

CPC COOPERATIVE PATENT CLASSIFICATION

B PERFORMING OPERATIONS; TRANSPORTING (NOTES omitted)

SHAPING

B23 MACHINE TOOLS; METAL-WORKING NOT OTHERWISE PROVIDED FOR (NOTES omitted)

B23C MILLING (broaching [B23D](#); broach-milling in making gears [B23F](#); arrangement for copying or controlling [B23Q](#))

WARNING

In this subclass non-limiting references (in the sense of paragraph 39 of the Guide to the IPC) may still be displayed in the scheme.

1/00	Milling machines not designed for particular work or special operations	3/053 {having means for guiding the tool carrying spindle}
1/002	. {Gantry-type milling machines}	3/055 {for engines}
1/005	. {with a tool moving in a closed path around the workpiece}	3/056 {for taps or valves}
1/007	. {movable milling machines, e.g. on rails}	3/058	. . . {Reconditioning of valves}
1/02	. with one horizontal working-spindle	3/06	. Milling crankshafts
1/025	. . with working-spindle movable in a fixed position	3/08	. Milling cams, camshafts, or the like
1/027	. . with working-spindle movable in a vertical direction	3/10	. Relieving by milling
1/04	. with a plurality of horizontal working-spindles	3/12	. Trimming or finishing edges, e.g. deburring welded corners
1/045	. . {Opposed - spindle machines}	3/122	. . {of pipes or cylinders}
1/06	. with one vertical working-spindle	3/124	. . . {internally}
1/08	. with a plurality of vertical working-spindles	3/126	. . {Portable devices or machines for chamfering edges}
1/10	. with both horizontal and vertical working-spindles	3/128	. . {Trimming or finishing edges of doors and windows}
1/12	. with spindle adjustable to different angles, e.g. either horizontal or vertical	3/13	. Surface milling of plates, sheets or strips
1/14	. with rotary work-carrying table (work tables for machine tools in general B23Q 1/00)	3/14	. Scrubbing or peeling ingots or similar workpieces
1/16	. specially designed for control by copying devices { (not used; see B23Q 35/00) }	3/16	. Working surfaces curved in two directions
1/18	. . for milling while revolving the work	3/18	. . for shaping screw-propellers, turbine blades, or impellers
1/20	. Portable devices or machines (details or components, e.g. casings, bodies, of portable power-driven tools not particularly related to the operation performed B25F 5/00); Hand-driven devices or machines	3/20	. . for shaping dies
3/00	Milling particular work; Special milling operations; Machines therefor (milling gear-teeth B23F, heat assisted machining B23P 25/00)	3/22	. Forming overlapped joints, e.g. of the ends of piston-rings
3/002	. {Milling elongated workpieces}	3/24	. Making square or polygonal ends on workpieces, e.g. key studs on tools
3/005	. . {Rails}	3/26	. Making square or polygonal holes in workpieces, e.g. key holes in tools
3/007	. {Milling end surfaces of nuts or tubes}	3/28	. Grooving workpieces (tread-cutting by milling B23G 1/32)
3/02	. Milling surfaces of revolution (B23C 3/06 , B23C 3/08 take precedence)	3/30	. . Milling straight grooves, e.g. keyways
3/023	. . {Milling spherical surfaces}	3/305	. . . {in which more than one milling tool is used simultaneously, e.g. for sheet material}
3/026	. . . {Milling balls}	3/32	. . Milling helical grooves, e.g. in making twist-drills
3/04	. . while revolving the work	3/34	. . Milling grooves of other forms, e.g. circumferential
3/05	. . Finishing valves or valve seats {(machines for grinding seat surfaces, e.g. in valve housings, B24B 15/00)}	3/35	. . Milling grooves in keys
3/051	. . . {Reconditioning of valve seats}	3/355	. . . {Holders for the template keys}
		3/36	. Milling milling-cutters (B23C 3/28 takes precedence)
		5/00	Milling-cutters (for cutting gear-teeth B23F 21/12)
		5/003	. {with vibration suppressing means}

- 5/006 . {Details of the milling cutter body}
- 5/02 . characterised by the shape of the cutter
- 5/04 . . Plain cutters, i.e. having essentially a cylindrical or tapered cutting surface of substantial length (B23C 5/10 takes precedence)
- 5/06 . . Face-milling cutters, i.e. having only or primarily a substantially flat cutting surface
- 5/08 . . Disc-type cutters
- 5/10 . . Shank-type cutters, i.e. with an integral shaft
- 5/1009 . . . {Ball nose end mills}
- 5/1018 {with permanently fixed cutting inserts}
- 5/1027 {with one or more removable cutting inserts}
- 5/1036 {having a single cutting insert, the cutting edges of which subtend 180 degrees}
- 5/1045 {having a cutting insert, the cutting edge of which subtends substantially 90 degrees}
- 5/1054 . . . {T slot cutters}
- 5/1063 {with permanently fixed cutting inserts}
- 5/1072 {with removable cutting inserts}
- 5/1081 . . . {with permanently fixed cutting inserts (B23C 5/1018 and B23C 5/1063 take precedence)}
- 5/109 . . . {with removable cutting inserts}
- 5/12 . . Cutters specially designed for producing particular profiles (B23C 5/10 takes precedence)
- 5/14 . . . essentially comprising curves {(B23C 5/1009 takes precedence)}
- 5/16 . characterised by physical features other than shape
- 5/165 . . {with chipbreaking or chipdividing equipment (for turning machines B23B 25/02; turning tools B23B 27/00; drilling machines B23B 47/34)}
- 5/18 . . with permanently-fixed cutter-bits or teeth
- 5/20 . . with removable cutter bits or teeth {or cutting inserts}
- 5/202 . . . {Plate-like cutting inserts with special form (special form related to securing of the insert B23C 5/22)}

WARNING

Group [B23C 5/202](#) is impacted by reclassification into group [B23C 5/205](#).
Groups [B23C 5/202](#) and [B23C 5/205](#) should be considered in order to perform a complete search.

- 5/205 {characterised by chip-breakers of special form}

WARNING

Group [B23C 5/205](#) is incomplete pending reclassification of documents from group [B23C 5/202](#).
Groups [B23C 5/202](#) and [B23C 5/205](#) should be considered in order to perform a complete search.

- 5/22 . . . Securing arrangements for bits or teeth {or cutting inserts}

WARNING

Group [B23C 5/22](#) is impacted by reclassification into groups [B23C 5/2298](#), [B23C 5/2301](#), [B23C 5/2304](#), [B23C 5/2306](#) and [B23C 5/2309](#).

All groups listed in this Warning should be considered in order to perform a complete search.

- 5/2204 {with cutting inserts clamped against the walls of the recess in the cutter body by a clamping member acting upon the wall of a hole in the insert}

WARNING

Group [B23C 5/2204](#) is impacted by reclassification into group [B23C 5/2298](#).
Groups [B23C 5/2204](#) and [B23C 5/2298](#) should be considered in order to perform a complete search.

- 5/2208 {for plate-like cutting inserts (B23C 5/2226, B23C 5/2234 take precedence)}

WARNING

Group [B23C 5/2208](#) is impacted by reclassification into group [B23C 5/2301](#).

Groups [B23C 5/2208](#) and [B23C 5/2301](#) should be considered in order to perform a complete search.

- 5/2213 {having a special shape}

WARNING

Group [B23C 5/2213](#) is impacted by reclassification into group [B23C 5/2304](#).

Groups [B23C 5/2213](#) and [B23C 5/2304](#) should be considered in order to perform a complete search.

- 5/2226 {for plate-like cutting inserts fitted on an intermediate carrier, e.g. shank fixed in the cutter body}

WARNING

Group [B23C 5/2226](#) is impacted by reclassification into group [B23C 5/2306](#).

Groups [B23C 5/2226](#) and [B23C 5/2306](#) should be considered in order to perform a complete search.

5/2234 {for plate-like cutting inserts fitted on a ring or ring segment}

WARNING

Group [B23C 5/2234](#) is impacted by reclassification into group [B23C 5/2309](#).

Groups [B23C 5/2234](#) and [B23C 5/2309](#) should be considered in order to perform a complete search.

5/2239 {with cutting inserts clamped by a clamping member acting almost perpendicular on the cutting face}

WARNING

Group [B23C 5/2239](#) is impacted by reclassification into group [B23C 5/2298](#).

Groups [B23C 5/2239](#) and [B23C 5/2298](#) should be considered in order to perform a complete search.

5/2243 {for plate-like cutting inserts (B23C 5/2252, B23C 5/226 take precedence)}

WARNING

Group [B23C 5/2243](#) is impacted by reclassification into group [B23C 5/2301](#).

Groups [B23C 5/2243](#) and [B23C 5/2301](#) should be considered in order to perform a complete search.

5/2247 {having a special shape}

WARNING

Group [B23C 5/2247](#) is impacted by reclassification into group [B23C 5/2304](#).

Groups [B23C 5/2247](#) and [B23C 5/2304](#) should be considered in order to perform a complete search.

5/2252 {for plate-like cutting inserts fitted on an intermediate carrier, e.g. shank fixed in the cutter body}

WARNING

Group [B23C 5/2252](#) is impacted by reclassification into group [B23C 5/2306](#).

Groups [B23C 5/2252](#) and [B23C 5/2306](#) should be considered in order to perform a complete search.

5/226 {for plate-like cutting inserts fitted on a ring or ring segment}

WARNING

Group [B23C 5/226](#) is impacted by reclassification into group [B23C 5/2309](#).

Groups [B23C 5/226](#) and [B23C 5/2309](#) should be considered in order to perform a complete search.

5/2265 {by means of a wedge}

WARNING

Group [B23C 5/2265](#) is impacted by reclassification into group [B23C 5/2298](#).

Groups [B23C 5/2265](#) and [B23C 5/2298](#) should be considered in order to perform a complete search.

5/2269 {for plate-like cutting inserts (B23C 5/2278, B23C 5/2291 take precedence)}

WARNING

Group [B23C 5/2269](#) is impacted by reclassification into group [B23C 5/2301](#).

Groups [B23C 5/2269](#) and [B23C 5/2301](#) should be considered in order to perform a complete search.

5/2273 {having a special shape}

WARNING

Group [B23C 5/2273](#) is impacted by reclassification into group [B23C 5/2304](#).

Groups [B23C 5/2273](#) and [B23C 5/2304](#) should be considered in order to perform a complete search.

5/2278 {for plate-like cutting inserts fitted on an intermediate carrier, e.g. shank fixed in the cutter body}

WARNING

Group [B23C 5/2278](#) is impacted by reclassification into group [B23C 5/2306](#).

Groups [B23C 5/2278](#) and [B23C 5/2306](#) should be considered in order to perform a complete search.

5/2291 {for plate-like cutting inserts fitted on a ring or ring segment}

WARNING

Group [B23C 5/2291](#) is impacted by reclassification into group [B23C 5/2309](#).

Groups [B23C 5/2291](#) and [B23C 5/2309](#) should be considered in order to perform a complete search.

5/2295 {the cutting elements being clamped simultaneously}

WARNING

Group [B23C 5/2295](#) is impacted by reclassification into group [B23C 5/2298](#).

Groups [B23C 5/2295](#) and [B23C 5/2298](#) should be considered in order to perform a complete search.

5/2298 {secured by resilient/flexible means}

WARNING

Group [B23C 5/2298](#) is incomplete pending reclassification of documents from groups [B23C 5/22](#), [B23C 5/2204](#), [B23C 5/2239](#), [B23C 5/2265](#) and [B23C 5/2295](#).

All groups listed in this Warning should be considered in order to perform a complete search.

5/2301 {for plate-like cutting inserts
([B23C 5/2306](#), [B23C 5/2309](#) take
precedence)}

WARNING

Group [B23C 5/2301](#) is incomplete pending reclassification of documents from groups [B23C 5/22](#), [B23C 5/2208](#), [B23C 5/2243](#) and [B23C 5/2269](#).

All groups listed in this Warning should be considered in order to perform a complete search.

5/2304 {having a special shape}

WARNING

Group [B23C 5/2304](#) is incomplete pending reclassification of documents from groups [B23C 5/22](#), [B23C 5/2213](#), [B23C 5/2247](#) and [B23C 5/2273](#).

All groups listed in this Warning should be considered in order to perform a complete search.

5/2306 {for plate-like cutting inserts fitted on an
intermediate carrier, e.g. shank fixed in the
cutter body}

WARNING

Group [B23C 5/2306](#) is incomplete pending reclassification of documents from groups [B23C 5/22](#), [B23C 5/2226](#), [B23C 5/2252](#) and [B23C 5/2278](#).

All groups listed in this Warning should be considered in order to perform a complete search.

5/2309 {for plate-like cutting inserts fitted on a
ring or ring segment}

WARNING

Group [B23C 5/2309](#) is incomplete pending reclassification of documents from groups [B23C 5/22](#), [B23C 5/2234](#), [B23C 5/226](#) and [B23C 5/2291](#).

All groups listed in this Warning should be considered in order to perform a complete search.

5/24 adjustable

WARNING

Group [B23C 5/24](#) is impacted by reclassification into groups [B23C 5/2462](#), [B23C 5/2465](#), [B23C 5/2468](#), [B23C 5/2472](#), [B23C 5/2475](#), [B23C 5/2479](#), [B23C 5/2482](#), [B23C 5/2486](#), [B23C 5/2489](#), [B23C 5/2493](#) and [B23C 5/2496](#).

All groups listed in this Warning should be considered in order to perform a complete search.

5/2462 {the adjusting means being oblique
surfaces}

WARNING

Group [B23C 5/2462](#) is incomplete pending reclassification of documents from group [B23C 5/24](#).

Groups [B23C 5/24](#) and [B23C 5/2462](#) should be considered in order to perform a complete search.

5/2465 {the adjusting means being notches}

WARNING

Group [B23C 5/2465](#) is incomplete pending reclassification of documents from group [B23C 5/24](#).

Groups [B23C 5/24](#) and [B23C 5/2465](#) should be considered in order to perform a complete search.

5/2468 {the adjusting means being serrations}

WARNING

Group [B23C 5/2468](#) is incomplete pending reclassification of documents from group [B23C 5/24](#).

Groups [B23C 5/24](#) and [B23C 5/2468](#) should be considered in order to perform a complete search.

5/2472 {the adjusting means being screws}

WARNING

Group [B23C 5/2472](#) is incomplete pending reclassification of documents from group [B23C 5/24](#).

Groups [B23C 5/24](#) and [B23C 5/2472](#) should be considered in order to perform a complete search.

5/2475 {the adjusting means being distance
elements, e.g. shims or washers}

WARNING

Group [B23C 5/2475](#) is incomplete pending reclassification of documents from group [B23C 5/24](#).

Groups [B23C 5/24](#) and [B23C 5/2475](#) should be considered in order to perform a complete search.

5/2479 {the adjusting means being eccentrics}

WARNING

Group [B23C 5/2479](#) is incomplete pending reclassification of documents from group [B23C 5/24](#).

Groups [B23C 5/24](#) and [B23C 5/2479](#) should be considered in order to perform a complete search.

5/2482 {the adjusting means being hydraulic cylinders}

WARNING

Group [B23C 5/2482](#) is incomplete pending reclassification of documents from group [B23C 5/24](#).

Groups [B23C 5/24](#) and [B23C 5/2482](#) should be considered in order to perform a complete search.

5/2486 {where the adjustment is made by elastically deforming the toolholders}

WARNING

Group [B23C 5/2486](#) is incomplete pending reclassification of documents from group [B23C 5/24](#).

Groups [B23C 5/24](#) and [B23C 5/2486](#) should be considered in order to perform a complete search.

5/2489 {where the adjustment is made by changing the inclination of the inserts}

WARNING

Group [B23C 5/2489](#) is incomplete pending reclassification of documents from group [B23C 5/24](#).

Groups [B23C 5/24](#) and [B23C 5/2489](#) should be considered in order to perform a complete search.

5/2493 {where the adjustment is made by deforming the seating surfaces}

WARNING

Group [B23C 5/2493](#) is incomplete pending reclassification of documents from group [B23C 5/24](#).

Groups [B23C 5/24](#) and [B23C 5/2493](#) should be considered in order to perform a complete search.

5/2496 {where the adjusting means are gears and racks}

WARNING

Group [B23C 5/2496](#) is incomplete pending reclassification of documents from group [B23C 5/24](#).

Groups [B23C 5/24](#) and [B23C 5/2496](#) should be considered in order to perform a complete search.

5/26 Securing milling cutters to the driving spindle

5/265 . . . {by fluid pressure means}

5/28 . . . Features relating to lubricating or cooling

WARNING

Group [B23C 5/28](#) is impacted by reclassification into groups [B23C 5/281](#), [B23C 5/282](#), [B23C 5/283](#), [B23C 5/285](#), [B23C 5/286](#) and [B23C 5/287](#).

All groups listed in this Warning should be considered in order to perform a complete search.

5/281 . . {Coolant moving along the outside tool periphery towards the cutting edges}

WARNING

Group [B23C 5/281](#) is incomplete pending reclassification of documents from group [B23C 5/28](#).

Groups [B23C 5/28](#) and [B23C 5/281](#) should be considered in order to perform a complete search.

5/282 . . {Coolant channel characterised by its cross-sectional shape}

WARNING

Group [B23C 5/282](#) is incomplete pending reclassification of documents from group [B23C 5/28](#).

Groups [B23C 5/28](#) and [B23C 5/282](#) should be considered in order to perform a complete search.

5/283 . . {Cutting inserts with internal coolant channels}

WARNING

Group [B23C 5/283](#) is incomplete pending reclassification of documents from group [B23C 5/28](#).

Groups [B23C 5/28](#) and [B23C 5/283](#) should be considered in order to perform a complete search.

5/285 . . {Nozzles}

WARNING

Group [B23C 5/285](#) is incomplete pending reclassification of documents from group [B23C 5/28](#).

Groups [B23C 5/28](#) and [B23C 5/285](#) should be considered in order to perform a complete search.

5/286 . . {Deflectors}

WARNING

Groups [B23C 5/286](#) and [B23C 5/287](#) are incomplete pending reclassification of documents from group [B23C 5/28](#).

Groups [B23C 5/28](#), [B23C 5/286](#) and [B23C 5/287](#) should be considered in order to perform a complete search.

5/287 . . . {intersecting the rotational axis}

7/00 Milling devices able to be attached to a machine tool, whether or not replacing an operative portion of the machine tool

7/02	. to lathes
7/04	. to planing or slotting machines
9/00	Details or accessories so far as specially adapted to milling machines or cutter (drives, control devices, or accessories, in general B23Q)
9/005	. {milling heads}
2200/00	Details of milling cutting inserts
2200/04	. Overall shape
2200/0405	. . Hexagonal
2200/0411	. . . irregular
2200/0416	. . Irregular
2200/0422	. . Octagonal
2200/0427	. . . rounded
2200/0433	. . Parallelogram
2200/0438	. . . rounded
2200/0444	. . Pentagonal
2200/045	. . Round
2200/0455	. . Square
2200/0461	. . . rounded
2200/0466	. . Star form
2200/0472	. . Trapezium
2200/0477	. . Triangular
2200/0483	. . . rounded
2200/0488	. . Heptagonal
2200/0494	. . Rectangular
2200/08	. Rake or top surfaces
2200/081	. . with projections (chip breaking projections in general B23C 2200/323)
2200/082	. . with an elevated clamping surface
2200/083	. . curved
2200/085	. . discontinuous
2200/086	. . with one or more grooves
2200/088	. . spherical
2200/12	. Side or flank surfaces
2200/121	. . with projections
2200/123	. . curved
2200/125	. . discontinuous
2200/126	. . . stepped
2200/128	. . with one or more grooves
2200/16	. Supporting or bottom surfaces
2200/161	. . with projections
2200/162	. . curved
2200/164	. . discontinuous
2200/165	. . with one or more grooves
2200/167	. . star form
2200/168	. . with features related to indexing (with lines to permit indexing of round inserts B23C 2200/363)
2200/20	. Top or side views of the cutting edge
2200/201	. . Details of the nose radius and immediately surrounding areas
2200/203	. . Curved cutting edges
2200/205	. . Discontinuous cutting edges
2200/206	. . Cutting edges having a wave-form
2200/208	. . Wiper, i.e. an auxiliary cutting edge to improve surface finish
2200/24	. Cross section of the cutting edge
2200/243	. . bevelled or chamfered
2200/246	. . rounded

2200/28 . Angles

WARNING

Group [B23C 2200/28](#) is impacted by reclassification into groups [B23C 2200/291](#) and [B23C 2200/293](#).

Groups [B23C 2200/28](#), [B23C 2200/291](#) and [B23C 2200/293](#) should be considered in order to perform a complete search.

2200/281 . . Negative rake angles

WARNING

Group [B23C 2200/281](#) is incomplete pending reclassification of documents from group [B23C 2200/283](#).

Groups [B23C 2200/283](#) and [B23C 2200/281](#) should be considered in order to perform a complete search.

2200/283 . . Negative cutting angles
(Frozen)

WARNING

Group [B23C 2200/283](#) is no longer used for the classification of documents as of February 1, 2022.

The content of this group is being reclassified into groups [B23C 2200/281](#) and [B23C 2200/284](#).

Groups [B23C 2200/283](#), [B23C 2200/281](#) and [B23C 2200/284](#) should be considered in order to perform a complete search.

2200/284 . . Negative clearance angles

WARNING

Group [B23C 2200/284](#) is incomplete pending reclassification of documents from group [B23C 2200/283](#).

Groups [B23C 2200/283](#) and [B23C 2200/284](#) should be considered in order to perform a complete search.

2200/286 . . Positive cutting angles
(Frozen)

WARNING

Group [B23C 2200/286](#) is no longer used for the classification of documents as of February 1, 2022.

The content of this group is being reclassified into groups [B23C 2200/287](#) and [B23C 2200/289](#).

Groups [B23C 2200/286](#), [B23C 2200/287](#) and [B23C 2200/289](#) should be considered in order to perform a complete search.

2200/287 . . Positive rake angles

WARNING

Group [B23C 2200/287](#) is incomplete pending reclassification of documents from group [B23C 2200/286](#).

Groups [B23C 2200/286](#) and [B23C 2200/287](#) should be considered in order to perform a complete search.

- 2200/289 . . Positive clearance angles

WARNING

Group [B23C 2200/289](#) is incomplete pending reclassification of documents from group [B23C 2200/286](#).

Groups [B23C 2200/286](#) and [B23C 2200/289](#) should be considered in order to perform a complete search.

- 2200/291 . . Variable rake angles

WARNING

Group [B23C 2200/291](#) is incomplete pending reclassification of documents from group [B23C 2200/28](#).

Groups [B23C 2200/28](#) and [B23C 2200/291](#) should be considered in order to perform a complete search.

- 2200/293 . . Variable clearance angles

WARNING

Group [B23C 2200/293](#) is incomplete pending reclassification of documents from group [B23C 2200/28](#).

Groups [B23C 2200/28](#) and [B23C 2200/293](#) should be considered in order to perform a complete search.

- 2200/32 . Chip breaking or chip evacuation

- 2200/323 . . by chip-breaking projections (with projection on top surface [B23C 2200/081](#))

- 2200/326 . . by chip-breaking grooves

- 2200/36 . Other features of the milling insert not covered by [B23C 2200/04](#) - [B23C 2200/32](#)

WARNING

Group [B23C 2200/36](#) is impacted by reclassification into groups [B23C 2200/364](#), [B23C 2200/369](#) and [B23C 2200/3691](#).

All groups listed in this Warning should be considered in order to perform a complete search.

- 2200/361 . . Fixation holes

- 2200/362 . . . Having two fixation holes

- 2200/363 . . Lines for indexing round inserts

- 2200/364 . . Porous inserts, e.g. lattice-shaped constructions

WARNING

Group [B23C 2200/364](#) is incomplete pending reclassification of documents from group [B23C 2200/36](#).

Groups [B23C 2200/36](#) and [B23C 2200/364](#) should be considered in order to perform a complete search.

- 2200/365 . . Lands, i.e. the outer peripheral section of rake faces

- 2200/366 . . . Variable

- 2200/367 . . Mounted tangentially, i.e. where the rake face is not the face with largest area

- 2200/368 . . Roughened surfaces

- 2200/369 . . Double-sided inserts

WARNING

Groups [B23C 2200/369](#) and [B23C 2200/3691](#) are incomplete pending reclassification of documents from group [B23C 2200/36](#).

Groups [B23C 2200/36](#), [B23C 2200/369](#) and [B23C 2200/3691](#) should be considered in order to perform a complete search.

- 2200/3691 . . . Split inserts

2210/00

Details of milling cutters

- 2210/02 . Connections between the shanks and detachable cutting heads

- 2210/03 . Cutting heads comprised of different material than the shank irrespective of whether the head is detachable from the shank

- 2210/04 . Angles

- 2210/0407 . . Cutting angles

- 2210/0414 . . . different

- 2210/0421 . . . negative

- 2210/0428 axial rake angle

- 2210/0435 radial rake angle

- 2210/0442 . . . positive

- 2210/045 axial rake angle

- 2210/0457 radial rake angle

- 2210/0464 . . . neutral

- 2210/0471 axial rake angle

- 2210/0478 radial rake angle

- 2210/0485 . . Helix angles

- 2210/0492 . . . different

- 2210/08 . Side or top views of the cutting edge

- 2210/082 . Details of the corner region between axial and radial cutting edges

- 2210/084 . . Curved cutting edges

- 2210/086 . . Discontinuous or interrupted cutting edges

- 2210/088 . . Cutting edges with a wave form

- 2210/12 . Cross section of the cutting edge

- 2210/123 . . Bevelled cutting edges

- 2210/126 . . Rounded cutting edges

- 2210/16 . Fixation of inserts or cutting bits in the tool (details of connections [B23C 2240/00](#))

- 2210/161 . . Elastically deformable clamping members

- 2210/163 . . Indexing

- 2210/165 . . Fixation bolts

- 2210/166 . . Shims

- 2210/168 . . Seats for cutting inserts, supports for replaceable cutting bits

- 2210/20 . Number of cutting edges

- 2210/201 . . one

- 2210/202 . . three

- 2210/203 . . four

- 2210/204 . . five

- 2210/205 . . six

- 2210/206 . . seven

- 2210/207 . . eight

- 2210/208 . . ten

- 2210/209 . . twelve

- 2210/24 . Overall form of the milling cutter (angles [B23C 2210/04](#); top or side views of cutting edges [B23C 2210/08](#); cross sections of cutting edges [B23C 2210/12](#))

- 2210/241 . . Cross sections of the whole milling cutter
- 2210/242 . . Form tools, i.e. cutting edges profiles to generate a particular form
- 2210/243 . . Cutting parts at both ends
- 2210/244 . . Milling cutters comprised of disc-shaped modules or multiple disc-like cutters
- 2210/245 . . Milling cutters comprising a disc having a wave form
- 2210/246 . . Milling cutters comprising a hole or hollow in the end face or between the cutting edges
- 2210/247 . . Stepped milling cutters
- 2210/248 . . . with enlarged cutting heads
- 2210/28 . Arrangement of teeth
- 2210/282 . . Unequal angles between the cutting edges, i.e. cutting edges unequally spaced in the circumferential direction
- 2210/285 . . Cutting edges arranged at different diameters
- 2210/287 . . Cutting edges arranged at different axial positions or having different lengths in the axial direction
- 2210/32 . Details of teeth
- 2210/321 . . Lands, i.e. the area on the rake face in the immediate vicinity of the cutting edge
- 2210/323 . . Separate teeth, i.e. discrete profiled teeth similar to those of a hob
- 2210/325 . . Different teeth, i.e. one tooth having a different configuration to a tooth on the opposite side of the flute
- 2210/326 . . File like cutting teeth, e.g. the teeth of cutting burrs
- 2210/328 . . Treated cutting edges
- 2210/40 . Flutes, i.e. chip conveying grooves
- 2210/402 . . of variable depth
- 2210/405 . . . having decreasing depth in the direction of the shank from the tip of the tool
- 2210/407 . . . having increasing depth in the direction of the shank from the tip of the tool
- 2210/44 . Margins, i.e. the part of the peripheral surface immediately adjacent the cutting edge
- 2210/445 . . variable
- 2210/48 . Chip breakers
- 2210/483 . . Chip breaking projections
- 2210/486 . . Chip breaking grooves or depressions
- 2210/50 . Cutting inserts

WARNING

Group [B23C 2210/50](#) is impacted by reclassification into groups [B23C 2210/501](#), [B23C 2210/502](#) and [B23C 2210/504](#).

All groups listed in this Warning should be considered in order to perform a complete search.

- 2210/501 . . with cutting edges following one or more helices

WARNING

Group [B23C 2210/501](#) is incomplete pending reclassification of documents from group [B23C 2210/50](#).

Groups [B23C 2210/50](#) and [B23C 2210/501](#) should be considered in order to perform a complete search.

- 2210/502 . . with cutting edges following straight flutes or rows of more than one insert

WARNING

Group [B23C 2210/502](#) is incomplete pending reclassification of documents from group [B23C 2210/50](#).

Groups [B23C 2210/50](#) and [B23C 2210/502](#) should be considered in order to perform a complete search.

- 2210/503 . . mounted internally on the cutter
- 2210/504 . . arranged in a manner that only extends longitudinally by one insert

WARNING

Group [B23C 2210/504](#) is incomplete pending reclassification of documents from group [B23C 2210/50](#).

Groups [B23C 2210/50](#) and [B23C 2210/504](#) should be considered in order to perform a complete search.

- 2210/506 . . mounted so as to be able to rotate freely
- 2210/52 . Bushings
- 2210/54 . Configuration of the cutting part
- 2210/56 . Supporting or guiding sections located on the periphery of the tool
- 2210/58 . Brushes
- 2210/60 . Axis of the cutter inclined with respect to the axis of rotation
- 2210/62 . Selectable cutting diameters
- 2210/64 . End milling cutters having a groove in the end cutting face, the groove not being present so as to provide a cutting edge

WARNING

Group [B23C 2210/64](#) is impacted by reclassification into group [B23C 2210/641](#).

Groups [B23C 2210/64](#) and [B23C 2210/641](#) should be considered in order to perform a complete search.

- 2210/641 . . at least one groove or gash being different than another

WARNING

Group [B23C 2210/641](#) is incomplete pending reclassification of documents from group [B23C 2210/64](#).

Groups [B23C 2210/64](#) and [B23C 2210/641](#) should be considered in order to perform a complete search.

- 2210/66 . Markings, i.e. symbols or indicating marks
- 2210/68 . Reground to nominal diameter by removal of material from both the front of the insert and the back of insert carrier
- 2210/70 . Pilots
- 2210/72 . Rotatable in both directions
- 2210/74 . Slits

2215/00 Details of workpieces

- 2215/04 . Aircraft components
- 2215/045 . . Propellers

2215/08	• Automotive parts (B23C 2215/16 , B23C 2215/20 and B23C 2215/24 take precedence)	2222/76	• Silver
2215/085	• • Wheels	2222/78	• Sodium
2215/12	• Propellers for boats	2222/84	• Steel (details of high speed steel B23C 2222/32)
2215/16	• Camshafts	2222/88	• Titanium
2215/20	• Crankshafts	2222/98	• Zinc
2215/24	• Components of internal combustion engines	2224/00	Materials of tools or workpieces composed of a compound including a metal
2215/242	• • Combustion chambers	2224/04	• Aluminium oxide
2215/245	• • Connecting rods	2224/13	• Chromium nitride
2215/247	• • Components of diesel engines	2224/14	• Chromium aluminium nitride (CrAlN)
2215/28	• Nipples	2224/20	• Tantalum carbide
2215/32	• Railway tracks	2224/22	• Titanium aluminium carbide nitride (TiAlCN)
2215/36	• Railway wheels	2224/24	• Titanium aluminium nitride (TiAlN)
2215/40	• Spectacles	2224/28	• Titanium carbide
2215/44	• Turbine blades	2224/32	• Titanium carbide nitride (TiCN)
2215/48	• Kaplan turbines	2224/36	• Titanium nitride
2215/52	• Axial turbine wheels	2224/56	• Vanadium aluminium nitride (VAlN)
2215/56	• Radial turbine wheels	2226/00	Materials of tools or workpieces not comprising a metal
2215/60	• Valve guides in combination with the neighbouring valve seat	2226/12	• Boron nitride
2215/64	• Well pipe windows, i.e. windows in tubings or casings for wells	2226/125	• • cubic [CBN]
2220/00	Details of milling processes	2226/18	• Ceramic
2220/04	• Milling with the axis of the cutter inclined to the surface being machined	2226/27	• Composites, e.g. fibre reinforced composites
2220/08	• Milling with the axis of the tool perpendicular to the workpiece axis	2226/31	• Diamond
2220/12	• Cutting off, i.e. producing multiple discrete components from a single piece of material	2226/315	• • polycrystalline [PCD]
2220/16	• Chamferring	2226/33	• Elastomers, e.g. rubber
2220/20	• Deburring	2226/37	• Fibreglass
2220/24	• Production of elliptical holes	2226/41	• Gypsum
2220/28	• Finishing (roughing and finishing B23C 2220/605)	2226/42	• Gem, i.e. precious stone
2220/32	• Five-axis	2226/45	• Glass (milling glass B28D 1/18)
2220/36	• Production of grooves	2226/54	• Paper
2220/363	• • Spiral grooves	2226/61	• Plastics not otherwise provided for, e.g. nylon
2220/366	• • Turbine blade grooves	2226/62	• Polystyrene foam
2220/40	• Using guiding means	2226/72	• Silicon carbide
2220/44	• High speed milling	2226/73	• Silicon nitride
2220/48	• Methods of milling not otherwise provided for	2226/75	• Stone, rock or concrete (milling stone or like materials B28D 1/18)
2220/52	• Orbital drilling, i.e. use of a milling cutter moved in a spiral path to produce a hole	2228/00	Properties of materials of tools or workpieces, materials of tools or workpieces applied in a specific manner
2220/56	• Plunge milling	2228/04	• applied by chemical vapour deposition [CVD]
2220/60	• Roughing	2228/08	• applied by physical vapour deposition [PVD]
2220/605	• • Roughing and finishing	2228/10	• Coating
2220/64	• Using an endmill, i.e. a shaft milling cutter, to generate profile of a crankshaft or camshaft	2228/12	• Cast, i.e. in the form of a casting
2220/68	• Whirling	2228/14	• Flexible
2222/00	Materials of tools or workpieces composed of metals, alloys or metal matrices	2228/24	• Hard, i.e. after being hardened
2222/04	• Aluminium	2228/25	• Honeycomb
2222/06	• Babbitt metal	2228/26	• Hot
2222/12	• Brass	2228/49	• Sintered
2222/14	• Cast iron	2228/50	• Soft metal
2222/16	• Cermet	2230/00	Details of chip evacuation (chip evacuation in cutting inserts B23C 2200/32)
2222/28	• Details of hard metal, i.e. cemented carbide	2230/04	• Transport of chips
2222/32	• Details of high speed steel (steel B23C 2222/84)	2230/045	• • to the middle of the cutter or in the middle of a hollow cutter
2222/52	• Magnesium	2230/08	• Using suction
2222/61	• Metal matrices with metallic or non-metallic particles or fibres	2235/00	Details of milling keys
2222/64	• Nickel	2235/04	• Keys with blind holes
		2235/08	• Brushes

- 2235/12 . Using a database to store details of the key, the information in the database being used for the generation of the profile of the key
- 2235/16 . Dial indicators
- 2235/21 . Calibration by electronic detection of position of probes and cutting wheels
- 2235/24 . Electronic sensors
- 2235/28 . Key blanks
- 2235/32 . Measurement systems
- 2235/36 . Ring keys
- 2235/41 . Scanning systems
- 2235/44 . Templates for the simulation of keys
- 2235/48 . Tracers, probes or styli
- 2240/00 Details of connections of tools or workpieces (fixation of the cutting insert or bit in the tool B23C 2210/16)**
- 2240/04 . Bayonet connections
- 2240/08 . Brazed connections
- 2240/12 . Connections using captive nuts
- 2240/16 . Welded connections
- 2240/21 . Glued connections
- 2240/24 . Connections using screws
- 2240/245 . . hollow screws, e.g. for the transmission of coolant
- 2240/32 . Connections using screw threads
- 2245/00 Details of adjusting inserts or bits in the milling cutter**
- 2245/04 . Adjustable wedge surfaces
- 2245/08 . Setting gauges
- 2245/12 . Spiral discs
- 2250/00 Compensating adverse effects during milling**
- 2250/04 . Balancing the cutter ([vibration damping B23C 2250/16](#))
- 2250/08 . compensating centrifugal force
- 2250/12 . Cooling and lubrication
- 2250/16 . Damping vibrations ([balancing B23C 2250/04](#))
- 2250/21 . compensating wear of parts not designed to be exchanged as wear parts
- 2255/00 Regulation of depth of cut**
- 2255/04 . Depth indicators
- 2255/08 . Limitation of depth of cut
- 2255/12 . Depth stops
- 2260/00 Details of constructional elements**
- 2260/04 . Adjustable elements
- 2260/08 . Bearings
- 2260/12 . Cams
- 2260/28 . Differential screw threads
- 2260/40 . Harmonic gearboxes, i.e. reduction gearing including a wave generator, a flex spline or a circular spline
- 2260/48 . Indication scales
- 2260/52 . Keys, e.g. spanners or Allen keys, especially for assembling or disassembling tooling
- 2260/56 . Lasers ([improving machinability with laser whilst milling B23P 25/003](#))
- 2260/68 . Rings
- 2260/72 . Seals
- 2260/76 . Sensors
- 2260/80 . Serrations
- 2260/84 . Springs
- 2260/88 . Steadies
- 2265/00 Details of general geometric configurations**
- 2265/08 . Conical
- 2265/12 . Eccentric
- 2265/16 . Elliptical
- 2265/32 . Polygonal
- 2265/36 . Spherical
- 2265/40 . Spiral
- 2270/00 Details of milling machines, milling processes or milling tools not otherwise provided for**
- 2270/02 . Use of a particular power source
- 2270/022 . . Electricity
- 2270/025 . . Hydraulics
- 2270/027 . . Pneumatics
- 2270/04 . Use of centrifugal force ([compensation of effect of centrifugal force B23C 2250/08](#))
- 2270/06 . Use of elastic or plastic deformation ([B23C 2210/161 takes precedence](#))
- 2270/08 . Clamping mechanisms or provision for clamping ([B23C 2210/16 takes precedence](#))
- 2270/10 . Use of ultrasound
- 2270/12 . Centering of two elements relative to one another
- 2270/14 . Constructions comprising exactly two similar components
- 2270/16 . Constructions comprising three or more similar components
- 2270/18 . Milling internal areas of components
- 2270/20 . Milling external areas of components