SHAREATE

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SHAREATE

CEMENTED CARBIDE

Materials for stamping dies,Non-standard tool

Shareate Tools Ltd.

COMPANY PROFILE

Shareate Tools was established in August 2005 as a multinational corporation engaged in the research and development, manufacturing, service, and sales of cemented carbide products and rock drilling tools. Shareate owns several domestic and overseas subsidiary companies, including， Shareate Wuhan, Zhuzhou Weco, Australia AMS, America AMS, and others, which were acquired or established through joint ventures. in October 2021, Shareate was officially listed on the SSE STAR Market (stock code 688257).

As a national strategic emerging industry, our company focuses on developing cemented carbide technology and progressively mastering core technologies in mining, cutting, and wear-resistant applications. With advanced production technology and a strong market position, we have built a complete industrial chain covering cemented carbide production and tool manufacturing.

Currently, our group company serves six fields: carbide, rock drilling tools, cutting tools, petroleum instrumentation, electric drilling equipment, and mining exploration services. Our main products include cone drill bits, carbide buttons and rods, molds, precision components for drilling tools, and carbide inserts. These products find wide application in various industries such as petroleum engineering, automotive manufacturing, infrastructure construction, mining operations, electronics production, machinery fabrication, new energy development, and comprehensive mining consumables services.

Over the years, Shareate has been granted 72 invention patents and 380 utility model patents. We are accredited with the API Spec Q1 and 1S0 9001 certifications. Shareate has established itself as the leading supplier of rock drilling tools in Asia and one of the top five globally.

Our products are exported to five continents and distributed in over 60 countries, We currently collaborate with renowned companies such as Rio Tinto, BHP, Glencore, Barrick, FMG, Vale, and Anglo American.

Shareate takes pride in being a leader in modern manufacturing and service integration. We operate state-of-the-art factories that adhere to the highest international standards, We understand that product success relies on the trust and support of our customers.

Therefore, Shareate works closely with customers worldwide to create best-in-class products and solutions to overcome the most challenging technical problems. Whatever your carbide-related situation may be, Shareate can provide an appropriate technical solution.

PASSION WINS DREAM
QUALITY WINS RESPECT

Continuous Accumulation and Innovation of Cemented Carbide Technology for Over 40 Years

◎ In 1982, we were the first company in china who brought in the cemented carbide

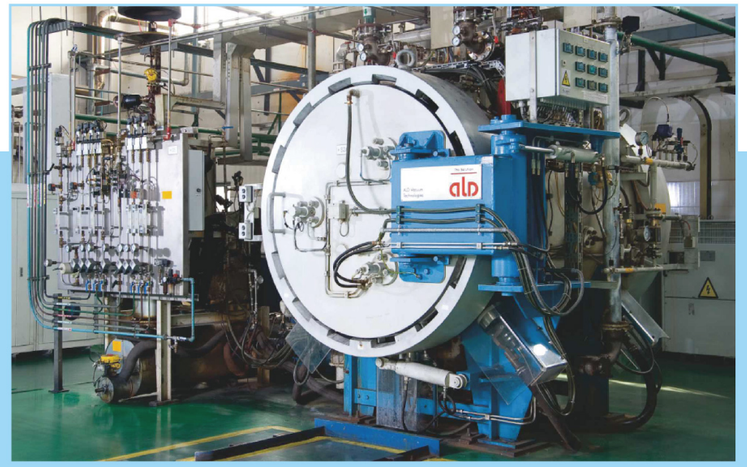
◎ The forerunner of low pressure sinteringtechnology with the greatest

◎ The advancedand complete physical & chemical testing and experimentalcenter, owning the prospective research and development

Manufacturing Equipment

A Quality-First Production System

A clean and organized workshop ensures smooth operations, while ergonomic workstation layouts enhance efficiency. Standardized workflows guarantee consistent product quality



ALD Sintering Furnance

Spray Granulation

Cold Isostatic Press (CIP)

CNC Milling Machine

Dry-Bag Isostatic Press

Testing Equipment

A Quality-First Inspection System

The company is equipped with various advanced laboratory instruments and testing devices. Experienced technicians conduct full-process monitoring to ensure product quality.

Scanning Electron Microscope/
Energy Spectrometer
Dispersive Spectroscopy (EDS)

Microhardness Tester

ZEISS Metallography Microscope

Projector

LECO Carbon Analyzer

LECO Oxycen Analyzer

SHAREATE

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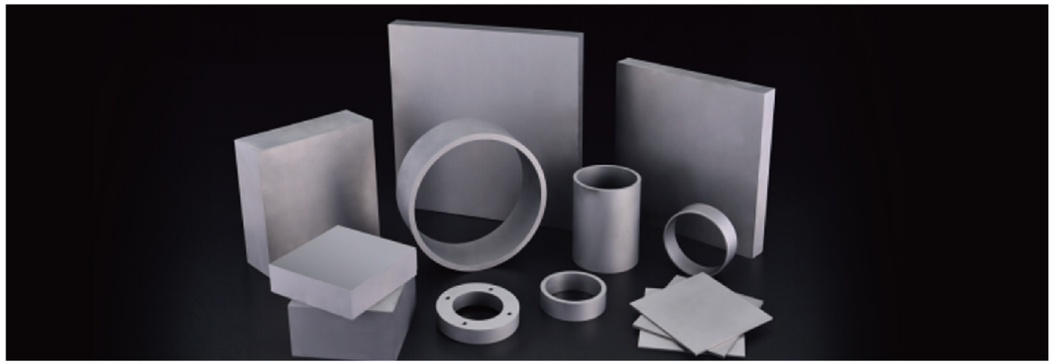
➤ Grades and physical properties

Series	Grade	Wt %	WC (μm)	Density Hardness (g/cm^3)	Hardness (HRA)	Fracture Toughness ($MPa·m^{1/2}$)	Strength Flexure (Mpa)
Ultrafine grain							
U	XR06U	6	0.4	14.75	94.0	8.3	3600
	XR09U	9	0.4	14.55	93.5	8.6	4000
	XR101N	10Ni	0.4-0.6	14.40	92.2	7.0	3100
	XR12UF	12	0.4	14.12	92.5	9.5	4000
Submicron grain							
S	XR05N	5Ni	0.6-0.8	14.80	93.2	5.2	2600
	XR10ST	10	0.6-0.8	14.45	91.7	11.5	3800
	XR12ST	12	0.6-0.8	14.15	91.2	12.6	4000
	XR15ST	15	0.6-0.8	13.90	90.3	13.7	4000
Fine grain							
F	XR06X	6	0.8-1.5	14.85	91.8	12.0	3600
Fine- medium grain							
FM	XR102N	10Ni	0.8-1.2	14.40	90.3	11.2	3200
	XR125	12	0.8-2.0	14.20	90.0	15.3	3800
	XR126	12	0.8-2.0	14.20	90.0	15.8	3900
	XR126H	12	0.8-2.0	14.25	90.0	16.3	4000
Medium grain							
M	XR123	12	1.0-3.0	14.20	89.3	16.0	3700
	XR141	15	1.0-3.0	13.95	88.0	17.5	3400
Medium- coarse grain							
MC	XR06C	6	1-5	14.85	90.5	15.3	3000
	XR08X	8	2-4	14.75	89.6	16.8	3000
	XR13T	13	2-4	14.15	87.8	17.9	3000
	XR151	15	2-5	14.00	86.5	18.8	2800
	XR202	21	2-5	13.35	84.5	20.9	2500
Coarse grain							
C	XR18K	18	4-6	13.65	84.8	21.1	2500
	XR22K	22	4-6	13.25	83.5	22.8	2500
Extra- coarse							
E	XR25K	25	6-9	13.15	81.5	25.0	2300

✡ 1) The material property values are representative data and not guaranteed values.
2) As the material design is upgraded, the material property values will be updated without further notice. Please refer to the latest version.

Material Characteristics and Applications for Stamping Dies



➤ Cemented Carbide for Electric Motor Progressive Stamping Dies — FM and M Series

The material is widely used for high-speed stamping of silicon steel sheets, with products extensively applied in the electric motor and motor fields.

Characteristics

◎ Utilizes a mixed-grain structure, which provides both excellent wear resistance and good chipping resistance.

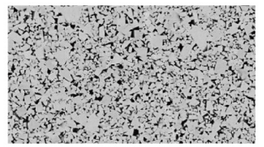
◎ The latest binder composition design concept endows the alloy with corrosion resistance, making it suitable for electrical discharge machining (EDM).

Application

XR126

Characteristics:
Medium-fine grain structure with 12% corrosion-resistant binder phase.
Good toughness, wear resistance, and corrosion resistance.

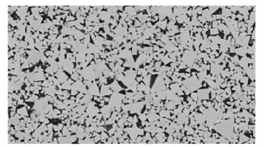
Application:
Suitable for die making of electric motor laminations in electric tools, automotive motors, washing machines, air conditioners, ballasts, and electricity meters.



XR123

Characteristics:
Medium-grain tungsten carbide with 12% corrosion-resistant binder phase.
Good impact resistance and wear resistance.

Application:
Suitable for die making of electric motor laminations in electric tools, automotive motors, washing machines, air conditioners, ballasts, and electricity meters.



XR141

Characteristics:
Medium-grain tungsten carbide with 15% corrosion-resistant binder phase.
Good impact resistance.

Application:
Suitable for die making of electric motor laminations in electric tools, automotive motors, washing machines, air conditioners, ballasts, and electricity meters.

➤ Cemented Carbide for Electronics Progressive Stamping Dies — S and FM Series

The materials are widely used for high-speed stamping of thin materials such as stainless steel, copper alloys, aluminum alloys, copper foil, aluminum foil, nanocrystalline soft magnetic alloy materials, and microwave-absorbing materials. The products are extensively applied in the following fields.

Characteristics

◎ Sub-micron grain size for excellent edge sharpness.

◎ Optimized binder content effectively enhances the material's resistance to chipping.

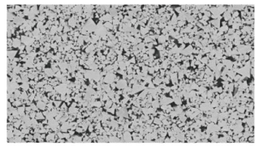
◎ Latest binder composition design provides corrosion resistance, making it suitable for electrical discharge machining (EDM).

Applications

XR125

Characteristics：
Medium-fine grain structure with 12% corrosion-resistant binder phase.
Good toughness.

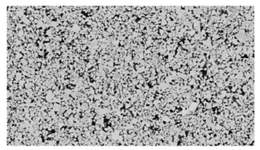
Application：
Versatile for high-speed stamping of stainless steel and copper materials with thicknesses up to 1 mm.



XR15ST

Characteristics：
Sub-micron grain structure with 15% corrosion-resistant binder phase.Balances toughness and wear resistance.

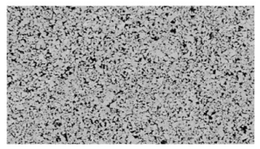
Application：
Versatile for high-speed stamping of stainless steel and copper materials with thicknesses up to 0.5 mm.



XR12ST

Characteristics：
Sub-micron grain structure with 12% corrosion-resistant binder phase.
Good wear resistance.

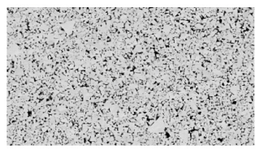
Application：
Suitable for high-speed stamping of stainless steel, copper, copper foil, aluminum foil, nanocrystalline soft magnetic materials, and microwave-absorbing materials with thicknesses up to 0.3 mm.



XR10ST

Characteristics：
Sub-micron grain structure with 10% corrosion-resistant binder phase.
Good wear resistance.

Application：
Suitable for high-speed stamping of stainless steel materials with thicknesses up to 0.15 mm.



➤ Cemented Carbide for Soft Metal Stamping Dies — XR06C

Characteristics

◎ Reduced cobalt content in the binder phase to minimize the adhesion between soft metals and cobalt.

◎ Mixed-grain structure that provides excellent wear resistance and good chipping resistance.

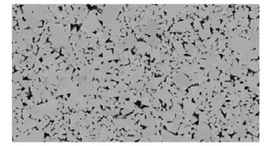
◎ Latest binder composition design offers corrosion resistance, making it suitable for electrical discharge machining (EDM).

Application

XR06C

Characteristics：
Medium-coarse grain structure with 6% corrosion-resistant binder phase.
Good toughness and wear resistance.

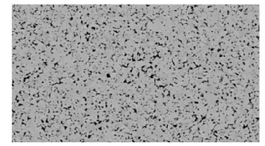
Application：
Suitable for high-speed stamping of soft metals such as pure iron, pure copper, and SPCC (stamping-quality cold-rolled steel).



XR06X

Characteristics：
Fine grain structure with 6% corrosion-resistant binder phase.
Good edge sharpness and wear resistance.

Application：
Suitable for high-speed stamping of soft metals such as pure iron and pure copper.



➤ Common Sheet Metal Specifications

Specifications for Electric Motor Progressive Die Materials

Length/mm	Width/mm	Thickness/mm	Thickness tolerance/mm	Remarks
150	150	≤90	0.6±0.1	◎Surface Grinding on Thickness Side ◎Ultrasonic Testing ◎Stress Relief Treatment ◎Magnetic Treatment
200	200	≤55		
250	250	≤40		
300	300	≤30		

Specification Table for Electronics Progressive Die Materials

Length/mm	Width/mm	Thickness/mm	Thickness tolerance/mm	Remarks
105	105	≤60	0.6±0.1	◎Surface Grinding on Thickness Side ◎Ultrasonic Testing ◎Stress Relief Treatment ◎Magnetic Treatment
125	112.5	≤60		
120	120	≤60		

✡ Other size sheet can negotiate.

Cemented Carbide for the Semiconductor Mold Industry

➤ Cemented Carbide for Semiconductor Packaging Molds — XR10ST, XR12ST

Characteristics

◎Sub-micron grain structure with corrosion-resistant binder phase.

◎Good wear resistance and polishability.

➤ Cemented Carbide for Semiconductor Lead Frame Blanking — XR125, XR12ST

Characteristics

◎The upper die material features a medium-fine grain structure, with a 12% corrosion-resistant binder phase, providing good toughness.The lower die material features a sub-micron grain structure, offering good wear resistance.

➤ Cemented Carbide for Semiconductor Lead Frame Trimming Dies — XR12UF and XR12ST

Characteristics

◎Upper Die Material:Utilizes an ultra-fine grain structure, providing excellent wear resistance.
Lower Die Material: Features a sub-micron grain structure, offering good wear resistance and toughness.

Application

◎The products are widely used in semiconductor packaging, lead frame blanking, trimming, and ejector plates.

Characteristics and Application of Materials for Powder Forming Mould

➤ Cemented Carbide for Square Battery Shell Drawing Dies — XR141

Characteristics

◎Medium-grain tungsten carbide with 15% corrosion-resistant binder phase, providing excellent electrical discharge machining (EDM) performance and surface polishability.

Application

◎Drawing dies for power battery shells and energy storage battery shells.

➤ Cemented Carbide for Round Battery Shell Drawing Dies — XR10ST, XR06U

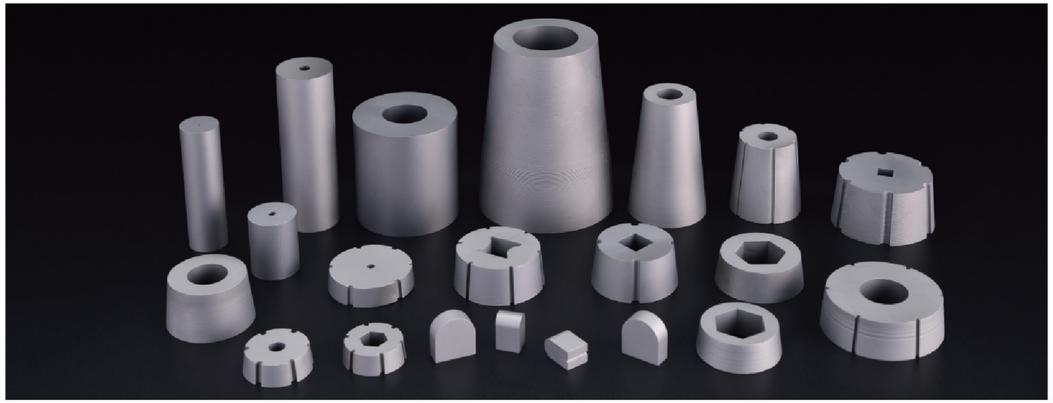
Characteristics

◎Utilizing ultra-fine and sub-micron structures, these materials offer excellent wear resistance as well as good surface polishability and finish.

Application

◎Drawing punches and thinning drawing dies for power battery shells.

Characteristics and Applications of Materials for Forging Dies



➤ Cemented Carbide for Cold Heading — XR151, XR201, XR203, XR22C, XR25K

Characteristics

◎Mixed-grain structure provides excellent wear resistance and good chipping resistance.

Application

◎Suitable for cold heading of fasteners, round bearing balls, and other automotive and mechanical components.

➤ Cemented Carbide for Cold Extrusion — XR18K, XR22K, XR25K

Characteristics

◎Coarse-grain tungsten carbide offers excellent impact resistance.

◎The latest binder composition design provides corrosion resistance, making it suitable for electrical discharge machining (EDM).

Application

◎Suitable for automotive components such as cruciform shafts and bevel gears.

➤ Cemented Carbide for Hot Upsetting — XR151, XR18K, XR22K, XR25K

Characteristics

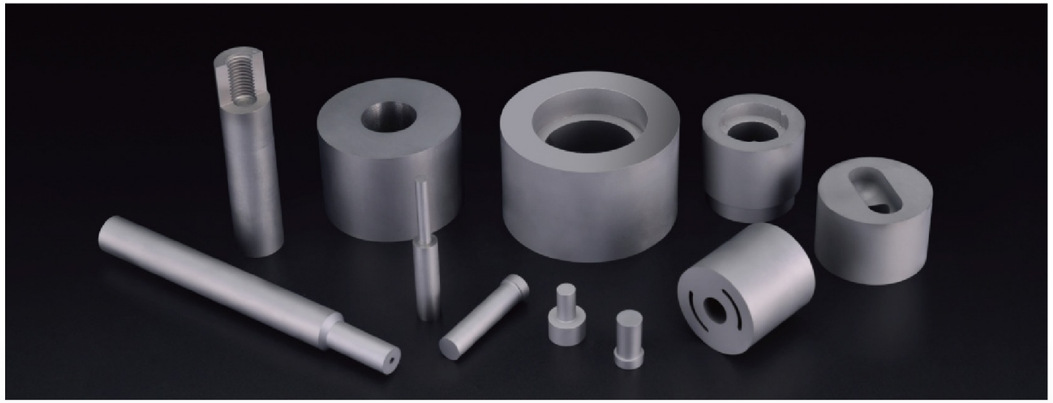
◎Coarse-grain tungsten carbide provides excellent impact resistance.

◎The latest binder composition design offers corrosion resistance, making it suitable for electrical discharge machining (EDM).

Application

◎Suitable for titanium alloy components, drive shafts, steering shafts, and other automotive and aerospace components.

Material Properties and Applications of Powder Forming Molds



➤ Carbide Materials for Powder Compaction –XR12UF, XR10ST, XR08X, XR123, XR141

Characteristics

◎Hybrid grain structure – Combines excellent wear resistance with superior chipping resistance.

◎Advanced binder phase design – Enhances corrosion resistance, making it suitable for EDM (electrical discharge machining).

Application

◎Metal powder forming molds – Dies, punches, upper/lower punches for iron powder, copper powder, etc.

◎Ceramic powder forming molds – Dies, punches, upper/lower punches for SiC (silicon carbide), WC (tungsten carbide), etc.

◎Magnetic material powder forming molds – Dies, punches, upper/lower punches for ferrite, NdFeB (neodymium iron boron), etc.

Characteristic and Application of Gear Hobbing Cutter Material

➤ Cemented Carbide for Gear Hobbing Tools — XR09U, XR12UF, XR10ST

XR09U

Characteristic:

Ultra-fine grain alloy, providing excellent edge sharpness and wear resistance.

Application:

Suitable for machining gear products with hardness above HRC60.

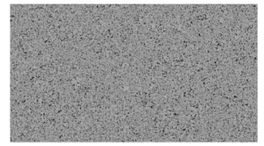
XR12UF

Characteristic:

Ultra-fine grain alloy, providing excellent edge sharpness and wear resistance.

Application:

Suitable for machining gear products with hardness up to HRC55.



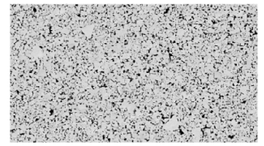
XR10ST

Characteristic:

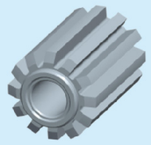
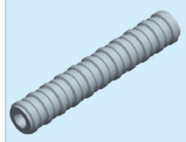
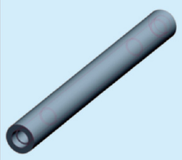
Sub-micron grain alloy, providing excellent edge sharpness and resistance to chipping.

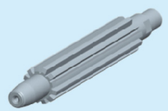
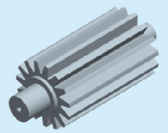
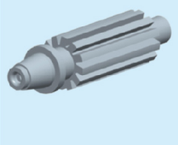
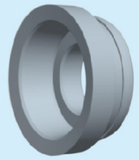
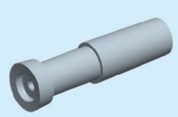
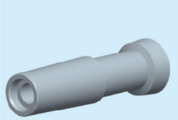
Application:

Suitable for machining gear products with hardness up to HRC35.



➤ Gear hobbing cutter product series

Hole type hob	• The number and angle of the customizable grooves. (It is also possible not to slot according to actual requirements) • Customizable bevel of tooth end. • Customizable chamfers for bores (single 45 degree chamfer, double 45 degree chamfer, sinking chamfer, etc.)	
	• Customizable positive or negative rake angles for hobs.(Negative front corner in right picture)	
	• Customizable spiral grooves	
Milling insert (worm and worm milling cutter)	• Foil products with multiple grooves. • Both side steps can be made according to actual requirements.	
Key broach	• Rough blank profile machining with periodic grooves to minimize accumulated errors.	
	• It can machine inner hole avoidance.	

Handle type hob	• Various handled hobs with or without grooves • Customizable two- end center holes, standard (A, B, partial C) and non-standard • Various shank tapers can be machined • Locking groove or keyway can be machined	
	• Outer diameter, length, number of teeth and angle can be customized	
	• The figure at right shows a handle-type hob with BT handle. • Handle threads can be machined, M6 or higher meets 6H pass and stop gauge inspection. US threads can also be made.	
Bowl shaper cutter	• Cutters with bowl shape for front and rear angles • Chamfer protection for non- working face • The inner support surface makes a yield groove	
Taper shank gear shaper cutter	• One end (edge) with a central hole and one end with a threaded taper shank • Machinable sinking centre hole	
	• Tail can be machined, M6 or higher to meet the 6H pass gauge inspection of internal threads • Can also process US threads	

✡ Customized production can be made according to customer drawings.

Characteristics and Applications of Materials for Rotary Cutting Tools

➤ Cemented Carbide for Rotary Cutting Tools — XR12ST, XR15ST

Characteristics

◎Sub-micron grain structure with corrosion-resistant binder phase, providing excellent edge sharpness and wear resistance.

Application

◎The products are widely used in the hygiene and medical, as well as packaging industries, such as:

Infant Care: Open diapers, pull-up pants,

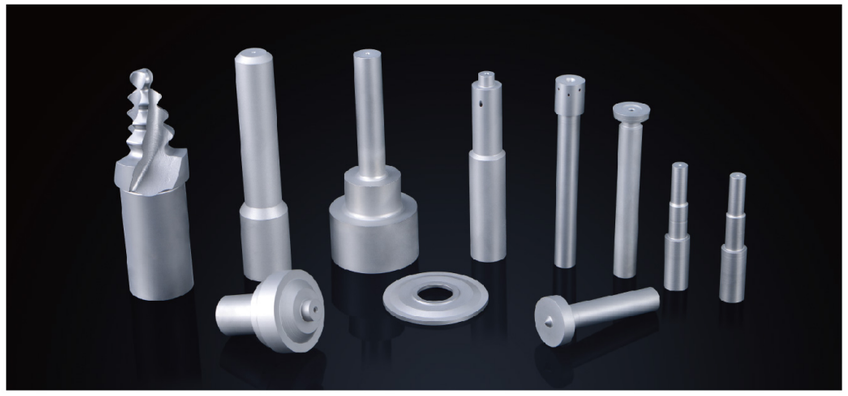
Feminine Care: Sanitary pads, tampons,

Adult Incontinence Products: Light incontinence products, heavy incontinence products。

Preformed Products

We offer preforming services for customers, including chip grooves, tapered holes, blind holes, through holes, stepped holes, threaded holes, chamfers, and center holes. These preforming processes reduce the need for wire cutting, electrical discharge machining (EDM), and grinding during subsequent processing, thereby shortening the customer's machining time and saving manufacturing costs.

➤ Cutting Tools Category



➤ Mould Category

➤ Preformed Threaded Hole Specification Table

Threaded Hole	M3	M4	M5	M6	M8	M10	M12
Maximum Depth/mm	10	16	25	30	30	30	30

✡ For other specifications of threaded holes or high-precision threaded holes, please consult with technical personnel.

Service and Growth

◎According to different working conditions, we recommend different materials of cemented carbide for customers;

◎For products with failure, we analyze systematically with customers and work out solutions together with customers;

◎Shareate tungsten steel continuously accumulates experience and grows with customers.

➤ HV30 and HRA hardness conversion meter

HV30	HRA	HV30	HRA	HV30	HRA
780	83.3	1250	88.9	1700	92.5
790	83.4	1260	89.1	1710	92.6
800	83.6	1270	89.2	1720	92.6
810	83.7	1280	89.3	1730	92.7
820	83.9	1290	89.4	1740	92.7
830	84	1300	89.5	1750	92.8
840	84.2	1310	89.6	1760	92.8
850	84.3	1320	89.7	1770	92.9
860	84.4	1330	89.8	1780	92.9
870	84.5	1340	89.9	1790	93
880	84.6	1350	90	1800	93
890	84.7	1355	90	1810	93.1
900	84.8	1360	90.1	1820	93.1
910	85	1370	90.2	1830	93.2
920	85.1	1380	90.3	1840	93.2
930	85.2	1390	90.3	1850	93.3
940	85.3	1400	90.4	1860	93.3
950	85.5	1410	90.5	1870	93.4
960	85.6	1420	90.6	1880	93.4
970	85.8	1430	90.7	1885	93.4
980	85.9	1440	90.8	1890	93.5
990	86	1450	90.8	1900	93.5
1000	86.1	1460	90.9	1910	93.6
1010	86.3	1470	91	1920	93.6
1020	86.4	1480	91.1	1930	93.7
1030	86.5	1490	91.2	1940	93.7
1040	86.6	1500	91.2	1950	93.8
1050	86.7	1510	91.3	1960	93.8
1060	86.8	1520	91.4	1970	93.8
1070	87	1530	91.5	1980	93.9
1080	87.2	1540	91.5	1990	93.9
1090	87.3	1550	91.6	2000	94
1100	87.3	1560	91.6	2010	94

HV30	HRA	HV30	HRA	HV30	HRA
1110	87.5	1570	91.7	2020	94
1120	87.6	1580	91.8	2030	94.1
1130	87.7	1590	91.9	2040	94.1
1140	87.8	1600	91.9	2050	94.2
1150	87.9	1610	92	2060	94.2
1160	88	1620	92.1	2070	94.2
1170	88.1	1630	92.1	2080	94.3
1180	88.2	1640	92.2	2090	94.3
1190	88.2	1650	92.2	2100	94.3
1200	88.3	1660	92.3	2110	944.4
1210	88.5	1670	92.3	2130	94.8
1220	88.6	1680	92.4	2200	95.2
1230	88.7	1685	92.4	2250	95.4
1240	88.8	1690	92.5		

➤ HRA and HRC hardness conversion meter

HRA	HRC
91.8- 92.8	79.5- 81.5
91.5- 92.5	79.0- 81.0
90.5- 91.5	77.0- 79.0
90.2- 91.2	76.5- 79.5
89.8- 90.8	75.6- 77.6
89.0- 90.0	74.0- 76.0
88.5- 89.5	73.0- 75.0
88.0- 89.0	72.0- 74.0
87.5- 88.5	71.0- 73.0
87.0- 88.0	71.0- 72.0
86.0- 87.0	69.0- 71.0
83.0- 84.5	63.0- 66.0
81.5- 83.0	61.0- 63.0

Post-Processing Considerations for Cemented Carbide

➤ The notes for transportation:

- When falling to the hard ground from high position, the cemented carbide products could be easily broken. Please check the products whether any damages happen when opening the package.
- Be careful not to get injured to hands or feet when carrying and using the products since the density of cemented carbide in two times higher than steel parts.
- The thin cement carbide products(pipe or strip shape or with sharp corners) will easily lose the corners or sides. So do not put excessive load when fastening,dismounting and transport before machining.

➤ Notes for machining:

2.1 Machining and grinding

- The cemented carbide could be easily cracking or chipping under the condition of impact effect and excessive machining load.Before starting machining please check whether the parts are fastened to the workbench.
- Don't strike the cemented carbide with iron hammer due to its non-good impact resistance.
- The general cemented carbide is not easily fixed by magnet. When using the magnet for fastening, please double check whether the parts are loose or not.
- The surfaces machined are very smooth and the corners are very sharp. Be careful for your safety when carrying and using.

2.2 Electro machining

- When the cemented carbide is in the process of electro machining, the machining surfaces are easily cracking and chipping corners, the work piece programs need to be adjusted according to the geometric parameter of the parts and the degree of the carbide materials.
- Wire- eletrode cutting sometimes causes the phenomenon of cracking on the machining surfaces. It is necessary to check the machining surfaces to confirm that there is no defect before staring next procedure.

2.3 Welding

- When the cemented carbide is in the process of welding procedure, the cemented carbide and welding gap easily emerge the cracks. It is necessary to proceed next procedure after checking and confirming that there is no defect.
- Be strict with the welding technology of cemented carbide and making fore welding pretreatment and post welding heat preservation which will protect the cemented carbide from fast heating and cooling to cause cracking of cemented carbide.

2.4 Corrosion

- The cemented caride will be easy to cause corrosion(rust) in the acidic environment because it contains iron series of metal (Cobalt and Nickel). Therefore, the solution used in the process of machining should be neutral or weakly alkaline substance.