

**CPC****COOPERATIVE PATENT CLASSIFICATION****F05B****INDEXING SCHEME RELATING TO MACHINES OR ENGINES OTHER THAN NON-POSITIVE-DISPLACEMENT MACHINES OR ENGINES, TO WIND MOTORS, TO NON-POSITIVE DISPLACEMENT PUMPS, AND TO GENERATING COMBUSTION PRODUCTS OF HIGH PRESSURE OR HIGH VELOCITY****NOTE**

This subclass constitutes an internal scheme for indexing only.

**F05B 2200/00****Mathematical features**

- F05B 2200/10 . Basic functions
- F05B 2200/11 .. Sum
- F05B 2200/12 .. Substraction
- F05B 2200/13 .. Product
- F05B 2200/14 .. Division
- F05B 2200/15 .. Inverse
  
- F05B 2200/20 . Special functions
- F05B 2200/21 .. Root
- F05B 2200/211 ... Square root
- F05B 2200/212 ... Cubic root
- F05B 2200/22 .. Power
- F05B 2200/221 ... Square power
- F05B 2200/222 ... Cubic power
- F05B 2200/23 .. Logarithm
- F05B 2200/24 .. exponential
- F05B 2200/25 .. Hyperbolic trigonometric, e.g. sinh, cosh, tanh
- F05B 2200/26 .. trigonometric
- F05B 2200/261 ... Sine
- F05B 2200/262 ... Cosine
- F05B 2200/263 ... Tangent
- F05B 2200/264 ... Cotangent
  
- F05B 2200/30 . miscellaneous
- F05B 2200/31 .. odd
- F05B 2200/32 .. even
- F05B 2200/33 .. bigger/smaller

- F05B 2200/34 .. biggest/smallest
- F05B 2200/35 .. first
- F05B 2200/36 .. last

## **F05B 2210/00 Working fluid**

### **NOTE**

Indexing codes of group [F05B 2210/00](#) can be followed by a name for a specific working fluid preceded by the "+" sign, e.g. [F05B 2210/11](#)+water.

- F05B 2210/10 . Kind or type
- F05B 2210/11 .. liquid, i.e. incompressible
- F05B 2210/12 .. gaseous, i.e. compressible
- F05B 2210/13 .. mixed, e.g. two-phase fluid
- F05B 2210/132 ... Pumps with means for separating and evacuating the gaseous phase
- F05B 2210/14 .. Refrigerants with particular properties, e.g. HFC-[134a](#)
- F05B 2210/16 . Air or water being indistinctly used as working fluid, i.e. the machine can work equally with air or water without any modification
- F05B 2210/18 . Air and water being simultaneously used as working fluid
- F05B 2210/20 . Properties
- F05B 2210/30 . Flow characteristics
- F05B 2210/301 .. with Mach-number kept constant along the flow
- F05B 2210/302 .. Pressure kept constant along the flow
- F05B 2210/40 . Flow geometry or direction
- F05B 2210/401 .. upwards due to the buoyancy of compressed air
- F05B 2210/402 .. Axial inlet and radial outlet
- F05B 2210/403 .. Radial inlet and axial outlet
- F05B 2210/404 .. bidirectional, i.e. in opposite, alternating directions

## **F05B 2220/00 Application**

- F05B 2220/10 . in ram-jet engines or ram-jet driven vehicles
- F05B 2220/20 . within closed fluid conduits, e.g. pipes
- F05B 2220/25 . as advertisement
- F05B 2220/30 . in turbines
- F05B 2220/301 .. in steam turbines

- F05B 2220/302 . . . in gas turbines
- F05B 2220/3021 . . . . for a special turbine stage
- F05B 2220/3022 . . . . . the first stage of a turbine
- F05B 2220/3023 . . . . . an intermediate stage of the turbine
- F05B 2220/3025 . . . . . the last stage of the turbine
- F05B 2220/303 . . . for aircraft propulsion, e.g. jet engines
- F05B 2220/304 . . . to drive unshrouded, low solidity propeller
- F05B 2220/305 . . . to drive unshrouded, high solidity propeller
- F05B 2220/306 . . . to drive shrouded, low solidity propeller
- F05B 2220/307 . . . to drive shrouded, high solidity propeller
- F05B 2220/308 . . . providing direct vertical lift
- F05B 2220/309 . . . in a helicopter
- F05B 2220/31 . . . in ram-air turbines ("RATS")
- F05B 2220/32 . . . in water turbines
- F05B 2220/33 . . . specially adapted for the fan of turbofan engines
  
- F05B 2220/40 . . in turbochargers
  
- F05B 2220/50 . . for auxiliary power units (APU's)
  
- F05B 2220/60 . . making use of surplus or waste energy
- F05B 2220/602 . . . with energy recovery turbines
- F05B 2220/604 . . . for domestic central heating or production of electricity
  
- F05B 2220/61 . . for hydrogen and/or oxygen production
  
- F05B 2220/62 . . for desalination
  
- F05B 2220/64 . . for aeration
  
- F05B 2220/70 . . in combination with
- F05B 2220/702 . . . a steam turbine
- F05B 2220/704 . . . a gas turbine
- F05B 2220/706 . . . an electrical generator
- F05B 2220/7062 . . . . of the direct current (D.C.) type
- F05B 2220/7064 . . . . of the alternating current (A.C.) type
- F05B 2220/70642 . . . . . of the synchronous type
- F05B 2220/70644 . . . . . of the asynchronous type, i.e. induction type
- F05B 2220/70646 . . . . . Double fed induction generators (DFIGs)
- F05B 2220/7066 . . . via a direct connection, i.e. a gearless transmission
- F05B 2220/7068 . . . equipped with permanent magnets
- F05B 2220/707 . . . of the linear type
- F05B 2220/708 . . . Photoelectric means, i.e. photovoltaic or solar cells
- F05B 2220/709 . . . Piezoelectric means

- F05B 2220/80 . in supersonic vehicles excluding hypersonic vehicles or ram, scram or rocket propulsion
- F05B 2220/90 . in vehicles adapted for vertical or short take off and landing ([v/stol vehicles](#)), ([gas turbines providing direct vertical lift F05B 2220/308](#))

## **F05B 2230/00      Manufacture**

### **NOTE**

Manufacture comprises also treatment, assembly or disassembly methods, repairing, handling or the like.

- F05B 2230/10 . by removing material
- F05B 2230/101 .. by electrochemical methods
- F05B 2230/102 .. by spark erosion methods
- F05B 2230/103 .. using lasers
- F05B 2230/104 . Micromachining
- F05B 2230/20 . essentially without removing material
- F05B 2230/21 .. by casting
- F05B 2230/211 ... by precision casting, e.g. microfusing or investment casting
- F05B 2230/22 .. by sintering
- F05B 2230/23 .. by permanently joining parts together
- F05B 2230/232 ... by welding
- F05B 2230/233 .... Electron beam welding
- F05B 2230/234 .... Laser welding
- F05B 2230/235 .... Tig/Mig welding
- F05B 2230/236 .... Diffusion bonding
- F05B 2230/237 .... Brazing
- F05B 2230/238 .... Soldering
- F05B 2230/239 .... Inertia or friction welding
- F05B 2230/24 .. by extrusion
- F05B 2230/25 .. by forging
- F05B 2230/26 .. by rolling
- F05B 2230/30 . with deposition of material
- F05B 2230/31 .. Layer deposition
- F05B 2230/311 ... by torch or flame spray
- F05B 2230/312 ... by plasma spray
- F05B 2230/313 ... by physical vapour deposition
- F05B 2230/314 ... by chemical vapour deposition
- F05B 2230/40 . Heat treatment

- F05B 2230/41 . . Hardening; Annealing
- F05B 2230/50 . Building or constructing in particular ways
- F05B 2230/502 . . using existing or "off the shelf" parts, e.g. using standardised turbocharger elements
- F05B 2230/60 . Assembly methods
- F05B 2230/601 . . using limited numbers of standard modules which can be adapted by machining
- F05B 2230/604 . . using positioning or alignment devices for aligning or centering, e.g. pins
- F05B 2230/606 . . . using maintaining alignment while permitting differential dilatation
- F05B 2230/608 . . . for adjusting the position or the alignment, e.g. wedges or excenters
- F05B 2230/61 . . using auxiliary equipment for lifting or holding ([hoisting on to a stationary structure with provisions on the structure itself F05B 2240/916](#))
- F05B 2230/6102 . . . carried on a floating platform
- F05B 2230/70 . Disassembly methods
- F05B 2230/80 . Repairing, retrofitting or upgrading methods
- F05B 2230/90 . Coating; Surface treatment ([manufacture with deposition of material F05B 2220/30](#))

## **F05B 2240/00 Components**

### **NOTE**

Components are the basic elements of construction.

- F05B 2240/10 . Stators
- F05B 2240/11 . . Shroud seal segments
- F05B 2240/12 . . Fluid guiding means, e.g. vanes
- F05B 2240/121 . . . Baffles or ribs
- F05B 2240/122 . . . Vortex generators, turbulators, or the like, for mixing ([by creating turbulence F05B 2260/222](#))
- F05B 2240/123 . . . Nozzles
- F05B 2240/1231 . . . . Plug nozzles
- F05B 2240/124 . . . Cascades, i.e. assemblies of similar profiles acting in parallel
- F05B 2240/13 . . to collect or cause flow towards or away from turbines
- F05B 2240/131 . . . by means of vertical structures, i.e. chimneys
- F05B 2240/132 . . . creating a vortex or tornado effect
- F05B 2240/133 . . . with a convergent-divergent guiding structure, e.g. a Venturi conduit
- F05B 2240/14 . . Casings, housings, nacelles, gondels or the like, protecting or supporting assemblies within
- F05B 2240/142 . . . in the form of a standard ISO container
- F05B 2240/20 . Rotors
- F05B 2240/201 . . using the Magnus-effect

- F05B 2240/202 .. with adjustable area of intercepted fluid
- F05B 2240/2021 ... by means of telescoping blades
- F05B 2240/2022 ... by means of tethering or coning blades
- F05B 2240/2023 ... by means of radially reefing blades
- F05B 2240/21 .. for wind turbines
- F05B 2240/211 ... with vertical axis
- F05B 2240/212 .... of the Darrieus type
- F05B 2240/213 .... of the Savonius type
- F05B 2240/214 .... of the Musgrove or "H"-type
- F05B 2240/215 .... of the panemone or "vehicle ventilator" type
- F05B 2240/216 .... of the anemometer type
- F05B 2240/217 .... of the crossflow- or "Banki"- or "double action" type
- F05B 2240/218 .... with horizontally hinged vanes
- F05B 2240/221 ... with horizontal axis
- F05B 2240/2211 .... of the multibladed, low speed, e.g. "American farm" type
- F05B 2240/2212 .... perpendicular to wind direction
- F05B 2240/2213 .... and with the rotor downwind from the yaw pivot axis
- F05B 2240/231 ... driven by aerodynamic lift effects
- F05B 2240/232 .... driven by drag
- F05B 2240/24 .. for turbines
- F05B 2240/241 ... of impulse type
- F05B 2240/2411 .... Pelton type
- F05B 2240/242 ... of reaction type
- F05B 2240/243 ... of the Archimedes screw type
- F05B 2240/244 ... of the cross-flow, e.g. Banki, Ossberger type
- F05B 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
- F05B 2240/301 ... Cross-section characteristics
- F05B 2240/302 ... Segmented or sectional blades
- F05B 2240/31 ... of changeable form or shape
- F05B 2240/311 .... flexible or elastic
- F05B 2240/312 .... capable of being reefed
- F05B 2240/3121 ..... around an axis orthogonal to rotor rotational axis
- F05B 2240/313 .... with adjustable flow intercepting area ([F05B 2240/312](#) takes precedence)
- F05B 2240/32 ... with roughened surfaces
- F05B 2240/33 .. Shrouds which are part of or which are rotating with the rotor
- F05B 2240/34 .. with auxiliary or secondary rotors attached to blades of main rotor
- F05B 2240/35 . Combustors or associated equipment
- F05B 2240/36 .. Fuel vaporizer
- F05B 2240/40 . Use of a multiplicity of similar components

- F05B 2240/50 . Bearings
- F05B 2240/51 .. magnetic
- F05B 2240/511 ... with permanent magnets
- F05B 2240/515 ... electromagnetic
- F05B 2240/52 .. Axial thrust bearings
- F05B 2240/53 .. Hydrodynamic or hydrostatic bearings
- F05B 2240/54 .. Radial bearings
  
- F05B 2240/57 . Seals
- F05B 2240/571 .. Brush seals
- F05B 2240/572 .. Leaf seals
  
- F05B 2240/60 . Shafts
- F05B 2240/61 .. hollow
- F05B 2240/62 .. flexible
- F05B 2240/63 .. Glands for admission or removal of fluids from shafts
  
- F05B 2240/70 . Slinger plates or washers
  
- F05B 2240/80 . Platforms for stationary or moving blades
- F05B 2240/801 .. cooled platforms
  
- F05B 2240/90 . Mounting on supporting structures or systems
- F05B 2240/91 .. on a stationary structure
- F05B 2240/911 ... already existing for a prior purpose
- F05B 2240/9111 .... which is a chimney
- F05B 2240/9112 .... which is a building
- F05B 2240/9113 .... which is a roadway, rail track, or the like for recovering energy from moving vehicles
- F05B 2240/912 ... on a tower
- F05B 2240/9121 .... on a lattice tower
- F05B 2240/913 ... on a mast
- F05B 2240/914 ... on an inflatable structure
- F05B 2240/915 ... which is vertically adjustable
- F05B 2240/9151 .... telescopically
- F05B 2240/9152 .... by being hinged
- F05B 2240/91521 ..... at ground level
- F05B 2240/916 ... with provision for hoisting onto the structure
- F05B 2240/917 ... attached to cables
- F05B 2240/92 .. on an airborne structure
- F05B 2240/921 ... kept aloft due to aerodynamic effects
- F05B 2240/922 ... kept aloft due to buoyancy effects
- F05B 2240/923 ... which is a vehicle

- F05B 2240/93 .. on a structure floating on a liquid surface
- F05B 2240/931 ... which is a vehicle
- F05B 2240/932 ... which is a catamaran-like structure
- F05B 2240/94 .. on a movable wheeled structure
- F05B 2240/941 ... which is a land vehicle
- F05B 2240/95 .. offshore
- F05B 2240/96 .. as part of a wind farm
- F05B 2240/97 .. on a submerged structure
- F05B 2240/98 .. which is inflatable
  
- F05B 2240/99 . characterised by colour or colour patterns

**F05B 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.

- F05B 2250/02 . variable
  
- F05B 2250/10 . two-dimensional
- F05B 2250/11 .. triangular
- F05B 2250/12 .. rectangular
- F05B 2250/121 ... square
- F05B 2250/13 .. trapezoidal
- F05B 2250/131 ... polygonal
- F05B 2250/132 ... hexagonal
- F05B 2250/14 .. elliptical
- F05B 2250/141 ... circular
- F05B 2250/15 .. spiral
- F05B 2250/16 .. parabolic
- F05B 2250/17 .. hyperbolic
- F05B 2250/18 .. patterned
- F05B 2250/181 ... ridged
- F05B 2250/182 ... crenellated, notched
- F05B 2250/183 ... zigzag
- F05B 2250/184 ... sinusoidal
- F05B 2250/19 .. machined; miscellaneous
- F05B 2250/191 ... perforated
- F05B 2250/192 ... beveled
- F05B 2250/193 ... milled
  
- F05B 2250/20 . three-dimensional

- F05B 2250/21 .. pyramidal
- F05B 2250/22 .. parallelepipedic
- F05B 2250/221 ... cubic
- F05B 2250/23 .. prismatic
- F05B 2250/231 ... cylindrical
- F05B 2250/232 ... conical
- F05B 2250/24 .. ellipsoidal
- F05B 2250/241 ... spherical
- F05B 2250/25 .. helical
- F05B 2250/26 .. paraboloidal
- F05B 2250/27 .. hyperboloidal
- F05B 2250/28 .. patterned
- F05B 2250/281 ... threaded
- F05B 2250/282 ... Cubic pattern
- F05B 2250/283 ... Honeycomb
- F05B 2250/29 .. machined; miscellaneous
- F05B 2250/291 ... hollowed
- F05B 2250/292 ... tapered
- F05B 2250/293 ... lathed, e.g. rotation symmetrical
  
- F05B 2250/30 . Arrangement of components
- F05B 2250/31 .. according to the direction of their main axis or their axis of rotation
- F05B 2250/311 ... the axes being in line
- F05B 2250/312 ... the axes being parallel to each other
- F05B 2250/313 ... the axes being perpendicular to each other
- F05B 2250/314 ... the axes being inclined in relation to each other
- F05B 2250/315 ... the main axis being substantially vertical
- F05B 2250/32 .. according to their shape
- F05B 2250/321 ... asymptotic
- F05B 2250/322 ... tangential
- F05B 2250/323 ... convergent
- F05B 2250/324 ... divergent
- F05B 2250/33 .. symmetrical
- F05B 2250/34 .. translated
- F05B 2250/35 .. rotated
- F05B 2250/36 .. in inner-outer relationship, e.g. shaft-bearing arrangements
  
- F05B 2250/40 . Movement of component
- F05B 2250/41 .. with one degree of freedom
- F05B 2250/411 ... in rotation
- F05B 2250/42 .. with two degrees of freedom
- F05B 2250/43 .. with three degrees of freedom

- F05B 2250/50 . Inlet or outlet
- F05B 2250/501 .. Inlet
- F05B 2250/5011 ... augmenting, i.e. with intercepting fluid flow cross sectional area greater than the rest of the machine behind the inlet
- F05B 2250/5012 ... concentrating only, i.e. with intercepting fluid flow cross sectional area not greater than the rest of the machine behind the inlet
- F05B 2250/502 .. Outlet
- F05B 2250/503 .. of regenerative pumps
  
- F05B 2250/60 . Structure; Surface texture
- F05B 2250/61 .. corrugated
- F05B 2250/611 ... undulated
- F05B 2250/62 .. smooth
- F05B 2250/621 ... polished
  
- F05B 2250/70 . Shape
- F05B 2250/71 .. curved
- F05B 2250/711 ... convex
- F05B 2250/712 ... concave
- F05B 2250/713 ... inflexed
- F05B 2250/72 .. symmetric
- F05B 2250/73 .. asymmetric
  
- F05B 2250/80 . Size or power range of the machines
- F05B 2250/82 .. Micromachines
- F05B 2250/84 .. Nanomachines ([Nanotechnology for interacting, sensing or actuating Y01N 8/00](#))
- F05B 2250/86 .. Megamachines
  
- F05B 2260/00      **Function****
  
- F05B 2260/02 . Transport, e.g. specific adaptations or devices for conveyance ([transport of wind turbines or equipments therefore F03D 1/005](#))
  
- F05B 2260/10 . Particular cycles
  
- F05B 2260/20 . Heat transfer, e.g. cooling
- F05B 2260/201 .. by impingement of a fluid
- F05B 2260/202 .. by film cooling
- F05B 2260/203 .. by transpiration cooling
- F05B 2260/205 .. Cooling fluid recirculation, i.e. after having cooled one or more components the cooling fluid is recovered and used elsewhere for other purposes
- F05B 2260/207 .. using a phase changing mass, ([e.g. heat absorbing by melting or boiling](#))
- F05B 2260/208 .. using heat pipes
- F05B 2260/209 .. using vortex tubes

- F05B 2260/211 .. by intercooling, e.g. during a compression cycle
- F05B 2260/212 ... by water injection
- F05B 2260/221 .. Improvement of heat transfer
- F05B 2260/222 ... by creating turbulence ([vortex generators](#), [turbulators](#) or the like for mixing [F05B 2240/122](#))
- F05B 2260/224 ... by increasing the heat transfer surface
- F05B 2260/2241 .... using fins or ribs
- F05B 2260/231 .. Preventing heat transfer
- F05B 2260/232 .. characterised by the cooling medium
- F05B 2260/233 ... the medium being steam
- F05B 2260/24 .. for draft enhancement in chimneys, using solar or other heat sources
  
- F05B 2260/30 . Retaining components in desired mutual position
- F05B 2260/301 .. Retaining bolts or nuts
- F05B 2260/3011 ... of the frangible or shear type
- F05B 2260/302 .. by means of magnetic or electromagnetic forces
- F05B 2260/303 .. with a bayonet coupling
- F05B 2260/304 .. Balancing of radial or axial forces on regenerative rotors
- F05B 2260/305 .. Reducing friction between regenerative impeller discs and casing walls
  
- F05B 2260/40 . Transmission of power
- F05B 2260/402 .. through friction drives
- F05B 2260/4021 ... through belt drives
- F05B 2260/4022 ... through endless chains
- F05B 2260/4023 ... through a friction clutch
- F05B 2260/403 .. through the shape of the drive components
- F05B 2260/4031 ... as in toothed gearing
- F05B 2260/40311 .... of the epicyclic, planetary or differential type
- F05B 2260/404 .. through magnetic drive coupling
- F05B 2260/4041 ... the driven magnets encircling the driver magnets
- F05B 2260/406 .. through hydraulic systems
- F05B 2260/407 .. through piezoelectric conversion
- F05B 2260/408 .. through magnetohydrodynamic conversion
  
- F05B 2260/42 . Storage of energy
- F05B 2260/421 .. in the form of rotational kinetic energy , e.g. in flywheels
  
- F05B 2260/50 . Kinematic linkage, i.e. transmission of position
- F05B 2260/502 .. involving springs
- F05B 2260/503 .. using gears
- F05B 2260/5032 ... of the bevel or angled type
- F05B 2260/504 .. using flat or V-belts and pulleys
- F05B 2260/505 .. using chains and sprockets; using toothed belts
- F05B 2260/506 .. using cams or eccentrics

- F05B 2260/507 .. using servos, independent actuators, etc.
- F05B 2260/60 . Fluid transfer
- F05B 2260/601 .. using an ejector or a jet pump
- F05B 2260/602 .. Drainage
- F05B 2260/603 ... of leakage having past a seal ([seals F05B 2240/57](#); [glands F05B 2240/63](#))
- F05B 2260/604 .. Vortex non-clogging type pumps
- F05B 2260/63 .. Preventing clogging or obstruction of flow paths by dirt, dust, or foreign particles
- F05B 2260/64 .. Aeration, ventilation, dehumidification or moisture removal of closed spaces
- F05B 2260/70 . Adjusting of angle of incidence or attack of rotating blades
- F05B 2260/71 .. as a function of flow velocity
- F05B 2260/72 .. by turning around an axis parallel to the rotor centre line
- F05B 2260/74 .. by turning around an axis perpendicular the rotor centre line
- F05B 2260/75 .. the adjusting mechanism not using auxiliary power sources ("servos")
- F05B 2260/76 .. the adjusting mechanism using auxiliary power sources
- F05B 2260/77 .. the adjusting mechanism driven or triggered by centrifugal forces
- F05B 2260/78 .. the adjusting mechanism driven or triggered by aerodynamic forces
- F05B 2260/79 .. Bearing, support or actuation arrangements therefor
- F05B 2260/80 . Diagnostics
- F05B 2260/82 . Forecasts
- F05B 2260/821 .. Parameter estimation or prediction
- F05B 2260/8211 ... of the weather
- F05B 2260/83 . Testing, e.g. methods, components or tools therefor
- F05B 2260/84 . Modeling or simulation
- F05B 2260/845 . Redundancy
- F05B 2260/85 . Starting
- F05B 2260/90 . Braking
- F05B 2260/901 .. using aerodynamic forces, i.e. lift or drag
- F05B 2260/9011 ... of the tips of rotor blades
- F05B 2260/902 .. using frictional mechanical forces
- F05B 2260/903 .. using electrical or magnetic forces
- F05B 2260/904 .. using hydrodynamic forces
- F05B 2260/95 . Preventing corrosion ([coating or surface treatment F05B 2230/90](#))
- F05B 2260/96 . Preventing, counteracting or reducing vibration or noise
- F05B 2260/962 .. my means creating "anti-noise"
- F05B 2260/964 .. by damping means

- F05B 2260/966 .. by correcting static or dynamic imbalance
- F05B 2260/97 . Reducing windage losses
- F05B 2260/972 .. in radial flow machines
- F05B 2260/98 . Lubrication
- F05B 2260/99 . Radar absorption
- F05B 2270/00      Control**
- F05B 2270/10 . Purpose of the control system
- F05B 2270/101 .. to control rotational speed (n)
- F05B 2270/1011 ... to prevent overspeed
- F05B 2270/1012 ... to prevent underspeed
- F05B 2270/1013 ... of different spools or shafts
- F05B 2270/1014 ... to keep rotational speed constant
- F05B 2270/1016 .. in variable speed operation
- F05B 2270/102 .. to control acceleration (u)
- F05B 2270/1021 ... by keeping it below damagingly high values
- F05B 2270/1022 ... by making it as high as possible
- F05B 2270/103 .. to affect the output of the engine
- F05B 2270/1031 ... Thrust
- F05B 2270/1032 ... Torque
- F05B 2270/1033 ... Power (if explicitly mentioned)
- F05B 2270/104 .. to match engine to driven device
- F05B 2270/1041 ... in particular the electrical frequency of driven generator
- F05B 2270/105 .. to improve fuel economy
- F05B 2270/1051 ... in particular at idling speed
- F05B 2270/106 .. to produce clean exhaust gases
- F05B 2270/1061 ... with as little smoke as possible
- F05B 2270/1062 ... with as little NOx`s as possible
- F05B 2270/1063 ... by monitoring combustion conditions
- F05B 2270/1064 .... indirectly, at the exhaust
- F05B 2270/107 .. to cope with emergencies
- F05B 2270/1071 ... in particular sudden load loss
- F05B 2270/10711 .... applying a low voltage ride through method
- F05B 2270/1072 ... in particular blow-out and relight
- F05B 2270/1073 ... of one engine in a multi-engine system
- F05B 2270/1074 ... by using back-up controls
- F05B 2270/1075 ... by temporary overriding set control limits
- F05B 2270/1076 ... caused by water or hail ingestion
- F05B 2270/108 .. to cope with, or avoid, compressor flow instabilities

F05B 2270/1081	...	Compressor surge or stall
F05B 2270/10812	....	caused by working fluid flow velocity profile distortion
F05B 2270/10815	.....	due to high angle of attack of aircraft
F05B 2270/10817	.....	due to compressor degradation
F05B 2270/109	..	to prolong engine life
F05B 2270/1091	...	by limiting temperatures
F05B 2270/1095	...	by limiting mechanical stresses
F05B 2270/1097	...	by preventing reverse rotation
F05B 2270/11	..	to maintain desired vehicle trajectory parameters
F05B 2270/1101	...	Altitude
F05B 2270/1102	...	Speed or Mach number
F05B 2270/111	..	to control two or more engines simultaneously
F05B 2270/15	..	to control thermoacoustic behaviour in the combustion chambers ( <a href="#">counteracting noise or vibration F05B 2260/96</a> )
F05B 2270/16	..	to control water or steam injection
F05B 2270/17	..	to avoid excessive deflection of the blades
F05B 2270/18	..	to control buoyancy
F05B 2270/19	..	to avoid stroboscopic flicker shadow on surroundings
F05B 2270/20	..	to optimise the performance of a machine
F05B 2270/30	.	Control parameters, e.g. input parameters
F05B 2270/301	..	Pressure
F05B 2270/3011	...	Inlet
F05B 2270/3013	...	Outlet
F05B 2270/3015	...	differential
F05B 2270/303	..	Temperature
F05B 2270/3032	...	excessive temperatures, e.g. caused by overheating
F05B 2270/304	..	Spool rotational speed
F05B 2270/305	..	Tolerances
F05B 2270/309	..	Rate of change of parameters
F05B 2270/31	..	Fuel schedule for stage combustors
F05B 2270/32	..	Wind speeds
F05B 2270/3201	...	"cut-off" or "shut-down" wind speed
F05B 2270/321	..	Wind directions
F05B 2270/322	..	the detection or prediction of a wind gust
F05B 2270/323	..	Air humidity
F05B 2270/324	..	Air pressure
F05B 2270/325	..	Air temperature
F05B 2270/326	..	Rotor angle
F05B 2270/327	..	Rotor or generator speeds
F05B 2270/328	..	Blade pitch angle
F05B 2270/329	..	Azimuth or yaw angle

- F05B 2270/33 .. Proximity of blade to tower
- F05B 2270/331 .. Mechanical loads
- F05B 2270/332 .. Maximum loads or fatigue criteria
- F05B 2270/333 .. Noise or sound levels
- F05B 2270/334 .. Vibration measurements
- F05B 2270/335 .. Output power or torque
- F05B 2270/336 .. Blade lift measurements
- F05B 2270/337 .. Electrical grid status parameters, e.g. voltage, frequency or power demand
  
- F05B 2270/40 . Type of control system
  - F05B 2270/402 .. passive or reactive, e.g. using large wind vanes
  - F05B 2270/404 .. active, predictive, or anticipative
  
- F05B 2270/50 . Control logic embodiment by
  - F05B 2270/502 .. electrical means, e.g. relays or switches
  - F05B 2270/504 .. electronic means, e.g. electronic tubes, transistors or IC`s within an electronic circuit
  - F05B 2270/506 .. hydraulic means, e.g. hydraulic valves within a hydraulic circuit
  - F05B 2270/508 .. mechanical means, e.g. levers, gears or cams
  
- F05B 2270/60 . Control system actuates through
  - F05B 2270/602 .. electrical actuators
  - F05B 2270/604 .. hydraulic actuators
  - F05B 2270/605 .. Pneumatic actuators
  - F05B 2270/606 .. mechanical actuators ([F05B 2270/602](#) takes precedence)
  
- F05B 2270/70 . Type of control algorithm
  - F05B 2270/701 .. proportional
  - F05B 2270/702 .. differential
  - F05B 2270/703 .. integral
  - F05B 2270/704 .. proportional-differential
  - F05B 2270/705 .. proportional-integral
  - F05B 2270/706 .. proportional-integral-differential
  - F05B 2270/707 .. fuzzy logic
  - F05B 2270/708 .. with comparison tables
  - F05B 2270/709 .. with neural networks
  
- F05B 2270/80 . Devices generating input signals, e.g. transducers, sensors, cameras or strain gauges
  - F05B 2270/802 .. Calibration thereof
  - F05B 2270/803 .. Sampling thereof
  - F05B 2270/804 .. Optical devices
    - F05B 2270/8041 ... Cameras
    - F05B 2270/8042 ... Lidar systems
  - F05B 2270/805 .. Radars

F05B 2270/806	..	Sonars
F05B 2270/807	..	Accelerometers
F05B 2270/808	..	Strain gauges; Load cells
F05B 2270/809	..	Encoders
F05B 2270/81	..	Microphones
F05B 2270/821	..	Displacement measuring means, e.g. inductive

**F05B 2280/00**      **Materials; Properties thereof**

F05B 2280/10	.	Inorganic materials, e.g. metals
F05B 2280/101	..	Iron
F05B 2280/1011	..	Cast iron
F05B 2280/102	..	Light metals
F05B 2280/1021	...	Aluminium
F05B 2280/1022	...	Beryllium
F05B 2280/1023	...	Boron
F05B 2280/1024	...	Lithium
F05B 2280/1025	...	Magnesium
F05B 2280/103	..	Heavy metals
F05B 2280/10301	...	Refractory metals, e.g. V, W
F05B 2280/10302	...	Chromium
F05B 2280/10303	...	Molybdenum
F05B 2280/10304	...	Titanium
F05B 2280/10305	...	Zirconium
F05B 2280/10306	...	Hafnium
F05B 2280/10307	...	Manganese
F05B 2280/10308	...	Lead
F05B 2280/10309	...	Tin
F05B 2280/1031	...	Zinc
F05B 2280/10311	...	Mercury
F05B 2280/104	..	Noble metals
F05B 2280/1041	...	Silver
F05B 2280/1042	...	Gold
F05B 2280/1043	...	Platinum group, e.g. Pt, Ir
F05B 2280/1044	...	Palladium
F05B 2280/1045	...	Ruthenium
F05B 2280/1046	...	Osmium
F05B 2280/1047	...	Iridium
F05B 2280/1048	...	Rhodium
F05B 2280/105	..	Copper
F05B 2280/106	..	Rare earth metals, e.g. Sc, Y
F05B 2280/107	..	Alloys

F05B 2280/1071	...	Steel alloys
F05B 2280/1072	..	Copper alloys
F05B 2280/10721	...	Bronze
F05B 2280/10722	...	Phosphor-bronze alloy
F05B 2280/10723	...	Nickel-Copper alloy, e.g. monel
F05B 2280/1073	..	Aluminium alloy, e.g. AlCuMgPb
F05B 2280/1074	..	Alloys not otherwise provided for
F05B 2280/10741	...	Superalloys
F05B 2280/10742	...	Heat stable alloys
F05B 2280/10743	...	Ni - Si alloys
F05B 2280/10744	...	Metal-aluminide intermetallic compounds
F05B 2280/20	.	Inorganic materials, e.g. non-metallic materials
F05B 2280/2001	..	Glass
F05B 2280/20011	...	MIBA
F05B 2280/20012	...	Quartz
F05B 2280/2002	..	Phosphor
F05B 2280/2003	..	Silicon
F05B 2280/2004	..	Ceramics; Oxides
F05B 2280/20041	...	Aluminium oxides
F05B 2280/20042	...	Zinc oxides
F05B 2280/20043	...	Zirconium oxides
F05B 2280/2005	..	Non-oxide ceramics
F05B 2280/2006	..	Carbon, e.g. graphite
F05B 2280/2007	..	Carbides
F05B 2280/20071	...	of silicon
F05B 2280/20072	...	of titanium, e.g. TiB
F05B 2280/20073	...	of wolfram, e.g. tungsten carbide
F05B 2280/2008	..	Nitrides
F05B 2280/20081	...	of aluminium
F05B 2280/20082	...	of boron
F05B 2280/20083	...	of silicon
F05B 2280/20084	...	of titanium
F05B 2280/20085	...	of zirconium
F05B 2280/2009	..	Sulfides
F05B 2280/20091	...	of molybdenum
F05B 2280/201	..	Sapphire
F05B 2280/2011	..	Aluminium titanate
F05B 2280/2013	..	Silica
F05B 2280/2014	..	Arsenic
F05B 2280/2015	..	Antimony
F05B 2280/2016	..	Bismuth

- F05B 2280/2017 .. Barium
- F05B 2280/30 . Inorganic materials not otherwise provided for
- F05B 2280/40 . Organic materials
  - F05B 2280/4001 .. Leather
  - F05B 2280/4002 .. Cellulosic materials, e.g. wood
  - F05B 2280/4003 .. Synthetic polymers, e.g. plastics; Rubber
  - F05B 2280/4004 .. Rubber
  - F05B 2280/4005 .. PTFE (PolyTetraFluorEthylene)
  - F05B 2280/4006 .. Polyamides, e.g. NYLON
  - F05B 2280/4007 .. Thermoplastics
  - F05B 2280/4008 .. Polyamides, e.g. Aurum
  - F05B 2280/4009 .. Polyetherketones, e.g. PEEK
  - F05B 2280/401 .. Silicon polymers
  - F05B 2280/4011 .. Organic materials not otherwise provided for
- F05B 2280/50 . Intrinsic material properties or characteristics
  - F05B 2280/5001 .. Elasticity
  - F05B 2280/5002 .. Thermal properties
    - F05B 2280/5003 .. Expansivity
      - F05B 2280/50031 ... similar
      - F05B 2280/50032 ... dissimilar
    - F05B 2280/5004 .. Heat transfer
    - F05B 2280/5005 .. Reflective properties
    - F05B 2280/5006 .. Shape memory
    - F05B 2280/5007 .. Hardness
    - F05B 2280/5008 .. Magnetic properties
      - F05B 2280/5009 .. non-magnetic
    - F05B 2280/501 .. Self lubricating materials; Solid lubricants
    - F05B 2280/5011 .. Surface roughness
  - F05B 2280/60 . Properties or characteristics given to material by treatment or manufacturing
    - F05B 2280/6001 .. Fabrics
      - F05B 2280/6002 ... Woven fabrics
    - F05B 2280/6003 .. Composites; e.g. fibre-reinforced
      - F05B 2280/6004 .. amorphous
      - F05B 2280/6005 .. crystalline
        - F05B 2280/6006 .. Directionally-solidified crystalline structures
        - F05B 2280/6007 .. monocrystalline
      - F05B 2280/6008 .. Structures
        - F05B 2280/6009 .. Grain size
        - F05B 2280/601 .. Syntactic

- F05B 2280/6011 .. Coating
- F05B 2280/6012 .. Foam
- F05B 2280/6013 .. Fibres
- F05B 2280/6014 .. Filler
- F05B 2280/6015 .. Resin
  
- F05B 2280/70 . Treatments or modification of materials
- F05B 2280/701 .. Heat treatments
- F05B 2280/702 .. Reinforcements