

**CPC****COOPERATIVE PATENT CLASSIFICATION****F05D****INDEXING SCHEME FOR ASPECTS RELATING TO  
NON-POSITIVE-DISPLACEMENT MACHINES OR ENGINES,  
GAS-TURBINES OR JET-PROPULSION PLANTS****Guidance heading:****F05D 2200/00****Mathematical features**

F05D 2200/10	. Basic functions
F05D 2200/11	.. Sum
F05D 2200/12	.. Subtraction
F05D 2200/13	.. Product
F05D 2200/14	.. Division
F05D 2200/15	.. Inverse
F05D 2200/20	. Special functions
F05D 2200/21	.. Root
F05D 2200/211	... Square root
F05D 2200/212	... Cubic root
F05D 2200/22	.. Power
F05D 2200/221	... Square power
F05D 2200/222	... Cubic power
F05D 2200/23	.. Logarithm
F05D 2200/24	.. exponential
F05D 2200/25	.. Hyperbolic trigonometric, e.g. sinh, cosh, tanh
F05D 2200/26	.. trigonometric
F05D 2200/261	... Sine
F05D 2200/262	... Cosine
F05D 2200/263	... Tangent
F05D 2200/264	... Cotangent
F05D 2200/30	. miscellaneous
F05D 2200/31	.. odd
F05D 2200/32	.. even
F05D 2200/33	.. bigger or smaller
F05D 2200/34	.. biggest or smallest
F05D 2200/35	.. first
F05D 2200/36	.. last

**Guidance heading:**

**F05D 2210/00****Working fluids**

- F05D 2210/10 . Kind or type
- F05D 2210/11 .. liquid, i.e. incompressible
- F05D 2210/12 .. gaseous, i.e. compressible
- F05D 2210/13 .. mixed, e.g. two-phase fluid
- F05D 2210/132 ... Pumps with means for separating and evacuating the gaseous phase
- F05D 2210/14 .. Refrigerants with particular properties, e.g. HFC

**F05D 2210/20**

- . Properties

**F05D 2210/30**

- . Flow characteristics

**F05D 2210/31**

- .. with Mach-number kept constant along the flow

**F05D 2210/32**

- .. Pressure kept constant along the flow

**F05D 2210/33**

- .. Turbulent flow

**F05D 2210/34**

- .. Laminar flow

**F05D 2210/40**

- . Flow geometry or direction

**F05D 2210/41**

- .. upwards due to the buoyancy of compressed air

**F05D 2210/42**

- .. Axial inlet and radial outlet

**F05D 2210/43**

- .. Radial inlet and axial outlet

**F05D 2210/44**

- .. bidirectional, i.e. in opposite, alternating directions

**F05D 2220/00****Application****F05D 2220/10**

- . in ram-jet engines or ram-jet driven vehicles

**F05D 2220/20**

- . within closed fluid conduits, e.g. pipes

**F05D 2220/30**

- . in turbines

**F05D 2220/31**

- .. in steam turbines

**F05D 2220/32**

- .. in gas turbines

**F05D 2220/321**

- ... for a special turbine stage

**F05D 2220/3212**

- .... the first stage of a turbine

**F05D 2220/3213**

- .... an intermediate stage of the turbine

**F05D 2220/3215**

- .... the last stage of the turbine

**F05D 2220/3216**

- .... for a special compressor stage

**F05D 2220/3217**

- ..... for the first stage of a compressor or a low pressure compressor

**F05D 2220/3218**

- ..... for an intermediate stage of a compressor

**F05D 2220/3219**

- ..... for the last stage of a compressor or a high pressure compressor

**F05D 2220/323**

- ... for aircraft propulsion, e.g. jet engines

**F05D 2220/324**

- ... to drive unshrouded, low solidity propeller

**F05D 2220/325**

- ... to drive unshrouded, high solidity propeller

- F05D 2220/326 . . . to drive shrouded, low solidity propeller
- F05D 2220/327 . . . to drive shrouded, high solidity propeller
- F05D 2220/328 . . . providing direct vertical lift
- F05D 2220/329 . . . in helicopters
- F05D 2220/34 . . in ram-air turbines ("RATS")
- F05D 2220/36 . . specially adapted for the fan of turbofan engines
  
- F05D 2220/40 . in turbochargers
  
- F05D 2220/50 . for auxiliary power units (APU's)
  
- F05D 2220/60 . making use of surplus or waste energy
- F05D 2220/62 . . with energy recovery turbines
- F05D 2220/64 . . for domestic central heating or production of electricity
  
- F05D 2220/70 . in combination with
- F05D 2220/72 . . a steam turbine
- F05D 2220/722 . . . as part of an integrated gasification combined cycle
- F05D 2220/74 . . a gas turbine
- F05D 2220/75 . . equipment using fuel having a low calorific value, e.g. low BTU fuel, waste end, syngas, biomass fuel or flare gas
- F05D 2220/76 . . an electrical generator
- F05D 2220/762 . . . of the direct current (D.C.) type
- F05D 2220/764 . . . of the alternating current (A.C.) type
- F05D 2220/7642 . . . . of the synchronous type
- F05D 2220/7644 . . . . of the asynchronous type, i.e. induction type
- F05D 2220/7646 . . . . . Double fed induction generators (DFIGs)
- F05D 2220/766 . . . via a direct connection, i.e. a gearless transmission
- F05D 2220/768 . . . equipped with permanent magnets
- F05D 2220/77 . . . of the linear type
  
- F05D 2220/80 . in supersonic vehicles excluding hypersonic vehicles or ram, scram or rocket propulsion
  
- F05D 2220/90 . in vehicles adapted for vertical or short take off and landing ([v/stol vehicles](#)) , ([gas turbines providing direct vertical lift](#) [R05D 220/38](#))

**F05D 2230/00****Manufacture**

- F05D 2230/10 . by removing material
- F05D 2230/11 . . by electrochemical methods
- F05D 2230/12 . . by spark erosion methods
- F05D 2230/13 . . using lasers
- F05D 2230/14 . . Micromachining
- F05D 2230/18 . . Manufacturing tolerances

- F05D 2230/20 . essentially without removing material
- F05D 2230/21 .. by casting
- F05D 2230/211 ... by precision casting, e.g. microfusing or investment casting
- F05D 2230/22 .. by sintering
- F05D 2230/23 .. by permanently joining parts together
- F05D 2230/232 ... by welding
- F05D 2230/233 .... Electron beam welding
- F05D 2230/234 .... Laser welding
- F05D 2230/235 .... TIG or MIG welding
- F05D 2230/236 .... Diffusion bonding
- F05D 2230/237 .... Brazing
- F05D 2230/238 .... Soldering
- F05D 2230/239 .... Inertia or friction welding
- F05D 2230/24 .. by extrusion
- F05D 2230/25 .. by forging
- F05D 2230/26 .. by rolling
  
- F05D 2230/30 . with deposition of material
- F05D 2230/31 .. Layer deposition
- F05D 2230/311 ... by torch or flame spraying
- F05D 2230/312 ... by plasma spraying
- F05D 2230/313 ... by physical vapour deposition
- F05D 2230/314 ... by chemical vapour deposition
  
- F05D 2230/40 . Heat treatment
- F05D 2230/41 .. Hardening; Annealing
- F05D 2230/411 ... Precipitation hardening
- F05D 2230/42 .. by hot isostatic pressing
  
- F05D 2230/50 . Building or constructing in particular ways
- F05D 2230/51 .. in a modular way, e.g. using several identical or complementary parts or features
- F05D 2230/52 .. using existing or "off the shelf" parts, e.g. using standardized turbocharger elements
- F05D 2230/53 .. by integrally manufacturing a component, e.g. by milling from a billet or one piece construction
- F05D 2230/54 .. by sheet metal manufacturing
  
- F05D 2230/60 . Assembly methods
- F05D 2230/61 .. using limited numbers of standard modules which can be adapted by machining
- F05D 2230/64 .. using positioning or alignment devices for aligning or centring, e.g. pins
- F05D 2230/642 ... using maintaining alignment while permitting differential dilatation
- F05D 2230/644 ... for adjusting the position or the alignment, e.g. wedges or eccenters
- F05D 2230/68 .. using auxiliary equipment for lifting or holding
  
- F05D 2230/70 . Disassembly methods

- F05D 2230/72 . Maintenance
- F05D 2230/80 . Repairing, retrofitting or upgrading methods
- F05D 2230/90 . Coating; Surface treatment ([manufacture with deposition of material F05D 2230/30](#))

## **F05D 2240/00 Components**

### **NOTE**

Components are the basic elements of construction

- F05D 2240/10 . Stators
- F05D 2240/11 . . Shroud seal segments
- F05D 2240/12 . . Fluid guiding means, e.g. vanes
- F05D 2240/121 . . . related to the leading edge of a stator vane
- F05D 2240/122 . . . related to the trailing edge of a stator vane
- F05D 2240/123 . . . related to the pressure side of a stator vane
- F05D 2240/124 . . . related to the suction side of a stator vane
- F05D 2240/125 . . . related to the tip of a stator vane
- F05D 2240/126 . . . Baffles or ribs
- F05D 2240/127 . . . Vortex generators, turbulators, or the like, for mixing ([by creating turbulence F05D 2260/2212](#))
- F05D 2240/128 . . . Nozzles
- F05D 2240/1281 . . . . Plug nozzles
- F05D 2240/129 . . . Cascades, i.e. assemblies of similar profiles acting in parallel
- F05D 2240/14 . . Casings or housings protecting or supporting assemblies within
- F05D 2240/15 . . Heat shield
- F05D 2240/20 . Rotors
- F05D 2240/24 . . for turbines
- F05D 2240/241 . . . of impulse type
- F05D 2240/242 . . . of reaction type
- F05D 2240/243 . . . of the Archimedes screw type
- F05D 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
- F05D 2240/301 . . . Cross-sectional characteristics
- F05D 2240/302 . . . characteristics related to shock waves, transonic or supersonic flow
- F05D 2240/303 . . . related to the leading edge of a rotor blade
- F05D 2240/304 . . . related to the trailing edge of a rotor blade
- F05D 2240/305 . . . related to the pressure side of a rotor blade
- F05D 2240/306 . . . related to the suction side of a rotor blade
- F05D 2240/307 . . . related to the tip of a rotor blade
- F05D 2240/31 . . . with roughened surfaces

- F05D 2240/35 . Combustors or associated equipment
- F05D 2240/36 .. Fuel vaporizer
- F05D 2240/40 . Use of a multiplicity of similar components
- F05D 2240/50 . Bearings
- F05D 2240/51 .. Magnetic
- F05D 2240/511 ... with permanent magnets
- F05D 2240/515 ... Electromagnetic
- F05D 2240/52 .. Axial thrust bearings
- F05D 2240/53 .. Hydrodynamic or hydrostatic bearings
- F05D 2240/54 .. Radial bearings
- F05D 2240/55 . Seals
- F05D 2240/56 .. Brush seals
- F05D 2240/57 .. Leaf seals
- F05D 2240/58 .. Piston ring seals
- F05D 2240/581 ... Double or plural piston ring arrangements, i.e. two or more piston rings
- F05D 2240/59 .. Lamellar seals
- F05D 2240/60 . Shafts
- F05D 2240/61 .. Hollow
- F05D 2240/62 .. Flexible
- F05D 2240/63 .. Glands for admission or removal of fluids from shafts
- F05D 2240/70 . Slinger plates or washers
- F05D 2240/80 . Platforms for stationary or moving blades
- F05D 2240/81 .. Cooled platforms
- F05D 2240/90 . Mounting on supporting structures or systems
- F05D 2240/91 .. on a stationary structure

## **F05D 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

- F05D 2250/10 . Two-dimensional
- F05D 2250/11 .. triangular
- F05D 2250/12 .. rectangular
- F05D 2250/121 ... square
- F05D 2250/13 .. trapezoidal

F05D 2250/131	...	polygonal
F05D 2250/132	...	hexagonal
F05D 2250/14	..	elliptical
F05D 2250/141	...	circular
F05D 2250/15	..	spiral
F05D 2250/16	..	parabolic
F05D 2250/17	..	hyperbolic
F05D 2250/18	..	patterned
F05D 2250/181	...	ridged
F05D 2250/182	...	crenellated, notched
F05D 2250/183	...	zigzag
F05D 2250/184	...	sinusoidal
F05D 2250/185	...	serpentine-like
F05D 2250/19	..	machined; miscellaneous
F05D 2250/191	...	perforated
F05D 2250/192	...	bevelled
F05D 2250/193	...	milled
F05D 2250/20	.	Three-dimensional
F05D 2250/21	..	pyramidal
F05D 2250/22	..	parallelepipedal
F05D 2250/221	...	cubic
F05D 2250/23	..	prismatic
F05D 2250/231	...	cylindrical
F05D 2250/232	...	conical
F05D 2250/24	..	ellipsoidal
F05D 2250/241	...	spherical
F05D 2250/25	..	helical
F05D 2250/26	..	paraboloid
F05D 2250/27	..	hyperboloid
F05D 2250/28	..	patterned
F05D 2250/281	...	threaded
F05D 2250/282	...	cubic pattern
F05D 2250/283	...	honeycomb
F05D 2250/29	..	machined; miscellaneous
F05D 2250/291	...	hollowed
F05D 2250/292	...	tapered
F05D 2250/293	...	lathed, e.g. rotation symmetrical
F05D 2250/294	...	grooved
F05D 2250/30	.	Arrangement of components
F05D 2250/31	..	according to the direction of their main axis or their axis of rotation
F05D 2250/311	...	the axes being in line

F05D 2250/312	...	the axes being parallel to each other
F05D 2250/313	...	the axes being perpendicular to each other
F05D 2250/314	...	the axes being inclined in relation to each other
F05D 2250/315	...	the main axis being substantially vertical
F05D 2250/32	..	according to their shape
F05D 2250/321	...	asymptotic
F05D 2250/322	...	tangential
F05D 2250/323	...	convergent
F05D 2250/324	...	divergent
F05D 2250/33	..	symmetrical
F05D 2250/34	..	translated
F05D 2250/35	..	rotated
F05D 2250/36	..	in inner-outer relationship, e.g. shaft-bearing arrangements
F05D 2250/37	..	circumferential
F05D 2250/38	..	angled, e.g. sweep angle
F05D 2250/40	.	Movement of components
F05D 2250/41	..	with one degree of freedom
F05D 2250/411	...	in rotation
F05D 2250/42	..	with two degrees of freedom
F05D 2250/43	..	with three degrees of freedom
F05D 2250/44	..	by counter rotation
F05D 2250/50	.	Inlet or outlet
F05D 2250/51	..	Inlet
F05D 2250/511	...	augmenting, i.e. with intercepting fluid flow cross sectional area greater than the rest of the machine behind the inlet
F05D 2250/512	...	concentrating only, i.e. with intercepting fluid flow cross sectional area not greater than the rest of the machine behind the inlet
F05D 2250/52	..	Outlet
F05D 2250/53	..	of regenerative pumps
F05D 2250/60	.	Structure; Surface texture
F05D 2250/61	..	corrugated
F05D 2250/611	...	undulated
F05D 2250/62	..	smooth or fine
F05D 2250/621	...	polished
F05D 2250/63	..	coarse
F05D 2250/70	.	Shape
F05D 2250/71	..	curved
F05D 2250/711	...	convex
F05D 2250/712	...	concave
F05D 2250/713	...	inflexed



F05D 2250/72	..	symmetric
F05D 2250/73	..	asymmetric
F05D 2250/74	..	given by a set or table of xyz-coordinates
F05D 2250/75	..	given by its similarity to a letter, e.g. T-shaped
F05D 2250/80	.	Size or power range of the machines
F05D 2250/82	..	Micromachines
F05D 2250/84	..	Nanomachines ( <a href="#">Nanotechnology for interacting, sensing or actuating Y01N 8/00</a> )
F05D 2250/90	.	Variable geometry
<b>F05D 2260/00</b>	<b>Function</b>	
F05D 2260/02	.	Transport and handling during maintenance and repair
F05D 2260/10	.	Particular cycles
F05D 2260/12	.	Testing on a test bench
F05D 2260/14	.	Preswirling
F05D 2260/15	.	Load balancing
F05D 2260/16	.	Fluid modulation at a certain frequency
F05D 2260/20	.	Heat transfer, e.g. cooling
F05D 2260/201	..	by impingement of a fluid
F05D 2260/202	..	by film cooling
F05D 2260/203	..	by transpiration cooling
F05D 2260/204	..	by the use of microcircuits
F05D 2260/205	..	Cooling fluid recirculation, i.e. after cooling one or more components is the cooling fluid recovered and used elsewhere for other purposes
F05D 2260/207	..	using a phase changing mass, e.g. heat absorbing by melting or boiling
F05D 2260/208	..	using heat pipes
F05D 2260/209	..	using vortex tubes
F05D 2260/211	..	by intercooling, e.g. during a compression cycle
F05D 2260/212	..	by water injection
F05D 2260/213	..	by the provision of a heat exchanger within the cooling circuit
F05D 2260/221	..	Improvement of heat transfer
F05D 2260/2212	...	by creating turbulence ( <a href="#">vortex generators, turbulators or the like for mixing F05D 2240/127</a> )
F05D 2260/2214	...	by increasing the heat transfer surface
F05D 2260/22141	....	using fins or ribs
F05D 2260/231	..	Preventing heat transfer
F05D 2260/232	..	characterized by the cooling medium
F05D 2260/2322	...	steam

- F05D 2260/234 . . of the generator by compressor inlet air
- F05D 2260/24 . . for draft enhancement in chimneys, using solar or other heat sources
- F05D 2260/30 . Retaining components in desired mutual position
- F05D 2260/31 . Retaining bolts or nuts
- F05D 2260/311 . of the frangible or shear type
- F05D 2260/32 . . by means of magnetic or electromagnetic forces
- F05D 2260/33 . . with a bayonet coupling
- F05D 2260/34 . . Balancing of radial or axial forces on regenerative rotors
- F05D 2260/35 . . Reducing friction between regenerative impeller discs and casing walls
- F05D 2260/36 . . by a form fit connection, e.g. by interlocking
- F05D 2260/37 . . by a press fit connection
- F05D 2260/38 . . by a spring, i.e. spring loaded or biased towards a certain position
- F05D 2260/39 . . by a V-shaped ring to join the flanges of two cylindrical sections, e.g. casing sections of a turbocharger
- F05D 2260/40 . Transmission of power
- F05D 2260/402 . . through friction drives
- F05D 2260/4021 . . . through belt drives
- F05D 2260/4022 . . . through endless chains
- F05D 2260/4023 . . . through a friction clutch
- F05D 2260/403 . . through the shape of the drive components
- F05D 2260/4031 . . . as in toothed gearing
- F05D 2260/40311 . . . . of the epicyclical, planetary or differential type
- F05D 2260/404 . . through magnetic drive coupling
- F05D 2260/4041 . . . the driven magnets encircling the driver magnets
- F05D 2260/406 . . through hydraulic systems
- F05D 2260/407 . . through piezoelectric conversion
- F05D 2260/408 . . through magnetohydrodynamic conversion
- F05D 2260/42 . Storage of energy
- F05D 2260/43 . . in the form of rotational kinetic energy, e.g. in flywheels
- F05D 2260/50 . Kinematic linkage, i.e. transmission of position
- F05D 2260/52 . . involving springs
- F05D 2260/53 . . using gears
- F05D 2260/532 . . . of the bevelled or angled type
- F05D 2260/54 . . using flat or V-belts and pulleys
- F05D 2260/55 . . using chains and sprockets; using toothed belts
- F05D 2260/56 . . using cams or eccentrics
- F05D 2260/57 . . using servos, independent actuators, etc.
- F05D 2260/60 . Fluid transfer

- F05D 2260/601 . . using an ejector or a jet pump
- F05D 2260/602 . . Drainage
- F05D 2260/6022 . . . of leakage having past a seal ([seals F05D 2240/57](#); [glands F05D 2240/63](#))
- F05D 2260/604 . . Vortex non-clogging type pumps
- F05D 2260/605 . . Venting into the ambient atmosphere or the like
- F05D 2260/606 . . Bypassing the fluid
- F05D 2260/607 . . Preventing clogging or obstruction of flow paths by dirt, dust, or foreign particles
- F05D 2260/608 . . Aeration, ventilation, dehumidification or moisture removal of closed spaces
- F05D 2260/609 . . Deoiling or demisting
- F05D 2260/61 . . Removal of CO2 ([removal of CO2 from waste gases B01D 53/62](#))
- F05D 2260/611 . . Sequestration of CO2
  
- F05D 2260/70 . Adjusting of angle of incidence or attack of rotating blades
- F05D 2260/71 . . as a function of flow velocity
- F05D 2260/72 . . by turning around an axis parallel to the rotor centre line
- F05D 2260/74 . . by turning around an axis perpendicular the rotor centre line
- F05D 2260/75 . . the adjusting mechanism not using auxiliary power sources, e.g. by "servos"
- F05D 2260/76 . . the adjusting mechanism using auxiliary power sources
- F05D 2260/77 . . the adjusting mechanism driven or triggered by centrifugal forces
- F05D 2260/78 . . the adjusting mechanism driven or triggered by aerodynamic forces
- F05D 2260/79 . . Bearing, support or actuation arrangements therefor
  
- F05D 2260/80 . Diagnostics
  
- F05D 2260/81 . Modelling or simulation
  
- F05D 2260/82 . Forecasts
- F05D 2260/821 . . Parameter estimation or prediction
  
- F05D 2260/83 . Testing, e.g. methods, components or tools therefor
  
- F05D 2260/84 . Redundancy
  
- F05D 2260/85 . Starting
  
- F05D 2260/90 . Braking
- F05D 2260/901 . . using aerodynamic forces, i.e. lift or drag
- F05D 2260/902 . . using frictional mechanical forces
- F05D 2260/903 . . using electrical or magnetic forces
- F05D 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)
- F05D 2260/941 . . particularly aimed at mechanical or thermal stress reduction
  
- F05D 2260/95 . Preventing corrosion ([coating or surface treatment F05D 2230/90](#))

- F05D 2260/96 . Preventing, counteracting or reducing vibration or noise
- F05D 2260/961 . . by mistuning rotor blades or stator vanes with irregular interblade spacing, airfoil shape
- F05D 2260/962 . . by means of "anti-noise"
- F05D 2260/963 . . by Helmholtz resonators
- F05D 2260/964 . . counteracting thermoacoustic noise
- F05D 2260/97 . Reducing windage losses
- F05D 2260/972 . . in radial flow machines
- F05D 2260/98 . Lubrication
- F05D 2260/99 . Ignition, e.g. ignition by warming up of fuel or oxidizer in a resonant acoustic cavity

**F05D 2270/00****Control**

- F05D 2270/01 . Purpose of the control system
- F05D 2270/02 . . to control rotational speed (n)
- F05D 2270/021 . . . to prevent overspeed
- F05D 2270/022 . . . to prevent underspeed
- F05D 2270/023 . . . of different spools or shafts
- F05D 2270/024 . . . to keep rotational speed constant
- F05D 2270/03 . . in variable speed operation
- F05D 2270/04 . . to control acceleration (u)
- F05D 2270/042 . . . by keeping it below damagingly high values
- F05D 2270/044 . . . by making it as high as possible
- F05D 2270/05 . . to affect the output of the engine
- F05D 2270/051 . . . Thrust
- F05D 2270/052 . . . Torque
- F05D 2270/053 . . . Explicitly mentioned power
- F05D 2270/06 . . to match engine to driven device
- F05D 2270/061 . . . in particular the electrical frequency of driven generator
- F05D 2270/07 . . to improve fuel economy
- F05D 2270/071 . . . in particular at idling speed
- F05D 2270/08 . . to produce clean exhaust gases
- F05D 2270/081 . . . with as little smoke as possible
- F05D 2270/082 . . . with as little NOx as possible
- F05D 2270/083 . . . by monitoring combustion conditions
- F05D 2270/0831 . . . . indirectly, at the exhaust
- F05D 2270/09 . . to cope with emergencies
- F05D 2270/091 . . . in particular sudden load loss
- F05D 2270/092 . . . in particular blow-out and relight
- F05D 2270/093 . . . of one engine in a multi-engine system

F05D 2270/094	...	by using back-up controls
F05D 2270/095	...	by temporary overriding set control limits
F05D 2270/096	...	caused by water or hail ingestion
F05D 2270/10	..	to cope with, or avoid, compressor flow instabilities
F05D 2270/101	...	Compressor surge or stall
F05D 2270/102	....	caused by working fluid flow velocity profile distortion
F05D 2270/1022	.....	due to high angle of attack of aircraft
F05D 2270/1024	.....	due to compressor degradation
F05D 2270/11	..	to prolong engine life
F05D 2270/112	...	by limiting temperatures
F05D 2270/114	...	by limiting mechanical stresses
F05D 2270/116	...	by preventing reverse rotation
F05D 2270/12	..	to maintain desired vehicle trajectory parameters
F05D 2270/121	...	Altitude
F05D 2270/122	...	Speed or Mach number
F05D 2270/13	..	to control two or more engines simultaneously
F05D 2270/14	..	to control thermoacoustic behaviour in the combustion chambers ( <a href="#">counteracting noise or vibration F05D 260/96</a> )
F05D 2270/16	..	to control water or steam injection
F05D 2270/17	..	to control boundary layer
F05D 2270/172	...	by a plasma generator, e.g. control of ignition
F05D 2270/173	...	by the Coanda effect
F05D 2270/18	..	using fluidic amplifiers or actuators
F05D 2270/20	..	to optimize the performance of a machine
F05D 2270/30	.	Control parameters, e.g. input parameters
F05D 2270/301	..	Pressure
F05D 2270/3011	...	Inlet pressure
F05D 2270/3013	...	Outlet pressure
F05D 2270/3015	...	differential pressure
F05D 2270/303	..	Temperature
F05D 2270/3032	...	excessive temperatures, e.g. caused by overheating
F05D 2270/304	..	Spool rotational speed
F05D 2270/305	..	Tolerances
F05D 2270/306	..	Mass flow
F05D 2270/3061	...	of the working fluid
F05D 2270/3062	...	of the auxiliary fluid for heating or cooling purposes
F05D 2270/309	..	Rate of change of parameters
F05D 2270/31	..	Fuel schedule for stage combustors
F05D 2270/311	..	Air humidity
F05D 2270/312	..	Air pressure
F05D 2270/313	..	Air temperature
F05D 2270/331	..	Mechanical loads

F05D 2270/332	..	Maximum loads or fatigue criteria
F05D 2270/333	..	Noise or sound levels
F05D 2270/334	..	Vibration measurements
F05D 2270/335	..	Output power or torque
F05D 2270/336	..	Blade lift measurements
F05D 2270/40	.	Type of control system
F05D 2270/42	..	passive or reactive, e.g. using large wind vanes
F05D 2270/44	..	active, predictive, or anticipative
F05D 2270/46	..	redundant, i.e. failsafe operation
F05D 2270/50	.	Control logic embodiments
F05D 2270/52	..	by electrical means, e.g. relays or switches
F05D 2270/54	..	by electronic means, e.g. electronic tubes, transistors or IC's within an electronic circuit
F05D 2270/56	..	by hydraulic means, e.g. hydraulic valves within a hydraulic circuit
F05D 2270/58	..	by mechanical means, e.g. levers, gears or cams
F05D 2270/60	.	Control system actuates means
F05D 2270/62	..	Electrical actuators
F05D 2270/64	..	Hydraulic actuators
F05D 2270/65	..	Pneumatic actuators
F05D 2270/66	..	Mechanical actuators ( <a href="#">F05D 2270/62</a> takes precedence)
F05D 2270/70	.	Type of control algorithm
F05D 2270/701	..	proportional
F05D 2270/702	..	differential
F05D 2270/703	..	integral
F05D 2270/704	..	proportional-differential
F05D 2270/705	..	proportional-integral
F05D 2270/706	..	proportional-integral-differential
F05D 2270/707	..	fuzzy logic
F05D 2270/708	..	with comparison tables
F05D 2270/709	..	with neural networks
F05D 2270/71	..	synthesized, i.e. parameter computed by a mathematical model
F05D 2270/80	.	Devices generating input signals, e.g. transducers, sensors, cameras or strain gauges
F05D 2270/802	..	Calibration thereof
F05D 2270/803	..	Sampling thereof
F05D 2270/804	..	Optical devices
F05D 2270/8041	...	Cameras
F05D 2270/805	..	Radars
F05D 2270/806	..	Sonars
F05D 2270/807	..	Accelerometers

F05D 2270/808	..	Strain gauges; Load cells
F05D 2270/809	..	Encoders
F05D 2270/81	..	Microphones
F05D 2270/821	..	Displacement measuring means, e.g. inductive

**F05D 2280/00****F05D 2290/00****F05D 2300/00**      **Materials; Properties thereof**

F05D 2300/10	.	Metals, alloys or intermetallic compounds
F05D 2300/11	..	Iron
F05D 2300/111	...	Cast iron
F05D 2300/12	..	Light metals
F05D 2300/121	...	Aluminium
F05D 2300/122	...	Beryllium
F05D 2300/123	...	Boron
F05D 2300/124	...	Lithium
F05D 2300/125	...	Magnesium
F05D 2300/13	..	Refractory metals, i.e. Ti, V, Cr, Zr, Nb, Mo, Hf, Ta, W
F05D 2300/131	...	Molybdenum
F05D 2300/132	...	Chromium
F05D 2300/133	...	Titanium
F05D 2300/134	...	Zirconium
F05D 2300/135	...	Hafnium
F05D 2300/14	..	Noble metals, i.e. Ag, Au, platinum group metals
F05D 2300/141	...	Silver
F05D 2300/142	...	Gold
F05D 2300/143	...	Platinum group metals, i.e. Os, Ir, Pt, Ru, Rh, Pd
F05D 2300/1431	....	Palladium
F05D 2300/1432	....	Ruthenium
F05D 2300/1433	....	Osmium
F05D 2300/1434	....	Iridium
F05D 2300/1435	....	Rhodium
F05D 2300/15	..	Rare earth metals, i.e. Sc, Y, lanthanides
F05D 2300/16	..	Other metals not provided for in groups <a href="#">F05D 2300/11</a> to <a href="#">F05D 2300/15</a>
F05D 2300/1602	...	Arsenic
F05D 2300/1604	...	Antimony
F05D 2300/1606	...	Bismuth
F05D 2300/1608	...	Barium
F05D 2300/161	...	Manganese

F05D 2300/1612	...	Lead
F05D 2300/1614	...	Tin
F05D 2300/1616	...	Zinc
F05D 2300/1618	...	Mercury
F05D 2300/17	..	Alloys
F05D 2300/171	...	Steel alloys
F05D 2300/172	...	Copper alloys
F05D 2300/1721	....	Bronze
F05D 2300/1722	....	Phosphor-bronze alloy
F05D 2300/1723	....	Nickel-Copper alloy, e.g. Monel
F05D 2300/173	...	Aluminium alloys, e.g. AlCuMgPb
F05D 2300/174	...	Titanium alloys, e.g. TiAl
F05D 2300/175	...	Superalloys
F05D 2300/176	...	Heat-stable alloys
F05D 2300/177	...	Ni - Si alloys
F05D 2300/18	..	Intermetallic compounds
F05D 2300/182	...	Metal-aluminide intermetallic compounds
F05D 2300/20	.	Oxide or non-oxide ceramics
F05D 2300/21	..	Oxide ceramics
F05D 2300/2102	...	Glass
F05D 2300/2104	...	MIBA
F05D 2300/2106	...	Quartz
F05D 2300/2108	...	Phosphor
F05D 2300/211	...	Silica
F05D 2300/2112	...	Aluminium oxides
F05D 2300/2114	...	Sapphire
F05D 2300/2116	...	Zinc oxide
F05D 2300/2118	...	Zirconium oxides
F05D 2300/212	...	Aluminium titanate
F05D 2300/22	..	Non-oxide ceramics
F05D 2300/222	...	Silicon
F05D 2300/224	...	Carbon, e.g. graphite
F05D 2300/226	...	Carbides
F05D 2300/2261	....	of silicon
F05D 2300/2262	....	of titanium, e.g. TiC
F05D 2300/2263	....	of tungsten, e.g. WC
F05D 2300/228	...	Nitrides
F05D 2300/2281	....	of aluminium
F05D 2300/2282	....	of boron
F05D 2300/2283	....	of silicon
F05D 2300/2284	....	of titanium



F05D 2300/2285	....	of zirconium
F05D 2300/229	...	Sulfides
F05D 2300/2291	....	of molybdenum
F05D 2300/30	.	Inorganic materials other than provided for in groups <a href="#">F05D 300/10</a> to <a href="#">F05D 300/2291</a>
F05D 2300/40	.	Organic materials
F05D 2300/41	..	Leather
F05D 2300/42	..	Cellulosic materials, e.g. wood
F05D 2300/43	..	Synthetic polymers, e.g. plastics; Rubber
F05D 2300/431	...	Rubber
F05D 2300/432	...	PTFE (PolyTetraFluorEthylene)
F05D 2300/433	...	Polyamides, e.g. NYLON
F05D 2300/434	...	Polyimides, e.g. AURUM
F05D 2300/436	...	Polyetherketones, e.g. PEEK
F05D 2300/437	...	Silicon polymers
F05D 2300/44	..	Resins
F05D 2300/48	..	other organic materials
F05D 2300/50	.	Intrinsic material properties or characteristics
F05D 2300/501	..	Elasticity
F05D 2300/502	..	Thermal properties
F05D 2300/5021	...	Expansivity
F05D 2300/50211	....	similar
F05D 2300/50212	....	dissimilar
F05D 2300/5023	...	Thermal capacity
F05D 2300/5024	...	Heat conductivity
F05D 2300/504	..	Reflective properties
F05D 2300/505	..	Shape memory behaviour
F05D 2300/506	..	Hardness
F05D 2300/507	..	Magnetic properties
F05D 2300/509	..	Self lubricating materials; Solid lubricants
F05D 2300/51	..	Hydrophilic, i.e. being or having wettable properties
F05D 2300/512	..	Hydrophobic, i.e. being or having non-wettable properties
F05D 2300/514	..	Porosity
F05D 2300/516	..	Surface roughness
F05D 2300/518	..	Ductility
F05D 2300/52	..	Translucence
F05D 2300/522	..	Density
F05D 2300/60	.	Properties or characteristics given to material by treatment or manufacturing
F05D 2300/601	..	Fabrics
F05D 2300/6012	...	Woven fabrics
F05D 2300/603	..	Composites; e.g. fibre-reinforced

F05D 2300/6031	...	Functionally graded composites
F05D 2300/6032	...	Metal matrix composites (MMC)
F05D 2300/6033	...	Ceramic matrix composites (CMC)
F05D 2300/6034	...	Orientation of fibres, weaving, ply angle
F05D 2300/604	..	Amorphous
F05D 2300/605	..	Crystalline
F05D 2300/606	..	Directionally-solidified crystalline structures
F05D 2300/607	..	Monocrystallinity
F05D 2300/608	..	Microstructure
F05D 2300/609	..	Grain size
F05D 2300/61	..	Syntactic materials, i.e. hollow spheres embedded in a matrix
F05D 2300/611	..	Coating
F05D 2300/6111	..	functionally graded coating
F05D 2300/612	..	Foam
F05D 2300/613	..	Felt
F05D 2300/614	..	Fibres or filaments
F05D 2300/615	..	Filler
F05D 2300/70	.	Treatment or modification of materials
F05D 2300/701	..	Heat treatment
F05D 2300/702	..	Reinforcement