

CPC COOPERATIVE PATENT CLASSIFICATION

F MECHANICAL ENGINEERING; LIGHTING; HEATING; WEAPONS; BLASTING (NOTE omitted)

ENGINES OR PUMPS

F05 INDEXING SCHEMES RELATING TO ENGINES OR PUMPS IN VARIOUS SUBCLASSES OF CLASSES [F01-F04](#)

F05D INDEXING SCHEME FOR ASPECTS RELATING TO NON-POSITIVE- DISPLACEMENT MACHINES OR ENGINES, GAS-TURBINES OR JET- PROPULSION PLANTS

2200/00 Mathematical features

- 2200/10 . Basic functions
- 2200/11 . . Sum
- 2200/12 . . Subtraction
- 2200/13 . . Product
- 2200/14 . . Division
- 2200/15 . . Inverse
- 2200/20 . Special functions
- 2200/21 . . Root
- 2200/211 . . . Square root
- 2200/212 . . . Cubic root
- 2200/22 . . Power
- 2200/221 . . . Square power
- 2200/222 . . . Cubic power
- 2200/23 . . Logarithm
- 2200/24 . . exponential
- 2200/25 . . Hyperbolic trigonometric, e.g. sinh, cosh, tanh
- 2200/26 . . trigonometric
- 2200/261 . . . Sine
- 2200/262 . . . Cosine
- 2200/263 . . . Tangent
- 2200/264 . . . Cotangent
- 2200/30 . miscellaneous
- 2200/31 . . odd
- 2200/32 . . even
- 2200/33 . . bigger or smaller
- 2200/34 . . biggest or smallest
- 2200/35 . . first
- 2200/36 . . last

2210/00 Working fluids

- 2210/10 . Kind or type
- 2210/11 . . liquid, i.e. incompressible
- 2210/12 . . gaseous, i.e. compressible
- 2210/13 . . mixed, e.g. two-phase fluid
- 2210/132 . . . Pumps with means for separating and evacuating the gaseous phase
- 2210/14 . . Refrigerants with particular properties, e.g. HFC
- 2210/20 . Properties
- 2210/30 . Flow characteristics
- 2210/31 . . with Mach-number kept constant along the flow
- 2210/32 . . Pressure kept constant along the flow
- 2210/33 . . Turbulent flow
- 2210/34 . . Laminar flow

- 2210/40 . Flow geometry or direction
- 2210/41 . . upwards due to the buoyancy of compressed air
- 2210/42 . . Axial inlet and radial outlet
- 2210/43 . . Radial inlet and axial outlet
- 2210/44 . . bidirectional, i.e. in opposite, alternating directions

2220/00 Application

- 2220/10 . in ram-jet engines or ram-jet driven vehicles
- 2220/20 . within closed fluid conduits, e.g. pipes
- 2220/30 . in turbines
- 2220/31 . . in steam turbines
- 2220/32 . . in gas turbines
- 2220/321 . . . for a special turbine stage
- 2220/3212 the first stage of a turbine
- 2220/3213 an intermediate stage of the turbine
- 2220/3215 the last stage of the turbine
- 2220/3216 for a special compressor stage
- 2220/3217 for the first stage of a compressor or a low pressure compressor
- 2220/3218 for an intermediate stage of a compressor
- 2220/3219 for the last stage of a compressor or a high pressure compressor
- 2220/323 . . . for aircraft propulsion, e.g. jet engines
- 2220/324 . . . to drive unshrouded, low solidity propeller
- 2220/325 . . . to drive unshrouded, high solidity propeller
- 2220/326 . . . to drive shrouded, low solidity propeller
- 2220/327 . . . to drive shrouded, high solidity propeller
- 2220/328 . . . providing direct vertical lift
- 2220/329 . . . in helicopters
- 2220/34 . . in ram-air turbines ("RATS")
- 2220/36 . . specially adapted for the fan of turbofan engines
- 2220/40 . in turbochargers
- 2220/50 . for auxiliary power units (APU's)
- 2220/60 . making use of surplus or waste energy
- 2220/62 . . with energy recovery turbines
- 2220/64 . . for domestic central heating or production of electricity
- 2220/70 . in combination with
- 2220/72 . . a steam turbine
- 2220/722 . . . as part of an integrated gasification combined cycle
- 2220/74 . . a gas turbine

- 2220/75 . . equipment using fuel having a low calorific value, e.g. low BTU fuel, waste end, syngas, biomass fuel or flare gas
- 2220/76 . . an electrical generator
- 2220/762 . . . of the direct current (D.C.) type
- 2220/764 . . . of the alternating current (A.C.) type
- 2220/7642 of the synchronous type
- 2220/7644 of the asynchronous type, i.e. induction type
- 2220/7646 Double fed induction generators (DFIGs)
- 2220/766 . . . via a direct connection, i.e. a gearless transmission
- 2220/768 . . . equipped with permanent magnets
- 2220/77 . . . of the linear type
- 2220/80 . . in supersonic vehicles excluding hypersonic vehicles or ram, scram or rocket propulsion
- 2220/90 . . in vehicles adapted for vertical or short take off and landing (v/stol vehicles)
- 2230/00 Manufacture**
- 2230/10 . . by removing material
- 2230/11 . . . by electrochemical methods
- 2230/12 . . . by spark erosion methods
- 2230/13 . . . using lasers
- 2230/14 . . . Micromachining
- 2230/18 . . . Manufacturing tolerances
- 2230/20 . . essentially without removing material
- 2230/21 . . . by casting
- 2230/211 by precision casting, e.g. microfusing or investment casting
- 2230/22 . . . by sintering
- 2230/23 . . . by permanently joining parts together
- 2230/232 by welding
- 2230/233 Electron beam welding
- 2230/234 Laser welding
- 2230/235 TIG or MIG welding
- 2230/236 Diffusion bonding
- 2230/237 Brazing
- 2230/238 Soldering
- 2230/239 Inertia or friction welding
- 2230/24 . . . by extrusion
- 2230/25 . . . by forging
- 2230/26 . . . by rolling
- 2230/30 . . with deposition of material
- 2230/31 . . . Layer deposition
- 2230/311 by torch or flame spraying
- 2230/312 by plasma spraying
- 2230/313 by physical vapour deposition
- 2230/314 by chemical vapour deposition
- 2230/40 . . Heat treatment
- 2230/41 . . . Hardening; Annealing
- 2230/411 Precipitation hardening
- 2230/42 . . . by hot isostatic pressing
- 2230/50 . . Building or constructing in particular ways
- 2230/51 . . . in a modular way, e.g. using several identical or complementary parts or features
- 2230/52 . . . using existing or "off the shelf" parts, e.g. using standardized turbocharger elements
- 2230/53 . . . by integrally manufacturing a component, e.g. by milling from a billet or one piece construction
- 2230/54 . . . by sheet metal manufacturing
- 2230/60 . . Assembly methods
- 2230/61 . . . using limited numbers of standard modules which can be adapted by machining
- 2230/64 . . . using positioning or alignment devices for aligning or centring, e.g. pins
- 2230/642 using maintaining alignment while permitting differential dilatation
- 2230/644 for adjusting the position or the alignment, e.g. wedges or eccenters
- 2230/68 . . . using auxiliary equipment for lifting or holding
- 2230/70 . . Disassembly methods
- 2230/72 . . Maintenance
- 2230/80 . . Repairing, retrofitting or upgrading methods
- 2230/90 . . Coating; Surface treatment ([manufacture with deposition of material F05D 2230/30](#))
- 2240/00 Components**
- NOTE**
- Components are the basic elements of construction
- 2240/10 . . Stators
- 2240/11 . . . Shroud seal segments
- 2240/12 . . . Fluid guiding means, e.g. vanes
- 2240/121 related to the leading edge of a stator vane
- 2240/122 related to the trailing edge of a stator vane
- 2240/123 related to the pressure side of a stator vane
- 2240/124 related to the suction side of a stator vane
- 2240/125 related to the tip of a stator vane
- 2240/126 Baffles or ribs
- 2240/127 Vortex generators, turbulators, or the like, for mixing ([by creating turbulence F05D 2260/2212](#))
- 2240/128 Nozzles
- 2240/1281 Plug nozzles
- 2240/129 Cascades, i.e. assemblies of similar profiles acting in parallel
- 2240/14 . . Casings or housings protecting or supporting assemblies within
- 2240/15 . . Heat shield
- 2240/20 . . Rotors
- 2240/24 . . . for turbines
- 2240/241 of impulse type
- 2240/242 of reaction type
- 2240/243 of the Archimedes screw type
- 2240/30 . . Characteristics of rotor blades, i.e. of any element transforming dynamic fluid energy to or from rotational energy and being attached to a rotor
- 2240/301 Cross-sectional characteristics
- 2240/302 characteristics related to shock waves, transonic or supersonic flow
- 2240/303 related to the leading edge of a rotor blade
- 2240/304 related to the trailing edge of a rotor blade
- 2240/305 related to the pressure side of a rotor blade
- 2240/306 related to the suction side of a rotor blade
- 2240/307 related to the tip of a rotor blade
- 2240/31 with roughened surfaces
- 2240/35 . . Combustors or associated equipment
- 2240/36 . . Fuel vaporizer
- 2240/40 . . Use of a multiplicity of similar components
- 2240/50 . . Bearings
- 2240/51 . . . Magnetic
- 2240/511 with permanent magnets
- 2240/515 Electromagnetic
- 2240/52 . . . Axial thrust bearings
- 2240/53 . . . Hydrodynamic or hydrostatic bearings

- 2240/54 . . Radial bearings
- 2240/55 . Seals
- 2240/56 . . Brush seals
- 2240/57 . . Leaf seals
- 2240/58 . . Piston ring seals
- 2240/581 . . . Double or plural piston ring arrangements, i.e. two or more piston rings
- 2240/59 . . Lamellar seals
- 2240/60 . Shafts
- 2240/61 . . Hollow
- 2240/62 . . Flexible
- 2240/63 . . Glands for admission or removal of fluids from shafts
- 2240/70 . Slinger plates or washers
- 2240/80 . Platforms for stationary or moving blades
- 2240/81 . . Cooled platforms
- 2240/90 . Mounting on supporting structures or systems
- 2240/91 . . on a stationary structure
- 2250/00** **Geometry**
- NOTE**
- Geometry indicates the shape or form of a component or the configuration or arrangement of components in a machine or in a plant
- 2250/10 . Two-dimensional
- 2250/11 . . triangular
- 2250/12 . . rectangular
- 2250/121 . . . square
- 2250/13 . . trapezoidal
- 2250/131 . . . polygonal
- 2250/132 . . . hexagonal
- 2250/14 . . elliptical
- 2250/141 . . . circular
- 2250/15 . . spiral
- 2250/16 . . parabolic
- 2250/17 . . hyperbolic
- 2250/18 . . patterned
- 2250/181 . . . ridged
- 2250/182 . . . crenellated, notched
- 2250/183 . . . zigzag
- 2250/184 . . . sinusoidal
- 2250/185 . . . serpentine-like
- 2250/19 . . machined; miscellaneous
- 2250/191 . . . perforated
- 2250/192 . . . bevelled
- 2250/193 . . . milled
- 2250/20 . Three-dimensional
- 2250/21 . . pyramidal
- 2250/22 . . parallelepipedal
- 2250/221 . . . cubic
- 2250/23 . . prismatic
- 2250/231 . . . cylindrical
- 2250/232 . . . conical
- 2250/24 . . ellipsoidal
- 2250/241 . . . spherical
- 2250/25 . . helical
- 2250/26 . . paraboloid
- 2250/27 . . hyperboloid
- 2250/28 . . patterned
- 2250/281 . . . threaded
- 2250/282 . . . cubic pattern
- 2250/283 . . . honeycomb
- 2250/29 . . machined; miscellaneous
- 2250/291 . . . hollowed
- 2250/292 . . . tapered
- 2250/293 . . . lathed, e.g. rotation symmetrical
- 2250/294 . . . grooved
- 2250/30 . Arrangement of components
- 2250/31 . . according to the direction of their main axis or their axis of rotation
- 2250/311 . . . the axes being in line
- 2250/312 . . . the axes being parallel to each other
- 2250/313 . . . the axes being perpendicular to each other
- 2250/314 . . . the axes being inclined in relation to each other
- 2250/315 . . . the main axis being substantially vertical
- 2250/32 . . according to their shape
- 2250/321 . . . asymptotic
- 2250/322 . . . tangential
- 2250/323 . . . convergent
- 2250/324 . . . divergent
- 2250/33 . . symmetrical
- 2250/34 . . translated
- 2250/35 . . rotated
- 2250/36 . . in inner-outer relationship, e.g. shaft-bearing arrangements
- 2250/37 . . circumferential
- 2250/38 . . angled, e.g. sweep angle
- 2250/40 . Movement of components
- 2250/41 . . with one degree of freedom
- 2250/411 . . . in rotation
- 2250/42 . . with two degrees of freedom
- 2250/43 . . with three degrees of freedom
- 2250/44 . . by counter rotation
- 2250/50 . Inlet or outlet
- 2250/51 . . Inlet
- 2250/511 . . . augmenting, i.e. with intercepting fluid flow cross sectional area greater than the rest of the machine behind the inlet
- 2250/512 . . . concentrating only, i.e. with intercepting fluid flow cross sectional area not greater than the rest of the machine behind the inlet
- 2250/52 . . Outlet
- 2250/53 . . of regenerative pumps
- 2250/60 . Structure; Surface texture
- 2250/61 . . corrugated
- 2250/611 . . . undulated
- 2250/62 . . smooth or fine
- 2250/621 . . . polished
- 2250/63 . . coarse
- 2250/70 . Shape
- 2250/71 . . curved
- 2250/711 . . . convex
- 2250/712 . . . concave
- 2250/713 . . . inflexed
- 2250/72 . . symmetric
- 2250/73 . . asymmetric
- 2250/74 . . given by a set or table of xyz-coordinates
- 2250/75 . . given by its similarity to a letter, e.g. T-shaped
- 2250/80 . Size or power range of the machines
- 2250/82 . . Micromachines
- 2250/84 . . Nanomachines
- 2250/90 . Variable geometry

| 2260/00 | Function |
|----------------|---|
| 2260/02 | . Transport and handling during maintenance and repair |
| 2260/10 | . Particular cycles |
| 2260/12 | . Testing on a test bench |
| 2260/14 | . Preswirling |
| 2260/15 | . Load balancing |
| 2260/16 | . Fluid modulation at a certain frequency |
| 2260/20 | . Heat transfer, e.g. cooling |
| 2260/201 | . . . by impingement of a fluid |
| 2260/202 | . . . by film cooling |
| 2260/203 | . . . by transpiration cooling |
| 2260/204 | . . . by the use of microcircuits |
| 2260/205 | . . . Cooling fluid recirculation, i.e. after cooling one or more components is the cooling fluid recovered and used elsewhere for other purposes |
| 2260/207 | . . . using a phase changing mass, e.g. heat absorbing by melting or boiling |
| 2260/208 | . . . using heat pipes |
| 2260/209 | . . . using vortex tubes |
| 2260/211 | . . . by intercooling, e.g. during a compression cycle |
| 2260/212 | . . . by water injection |
| 2260/213 | . . . by the provision of a heat exchanger within the cooling circuit |
| 2260/221 | . . . Improvement of heat transfer |
| 2260/2212 | by creating turbulence (vortex generators , turbulators or the like for mixing F05D 2240/127) |
| 2260/2214 | by increasing the heat transfer surface |
| 2260/22141 | using fins or ribs |
| 2260/231 | . . . Preventing heat transfer |
| 2260/232 | . . . characterized by the cooling medium |
| 2260/2322 | steam |
| 2260/234 | . . . of the generator by compressor inlet air |
| 2260/24 | . . . for draft enhancement in chimneys, using solar or other heat sources |
| 2260/30 | . Retaining components in desired mutual position |
| 2260/31 | . Retaining bolts or nuts |
| 2260/311 | . of the frangible or shear type |
| 2260/32 | . . . by means of magnetic or electromagnetic forces |
| 2260/33 | . . . with a bayonet coupling |
| 2260/34 | . . . Balancing of radial or axial forces on regenerative rotors |
| 2260/35 | . . . Reducing friction between regenerative impeller discs and casing walls |
| 2260/36 | . . . by a form fit connection, e.g. by interlocking |
| 2260/37 | . . . by a press fit connection |
| 2260/38 | . . . by a spring, i.e. spring loaded or biased towards a certain position |
| 2260/39 | . . . by a V-shaped ring to join the flanges of two cylindrical sections, e.g. casing sections of a turbocharger |
| 2260/40 | . Transmission of power |
| 2260/402 | . . . through friction drives |
| 2260/4021 | through belt drives |
| 2260/4022 | through endless chains |
| 2260/4023 | through a friction clutch |
| 2260/403 | . . . through the shape of the drive components |
| 2260/4031 | as in toothed gearing |
| 2260/40311 | of the epicyclical, planetary or differential type |
| 2260/404 | . . . through magnetic drive coupling |
| 2260/4041 | the driven magnets encircling the driver magnets |
| 2260/406 | . . . through hydraulic systems |
| 2260/407 | . . . through piezoelectric conversion |
| 2260/408 | . . . through magnetohydrodynamic conversion |
| 2260/42 | . Storage of energy |
| 2260/43 | . . . in the form of rotational kinetic energy, e.g. in flywheels |
| 2260/50 | . Kinematic linkage, i.e. transmission of position |
| 2260/52 | . . . involving springs |
| 2260/53 | . . . using gears |
| 2260/532 | of the bevelled or angled type |
| 2260/54 | . . . using flat or V-belts and pulleys |
| 2260/55 | . . . using chains and sprockets; using toothed belts |
| 2260/56 | . . . using cams or eccentrics |
| 2260/57 | . . . using servos, independent actuators, etc. |
| 2260/60 | . Fluid transfer |
| 2260/601 | . . . using an ejector or a jet pump |
| 2260/602 | . . . Drainage |
| 2260/6022 | of leakage having past a seal (seals F05D 2240/57 ; glands F05D 2240/63) |
| 2260/604 | . . . Vortex non-clogging type pumps |
| 2260/605 | . . . Venting into the ambient atmosphere or the like |
| 2260/606 | . . . Bypassing the fluid |
| 2260/607 | . . . Preventing clogging or obstruction of flow paths by dirt, dust, or foreign particles |
| 2260/608 | . . . Aeration, ventilation, dehumidification or moisture removal of closed spaces |
| 2260/609 | . . . Deoiling or demisting |
| 2260/61 | . . . Removal of CO ₂ (removal of CO₂ from waste gases B01D 53/62) |
| 2260/611 | . . . Sequestration of CO ₂ |
| 2260/70 | . Adjusting of angle of incidence or attack of rotating blades |
| 2260/71 | . . . as a function of flow velocity |
| 2260/72 | . . . by turning around an axis parallel to the rotor centre line |
| 2260/74 | . . . by turning around an axis perpendicular the rotor centre line |
| 2260/75 | . . . the adjusting mechanism not using auxiliary power sources, e.g. by "servos" |
| 2260/76 | . . . the adjusting mechanism using auxiliary power sources |
| 2260/77 | . . . the adjusting mechanism driven or triggered by centrifugal forces |
| 2260/78 | . . . the adjusting mechanism driven or triggered by aerodynamic forces |
| 2260/79 | . . . Bearing, support or actuation arrangements therefor |
| 2260/80 | . Diagnostics |
| 2260/81 | . Modelling or simulation |
| 2260/82 | . Forecasts |
| 2260/821 | . . . Parameter estimation or prediction |
| 2260/83 | . Testing, e.g. methods, components or tools therefor |
| 2260/84 | . Redundancy |
| 2260/85 | . Starting |
| 2260/90 | . Braking |
| 2260/901 | . . . using aerodynamic forces, i.e. lift or drag |
| 2260/902 | . . . using frictional mechanical forces |
| 2260/903 | . . . using electrical or magnetic forces |
| 2260/904 | . . . using hydrodynamic forces |

F05D

- 2260/94 Functionality given by mechanical stress related aspects such as low cycle fatigue [LCF] of high cycle fatigue [HCF]
- 2260/941 particularly aimed at mechanical or thermal stress reduction
- 2260/95 Preventing corrosion ([coating or surface treatment F05D 2230/90](#))
- 2260/96 Preventing, counteracting or reducing vibration or noise
- 2260/961 by mistuning rotor blades or stator vanes with irregular interblade spacing, airfoil shape
- 2260/962 by means of "anti-noise"
- 2260/963 by Helmholtz resonators
- 2260/964 counteracting thermoacoustic noise
- 2260/97 Reducing windage losses
- 2260/972 in radial flow machines
- 2260/98 Lubrication
- 2260/99 Ignition, e.g. ignition by warming up of fuel or oxidizer in a resonant acoustic cavity

- 2270/00 Control**
- 2270/01 Purpose of the control system
- 2270/02 to control rotational speed (n)
- 2270/021 to prevent overspeed
- 2270/022 to prevent underspeed
- 2270/023 of different spools or shafts
- 2270/024 to keep rotational speed constant
- 2270/03 in variable speed operation
- 2270/04 to control acceleration (u)
- 2270/042 by keeping it below damagingly high values
- 2270/044 by making it as high as possible
- 2270/05 to affect the output of the engine
- 2270/051 Thrust
- 2270/052 Torque
- 2270/053 Explicitly mentioned power
- 2270/06 to match engine to driven device
- 2270/061 in particular the electrical frequency of driven generator
- 2270/07 to improve fuel economy
- 2270/071 in particular at idling speed
- 2270/08 to produce clean exhaust gases
- 2270/081 with as little smoke as possible
- 2270/082 with as little NOx as possible
- 2270/083 by monitoring combustion conditions
- 2270/0831 indirectly, at the exhaust
- 2270/09 to cope with emergencies
- 2270/091 in particular sudden load loss
- 2270/092 in particular blow-out and relight
- 2270/093 of one engine in a multi-engine system
- 2270/094 by using back-up controls
- 2270/095 by temporary overriding set control limits
- 2270/096 caused by water or hail ingestion
- 2270/10 to cope with, or avoid, compressor flow instabilities
- 2270/101 Compressor surge or stall
- 2270/102 caused by working fluid flow velocity profile distortion
- 2270/1022 due to high angle of attack of aircraft
- 2270/1024 due to compressor degradation
- 2270/11 to prolong engine life
- 2270/112 by limiting temperatures
- 2270/114 by limiting mechanical stresses
- 2270/116 by preventing reverse rotation
- 2270/12 to maintain desired vehicle trajectory parameters
- 2270/121 Altitude
- 2270/122 Speed or Mach number
- 2270/13 to control two or more engines simultaneously
- 2270/14 to control thermoacoustic behaviour in the combustion chambers ([counteracting noise or vibration F05D 2260/96](#))
- 2270/16 to control water or steam injection
- 2270/17 to control boundary layer
- 2270/172 by a plasma generator, e.g. control of ignition
- 2270/173 by the Coanda effect
- 2270/18 using fluidic amplifiers or actuators
- 2270/20 to optimize the performance of a machine
- 2270/30 Control parameters, e.g. input parameters
- 2270/301 Pressure
- 2270/3011 Inlet pressure
- 2270/3013 Outlet pressure
- 2270/3015 differential pressure
- 2270/303 Temperature
- 2270/3032 excessive temperatures, e.g. caused by overheating
- 2270/304 Spool rotational speed
- 2270/305 Tolerances
- 2270/306 Mass flow
- 2270/3061 of the working fluid
- 2270/3062 of the auxiliary fluid for heating or cooling purposes
- 2270/309 Rate of change of parameters
- 2270/31 Fuel schedule for stage combustors
- 2270/311 Air humidity
- 2270/312 Air pressure
- 2270/313 Air temperature
- 2270/331 Mechanical loads
- 2270/332 Maximum loads or fatigue criteria
- 2270/333 Noise or sound levels
- 2270/334 Vibration measurements
- 2270/335 Output power or torque
- 2270/336 Blade lift measurements
- 2270/40 Type of control system
- 2270/42 passive or reactive, e.g. using large wind vanes
- 2270/44 active, predictive, or anticipative
- 2270/46 redundant, i.e. failsafe operation
- 2270/50 Control logic embodiments
- 2270/52 by electrical means, e.g. relays or switches
- 2270/54 by electronic means, e.g. electronic tubes, transistors or IC's within an electronic circuit
- 2270/56 by hydraulic means, e.g. hydraulic valves within a hydraulic circuit
- 2270/58 by mechanical means, e.g. levers, gears or cams
- 2270/60 Control system actuates means
- 2270/62 Electrical actuators
- 2270/64 Hydraulic actuators
- 2270/65 Pneumatic actuators
- 2270/66 Mechanical actuators ([F05D 2270/62 takes precedence](#))
- 2270/70 Type of control algorithm
- 2270/701 proportional
- 2270/702 differential
- 2270/703 integral
- 2270/704 proportional-differential
- 2270/705 proportional-integral
- 2270/706 proportional-integral-differential

F05D

- 2270/707 . . fuzzy logic
- 2270/708 . . with comparison tables
- 2270/709 . . with neural networks
- 2270/71 . . synthesized, i.e. parameter computed by a mathematical model
- 2270/80 . Devices generating input signals, e.g. transducers, sensors, cameras or strain gauges
- 2270/802 . . Calibration thereof
- 2270/803 . . Sampling thereof
- 2270/804 . . Optical devices
- 2270/8041 . . . Cameras
- 2270/805 . . Radars
- 2270/806 . . Sonars
- 2270/807 . . Accelerometers
- 2270/808 . . Strain gauges; Load cells
- 2270/809 . . Encoders
- 2270/81 . . Microphones
- 2270/821 . . Displacement measuring means, e.g. inductive
- 2300/00 Materials; Properties thereof**
- 2300/10 . Metals, alloys or intermetallic compounds
- 2300/11 . . Iron
- 2300/111 . . . Cast iron
- 2300/12 . . Light metals
- 2300/121 . . . Aluminium
- 2300/122 . . . Beryllium
- 2300/123 . . . Boron
- 2300/124 . . . Lithium
- 2300/125 . . . Magnesium
- 2300/13 . . Refractory metals, i.e. Ti, V, Cr, Zr, Nb, Mo, Hf, Ta, W
- 2300/131 . . . Molybdenum
- 2300/132 . . . Chromium
- 2300/133 . . . Titanium
- 2300/134 . . . Zirconium
- 2300/135 . . . Hafnium
- 2300/14 . . Noble metals, i.e. Ag, Au, platinum group metals
- 2300/141 . . . Silver
- 2300/142 . . . Gold
- 2300/143 . . . Platinum group metals, i.e. Os, Ir, Pt, Ru, Rh, Pd
- 2300/1431 Palladium
- 2300/1432 Ruthenium
- 2300/1433 Osmium
- 2300/1434 Iridium
- 2300/1435 Rhodium
- 2300/15 . . Rare earth metals, i.e. Sc, Y, lanthanides
- 2300/16 . . Other metals not provided for in groups [F05D 2300/11](#) - [F05D 2300/15](#)
- 2300/1602 . . . Arsenic
- 2300/1604 . . . Antimony
- 2300/1606 . . . Bismuth
- 2300/1608 . . . Barium
- 2300/161 . . . Manganese
- 2300/1612 . . . Lead
- 2300/1614 . . . Tin
- 2300/1616 . . . Zinc
- 2300/1618 . . . Mercury
- 2300/17 . . Alloys
- 2300/171 . . . Steel alloys
- 2300/172 . . . Copper alloys
- 2300/1721 Bronze
- 2300/1722 Phosphor-bronze alloy
- 2300/1723 Nickel-Copper alloy, e.g. Monel
- 2300/173 . . . Aluminium alloys, e.g. AlCuMgPb
- 2300/174 . . . Titanium alloys, e.g. TiAl
- 2300/175 . . . Superalloys
- 2300/176 . . . Heat-stable alloys
- 2300/177 . . . Ni - Si alloys
- 2300/18 . . Intermetallic compounds
- 2300/182 . . . Metal-aluminide intermetallic compounds
- 2300/20 . . Oxide or non-oxide ceramics
- 2300/21 . . Oxide ceramics
- 2300/2102 . . . Glass
- 2300/2104 . . . MIBA
- 2300/2106 . . . Quartz
- 2300/2108 . . . Phosphor
- 2300/211 . . . Silica
- 2300/2112 . . . Aluminium oxides
- 2300/2114 . . . Sapphire
- 2300/2116 . . . Zinc oxide
- 2300/2118 . . . Zirconium oxides
- 2300/212 . . . Aluminium titanate
- 2300/22 . . Non-oxide ceramics
- 2300/222 . . . Silicon
- 2300/224 . . . Carbon, e.g. graphite
- 2300/226 . . . Carbides
- 2300/2261 of silicon
- 2300/2262 of titanium, e.g. TiC
- 2300/2263 of tungsten, e.g. WC
- 2300/228 . . . Nitrides
- 2300/2281 of aluminium
- 2300/2282 of boron
- 2300/2283 of silicon
- 2300/2284 of titanium
- 2300/2285 of zirconium
- 2300/229 . . . Sulfides
- 2300/2291 of molybdenum
- 2300/30 . . Inorganic materials other than provided for in groups [F05D 2300/10](#) - [F05D 2300/2291](#)
- 2300/40 . . Organic materials
- 2300/41 . . Leather
- 2300/42 . . Cellulosic materials, e.g. wood
- 2300/43 . . Synthetic polymers, e.g. plastics; Rubber
- 2300/431 . . . Rubber
- 2300/432 . . . PTFE [PolyTetraFluorEthylene]
- 2300/433 . . . Polyamides, e.g. NYLON
- 2300/434 . . . Polyimides, e.g. AURUM
- 2300/436 . . . Polyetherketones, e.g. PEEK
- 2300/437 . . . Silicon polymers
- 2300/44 . . Resins
- 2300/48 . . other organic materials
- 2300/50 . . Intrinsic material properties or characteristics
- 2300/501 . . Elasticity
- 2300/502 . . Thermal properties
- 2300/5021 . . . Expansivity
- 2300/50211 similar
- 2300/50212 dissimilar
- 2300/5023 . . . Thermal capacity
- 2300/5024 . . . Heat conductivity
- 2300/504 . . Reflective properties
- 2300/505 . . Shape memory behaviour
- 2300/506 . . Hardness

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- 2300/507 . . Magnetic properties
- 2300/509 . . Self lubricating materials; Solid lubricants
- 2300/51 . . Hydrophilic, i.e. being or having wettable properties
- 2300/512 . . Hydrophobic, i.e. being or having non-wettable properties
- 2300/514 . . Porosity
- 2300/516 . . Surface roughness
- 2300/518 . . Ductility
- 2300/52 . . Translucence
- 2300/522 . . Density
- 2300/60 . Properties or characteristics given to material by treatment or manufacturing
- 2300/601 . . Fabrics
- 2300/6012 . . . Woven fabrics
- 2300/603 . . Composites; e.g. fibre-reinforced
- 2300/6031 . . . Functionally graded composites
- 2300/6032 . . . Metal matrix composites [MMC]
- 2300/6033 . . . Ceramic matrix composites [CMC]
- 2300/6034 . . . Orientation of fibres, weaving, ply angle
- 2300/604 . . Amorphous
- 2300/605 . . Crystalline
- 2300/606 . . Directionally-solidified crystalline structures
- 2300/607 . . Monocrystallinity
- 2300/608 . . Microstructure
- 2300/609 . . Grain size
- 2300/61 . . Syntactic materials, i.e. hollow spheres embedded in a matrix
- 2300/611 . . Coating
- 2300/6111 . . functionally graded coating
- 2300/612 . . Foam
- 2300/613 . . Felt
- 2300/614 . . Fibres or filaments
- 2300/615 . . Filler
- 2300/70 . Treatment or modification of materials
- 2300/701 . . Heat treatment
- 2300/702 . . Reinforcement