight, and subclasses 173-175 for weight measurement system.

306 Specific application of control based on elapsed time:
This subclass is indented under 90. Subject matter comprising means for controlling a

device or process in response to a measured or calculated elapsed time.

SEE OR SEARCH CLASS:

368, Horology: Time Measuring Systems or Devices, subclasses 139 through 154 for mechanical timepieces and subclasses 184-202 for time regulating means.

702, Data Processing: Measuring, Calibrating, or Testing, subclass 89 for calibration or correction of time measurement system, subclass 125 for testing system in which signal is generated for timing purpose, subclasses 176-178 for time duration or rate measurement system, and subclass 187 for history logging or time stamping.

CROSS-REFERENCE ART COLLECTIONS

900 SPECIAL ROBOT STRUCTURAL ELEMENT:

This subclass is indented under the class definition. Subject matter comprising a robot with special structural element not provided for elsewhere.

(1) Note. Structural elements of this subclass type include, for example, robot arm structures excluded from other classes.

SEE OR SEARCH CLASS:

901, Robots, art collections 15-18 for robot arm structures in general.

FOREIGN ART COLLECTIONS

Any foreign patents/nonpatent literature, which were reclassified, have been transferred directly to the art collection listed below. This art collection contains ONLY foreign documents/nonpatent literature. [Note: Parenthetical references in the titles refer to the abolished U.S. classifications from which these art collections were derived.]

FOR 101 SEQUENTIAL OR SELECTIVE DATA PROCESSING CONTROL SYSTEM, METHOD, OR APPARATUS (364/140):

Foreign art collection comprising a data processing system combined with a device or apparatus controlled thereby (the entirety referred to as a control system) where output signals are sequentially or selectively applied to control a system in a repetitive, orderly manner according to a predetermined schedule of operation.

FOR 102 OPTIMIZATION OR ADAPTIVE DATA PROCESSING CONTROL SYSTEM, METHOD, OR APPARATUS (364/148):

Foreign art collection comprising a data processing system combined with a device or apparatus controlled thereby (the entirety referred to as a control system) where a control seeks to extremilize (optimize) the system s performance criterion (e.g., efficiency, consumption, or profit).

FOR 103 DIGITAL POSITIONING (OTHER THAN MACHINE TOOL) CONTROL SYSTEM, METHOD, OR APPARATUS (364/167.01):

Foreign art collection comprising a data processing system combined with a device or apparatus controlled thereby (the entirety referred to as a control system) where the positioning of a control system member is controlled by a programmed digital computer utilizing numerical values, digital signals, or coded pulses which correspond to a desired position of control.

FOR 104 GAME OR AMUSEMENT (364/410):

Foreign art collection wherein a data processing system or calculating computer is designed for or utilized in the area of athletic events or entertainment.

FOR 105 Scoring (364/411):

Foreign art collection under FOR 104 which keeps track of the total amount of winning or losing in a game.

FOR 106 Wagering (364/412):

Foreign art collection under FOR 104 which includes the element of chance or betting.

END