Cutting tool nomenclature pdf

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Specification	Grain size μm	Binder content wt%	Thermal conductivity λ W/(m·K)	Vickers hardness *HV* GPa	Rake angle α °
CBN	2	7 % Co	110-120	41 – 44	0
PCD-a	> 0.5	10 % Co	480 – 560	50 – 60	0, 10
PCD-b	50	5 % Co	480 – 560	60 – 80	0
BL-NPD	0.03 – 0.05	—	250 – 300	120 – 140	0
SC	—	—	1000 – 2200	70 – 120	0
CVD-SC	—	—	1000 – 2200	70 – 120	0

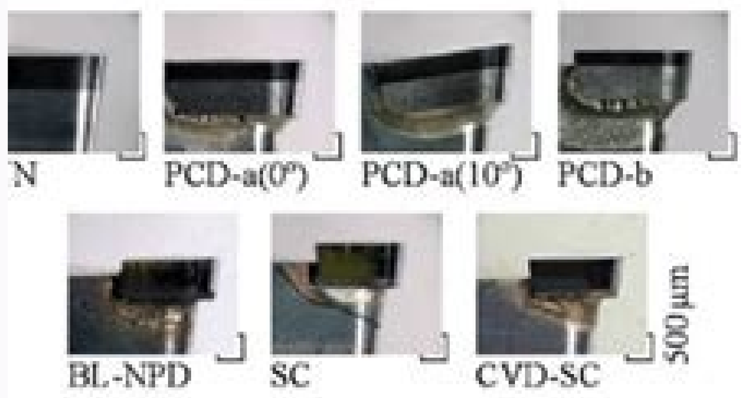
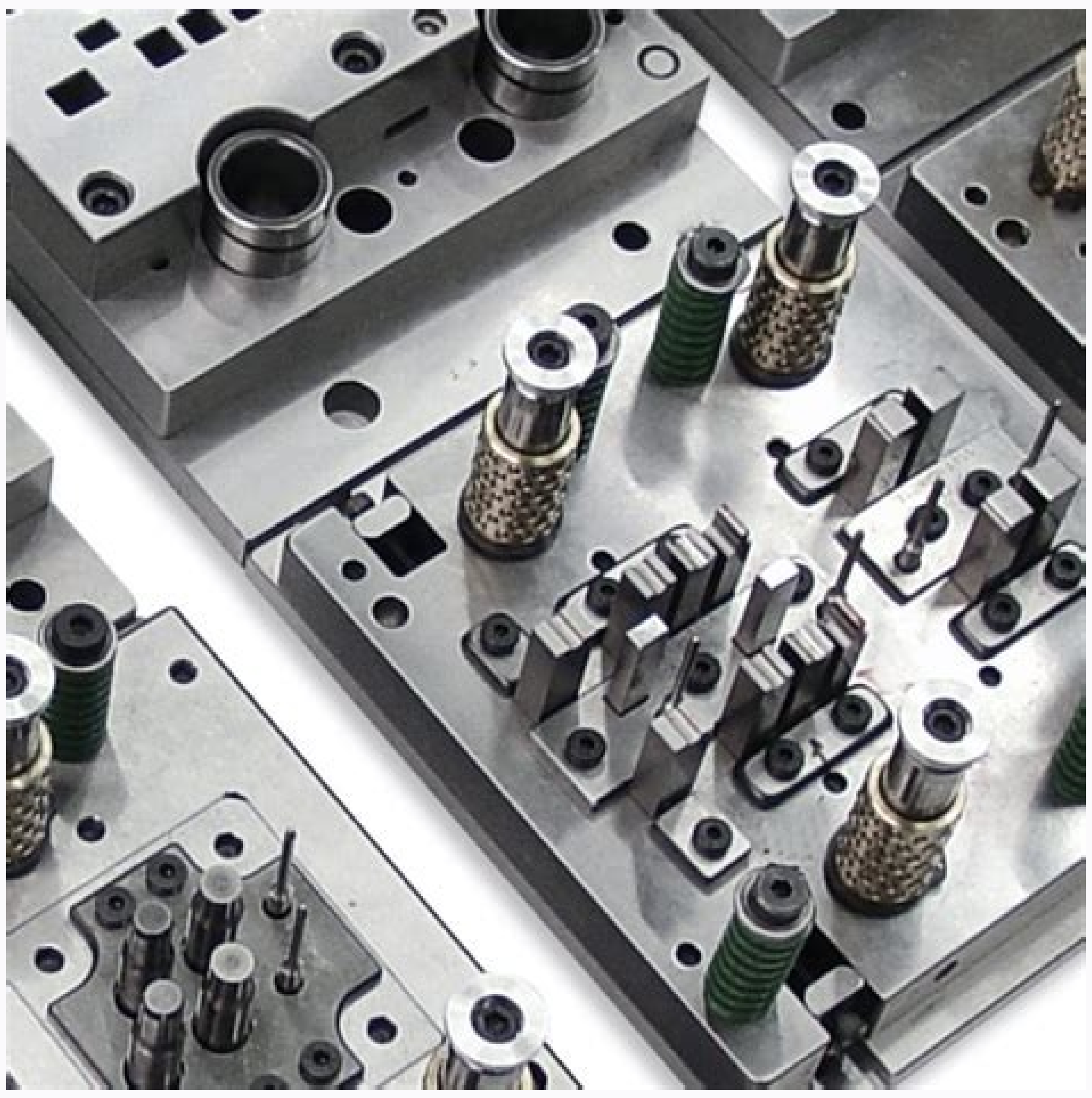


Fig. 1 Seven types of cutting tools.

Table 3 Cutting conditions.

Workpiece			Cemented carbide (WC-m, WC-d, WC-
Insert (Nose radius: r_ε = 0.8 mm)			CBN, PCD-a, PCD-b BL-NPD, SC, CVD-S
Cutting speed	*v*	m/s	40
Depth of cut	*d*	mm	0.05
Feed	*f*	mm/rev	0.1
Cutting style			Dry



Cutting tool nomenclature ppt. Multi point cutting tool nomenclature pdf. Cutting tool nomenclature and tool signature. Cutting tool nomenclature pdf. Single point cutting tool nomenclature mcq. Single point cutting tool nomenclature. Single point cutting tool nomenclature ppt. Multi point cutting tool nomenclature.

4/17/2020 Cutting tool nomenclature:- · Cutting tool nomenclature means systematic naming of the various parts and angles of a cutting tool. The surfaces on the point of a tool bear definite relationship to each other that are defined by angles. · The complete nomenclatures of the various parts of a single point tool are: shank, face, flank, heel, nose, base, back rake, side rake, side clearance, end cutting edge, wide cutting edge and lip angle. These elements define the shape of the tool. · The shank is that portion of the tool bit which is not ground to form cutting edges and is rectangular in cross - section. · The face of the cutting tool is that surface against which the chip sides upward. · The flank of a cutting tool is that surface which faces the workpiece. · The heel of a single point tool is the lowest portion of the side cutting edges. · The nose of a tool is the conjunction of the side and end cutting edges. A nose radius increases the tool life and improves surface finish. · The base of a tool is the underside of the shank. · The rake is the slope of the top away from the cutting edge. Back rake indicates that the plane which forms the face or top of a tool has been ground back at an angle sloping from the nose. · Side rake indicates that the plane that forms the face or top of a tool has been ground back at an angel sloping from the side cutting edge. · Side rack is more important than back rake in turning operation · The side clearance or side relief indicates that the plane that forms the flank or side of a tool has been ground back at an angel sloping down form the side cutting edge. · The end clearance or end relief indicates that the nose or end of a tool has been ground back at an angle sloping down from the end cutting edges. · The end cutting edge angle indicates that the plane which forms the end of a tool has been ground back at an angle sloping form the nose to the side of t e shank. · The side cutting edge angle indicates that the plane which forms the flank or side for a tool has been ground back at an angle to the side of the shank. In the main, chips are removed by this cutting edge. · The lip or cutting angle is the included angle when the tool has been ground wedge shaped. · The tool signature is a sequence of numbers listing the various angles, in degrees and size of the nose radius. This numerical method of identification has been standardized by the American Standard Association. · The seven elements that comprise the signature of a single point cutting tools are always stated in the following order: back rake angle and nose radius. Thus a tool with a shape specified as 8 - 14 - 6 - 6 - 6 - 15 – 4 · 8o is back rake, 14o side rake, 6o end relief, 6o side relief, 6o end cutting edge and 15o side cutting edge angles, and 4 mm nose radius. single-point cutting tool diagramThe main body of the tool is known as the shank. It is the backward part of the tool which is held by tool post.The top surface tool on which chips passes after cutting is known as a face. It is the horizontal surface adjacent of cutting edges.Sometime flank is also known as cutting face. It is the vertical surface adjacent to the cutting edge. According to cutting edge, there are two flank side flank and end flank.3. Nose or Cutting Point:The point where both cutting edge meets known as cutting point or nose. It is in front of the tool.The bottom surface of the tool is known as the base. It is just the opposite surface of the face.It is an intersecting line of face and base.6. End Cutting Edge Angle:The angle between the end cutting edge or flank to the plane perpendicular to the side of the shank is known as the end cutting angle.This angle usually varies from 5 to 15 degree7. Side Cutting Edge Angle:The angle between the side cutting edge or flank to the plane parallel to the side of the shank known as side cutting edge angle.The angle form to smooth flowing of chips from the face, known as rack angle. It allows to smooth flow of chips.The back rack angle is the angle between the face and the plane perpendicular to the end cutting edge.Softer the material, greater should be the positive rake angle.The back rake angle may be positive negative or neutral.9. Side Rack Angle:The angle between the face and plane perpendicular to the side cutting edge is known as the side rack angle. It allows chips to flow smoothly when material cut by side cutting edge.The amount by which a chip is bent depends upon this angle. When the side rack angle increases, the magnitude of chip bending decreases. Smoother surface furnish is produced by a larger side rake angle.It is also known as a clearance angle. It is the angle that avoids tool wear. It avoid the rubbing of flank with a workpiece.End cutting angle made by end flank to the plane perpendicular to the base.This angle may vary from 6 to 10 degrees.11. Side Relief Angle:It is the angle made by the side flank to the plane perpendicular to the base. It avoid rubbing of side flank with a workpiece.This angle allows the tool to fed sideways into the job in order to cut the work material without rubbing.When the side relief angle is very small, the tool will rub against the job and therefore it will get overheated and become blunt and the surface finish obtained will be poor.The intersecting area of both cutting edges is known as the nose of the tool.Factors influencing rake angle of the single point cutting tool:1. Type of material being cut: a harder material like cast iron may be machined with a smaller rake angle than that required by a soft metal like mild steel or aluminum. 2. Type of tool material being used: tool material like cemented carbide permits turning at a very high speed. It has been observed that in machining at a very high cutting speed rake angle has a little influence of cutting pressure. 3. Depth of cut: in rough turning, a high depth of cut is given to withstand severe cutting pressure. so the rake angle should be decreased to increase the lip angle that provides strength to the cutting edge. 4. The rigidity of the tool holder and condition of the machine: an improperly supported tool on an old and worn out machine can't take up severe cutting pressure. so machining under such conditions the tool used should have a larger rake angle than that at the normal condition to reduce the cutting pressure.Tool SignatureThe tool signature or tool designation is used to denote a standardized system of specifying the principal tool angles of a single-point cutting tool. Some common systems used for tool designation or tool nomenclature are the following-1. American or (ASA) System.It defines the principle angles like side rake, back rack, nose, etc. without any reference to their location concerning cutting edge. As such, this system of nomenclature does not give any indication of the tool behavior with regard to the flow of chip during the cutting operation the three reference planes adopted for designating different tool angles are similar to those used in conventional machine drawing i.e, x-x,y-y, and z-z the last one containing the base of the tool and the two plane being normal to this plane as well as mutually perpendicular. Thus, this system is a coordinate system of tool nomenclature.This system, according to B-S1886-1952, defines the maximum rake. The various tool parameters in this system are indicated if the order of Back rake, Side rake, End relief angle, Side relief angle, End cutting angle, Side cutting edge angle, and Nose radius.This category of tool nomenclature systems includes the German or DIN System (DIN-6581), Russian Systems (OCT-BKC 6897and 6898), and Czechoslovakian System (CSN-1226). The various tool parameters in these systems are specified with reference to the tool reference to the tool reference planes.It is an internationally adopted system, developed recently. It incorporates the salient features of tool nomenclature of different systems in it.Example: A tool with 8, 10, 6, 6, 6, 10, 0.2, signature in the A.S.A system is having the following specification.Side rake (αx)=100 End relief angle (βy) =60 Side relief angle (βx) =60 End cutting edge angle (φe) = 60 Side cutting edge angle (φs) = 100 Nose radius = 0.2mmSingle Point Cutting Tool Examples :Single Point Cutting tool consists of only one main cutting edge that can perform material removal action at a time in a single pass.Turning toolShaping toolPlaning toolSlotting toolBoring toolFly CutterMaterial Used For single Point Cutting tools :Tool bits generally made of seven materialsHigh-speed steelCast alloys (such as stellite)Cemented carbidesCeramicsCermetsCubic Boron NitridePolycrystalline DiamondHigh Carbon SteelThese are usually plain carbon steel containing 0.6 to 1.5 % C. Method of fabrication for High Carbon Steel (HCS) is forging. HCS has a hot hardness temperature of about 250°C. Also, its maximum cutting velocity is about 5 m/min. Hence, HCS is generally used for machining soft materials like aluminum, copper, magnesium, etc. HCS is harder and the cheapest tool material.High-Speed SteelHigh-Speed Steel (HSS) is usually carbon steel containing 1.5 to 2% carbon, 18 % tungsten, 4% chromium, 1% vanadium, and rest is iron. Tungsten is added to increase hardness. Chromium is added to increase hot hardness. Vanadium is added to increase wear resistance. The method of fabrication for HSS is forging. The cutting velocity of HSS is 40-60 m/min. It gives a higher speed than HCS. The hot hardness temperature of HSS is about 600°C. Sometimes 18% molybdenum is added instead of tungsten to increase the wear resistance of the tool. Then this HSS is called as molybdenum based HSS. But tungsten-based HSS is commonly used. HSS has the only disadvantage that during machining of pure carbon work material, diffusion of carbon atoms into iron is much more because iron has a stronger affinity to attract carbon.Advantages of Single Point Cutting Tool :Single Point Cutting tool is simple in construction hence easy to Design and Manufacture.As compare to multipoint cutting tool single point cutter are cheaper.'Resharpening of cutter is easyDisadvantages of Single-point Cutting Tools :These tools have low material removal rates (MRR) hence productivity is low.The tool wear rate is high.Tool life is short.High Cutting temperature More Resources /articlesManufacturing Technology Notes , ArticlesMechanical Subjectwise Basic Concept Notes ,ArticlesNew Mechanical Projects 2020 (All Projects Post Index List)Machine Tool , Manufacturing Projects List - Abstract , Report link to Pressure Vessels - Parts, Design, Application, Types, Material, Diagram link to Knuckle Joint - Parts, Diagram, Design Calcuation, Applications

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