



## CEMENTED CARBIDE

Materials for stamping dies • Gear hobbing cutter • Preformed products



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**SHAREATE TOOLS LTD.**



## COMPANY PROFILE

SHAREATE TOOLS LTD. (Formerly— Suzhou kingdream Shareate cemented carbide Co Ltd) is a national high-tech enterprise, engaged in cemented carbide products and rock drilling tools .

The company has strong scientific and technological innovation capability, has formed a system of independent intellectual property rights, which 47 patents were granted by the state, including 19 patents and 50 proprietary technologies. Shareate got through the API Q1 Specification and ISO 9001 standards in 2008. The company has independent R & D center and has been identified as " Jiangsu high efficiency rock drilling tool engineering technology research and development center ", " Jiangsu Enterprise Technology Center " Shareate and Nanjing University of Aeronautics & Astronautics jointly " ect.

Our main products: Rotary Tricone Bit, DTH Hammer & Bit for mining, water well and oil-field drilling applications, oil drilling and mining cemented carbide, carbide substrates for PDC bits, petroleum drill bit nozzle, ultra-fine cemented carbide rod, fine grain cutting tools, stamping die plate, cold heading dies, powder metallurgy die,

tungsten carbide tubular welding, wear parts, non-standard parts. Shareate products are exported to more than 20 countries, such as South America, Africa, Australia, Russia, South Korea, USA, Canada and other countries, favored and praised by users at home and abroad.

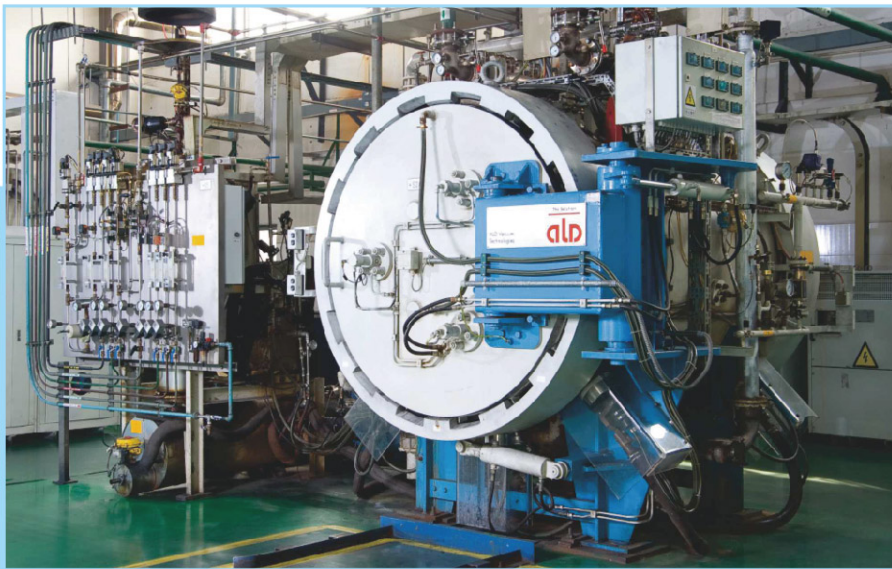
Shareate adhere to the internationalization and modernization, manufacturing, service integration direction, adhere to the implementation of the overseas development strategy, multinational development, self sharpening to create cemented carbide products and mining drilling tools of world famous brand, we know that success can not be separated from the vast trust and support, Shareate is willing to work with clients at home and abroad to work together to create a better future.

## Manufacturing Equipment

The clean and tidy operating field guarantees the orderly production

The rational workshop equipment improves the work efficiency

Spray granulation, high-precision DORST Automatic Pressing Machine and 10Mpa ALD low-pressure sintering furnace ensure the product quality



ALD Sintering Furnace



Spray Granulation



Cold isostatic press



CNC Milling Machine



Dry-bag Isostatic Pressing Machine

## Inspection Equipment

We are equipped with advanced experimental apparatus, testing equipment, experienced technicians to monitor the whole process of production which guarantees the high quality products.



Scanning Electron Microscope/  
Energy Spectrometer



Microhardness Tester



ZEISS Metallography Microscope



Projector



LECO Carbon Analyzer



LECO Oxygen Analyzer

► Grades and physical properties

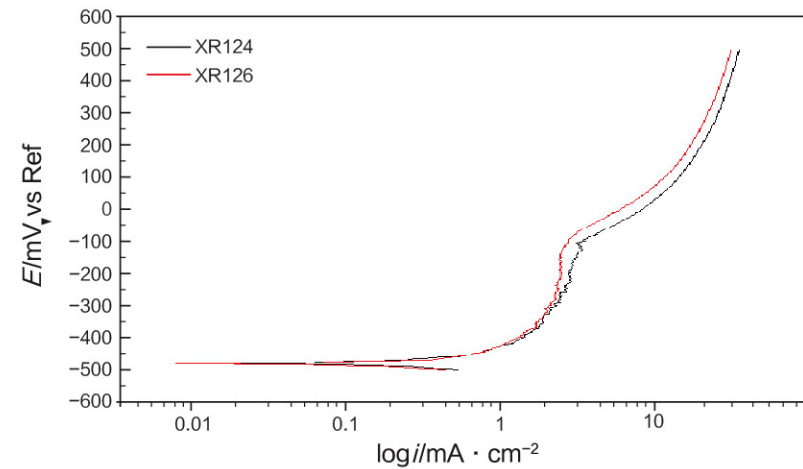
Series	Grade	Co Wt %	WC $\mu$ m	Density g/cm <sup>3</sup>	Hardness HRA	Fracture Toughness MPa · m <sup>1/2</sup>	Flexure strength Mpa
Ultrafine grain							
U	XR09U	9	0.4	14.55	93.5	8.6	4000
	XR12UF	12	0.4	14.12	92.5	9.5	4000
Submicron grain							
S	XR06F	6	0.6-0.8	14.83	93.7	8.3	3500
	XR10ST	10	0.6-0.8	14.45	91.7	11.5	3800
	XR12ST	12	0.6-0.8	14.15	91.2	12.6	4000
	XR13X	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	XR125	12	0.8-2.0	14.20	90.0	15.3	3800
	XR126	12	0.8-2.0	14.25	90.0	15.8	3900
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
	XR201	20	2-5	13.45	85.5	20.1	2500
	XR202	21	2-5	13.35	84.5	20.9	2500
	XR203	20	3-5	13.50	84.0	21.5	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	XR22C	22	6-9	13.25	82.5	23.5	2500
	XR25K	25	6-9	13.15	81.5	25.0	2300

★ 1) The material characteristic value is representative data, not guarantee value;  
 2) With the upgrading of material design, the material property values will be updated without further notice. Please refer to the latest version.

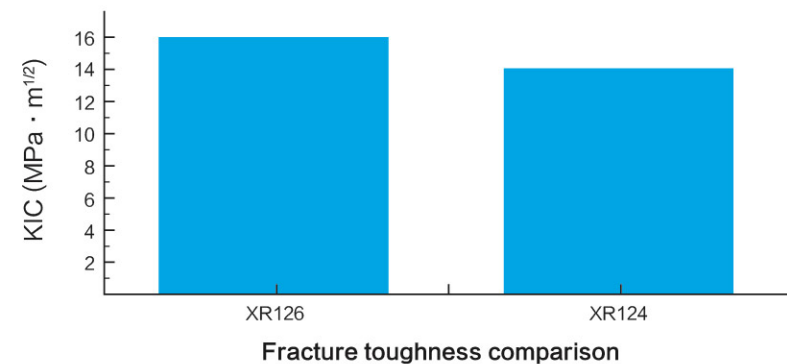


## Latest Corrosion Resistant Cemented Carbide

In order to meet the development of high-speed stamping and the demand of increasing the service life of the die, Suzhou Shareate continuously optimizes the alloy composition and process, and develops new product series XR126, which improves the corrosion resistance and toughness of the alloy, thus improving the service life of the die



Potentiodynamic corrosivity test



Fracture toughness comparison

### ► Application cases of XR126 and XR124

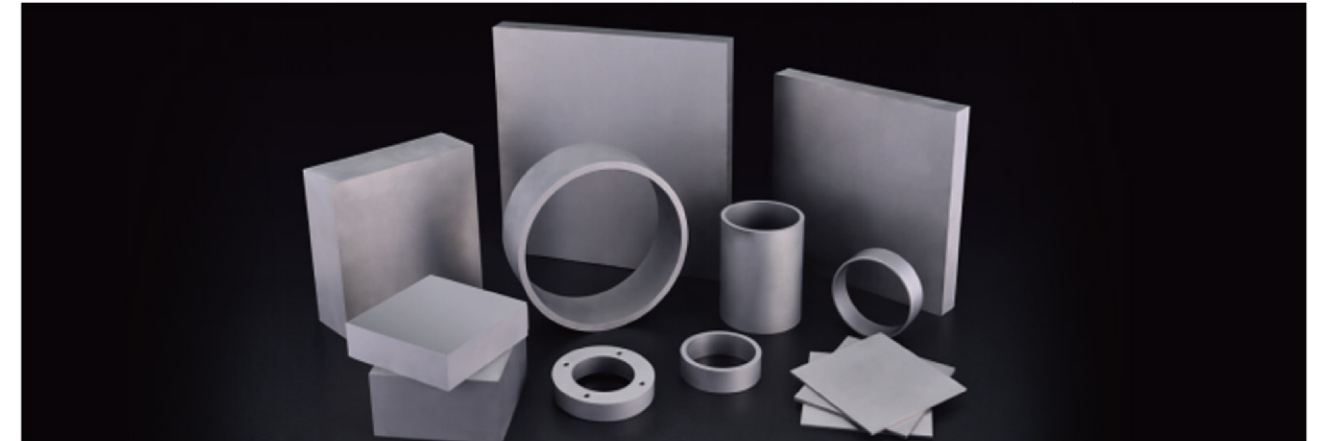
#### Test condition and requirement:

- Stamping strip: B35A230
- Tensile strength of tape: 548 (N/mm<sup>2</sup>)
- Strip yield strength: 431 (N/mm<sup>2</sup>)
- Strip hardness: 220HV
- Impact speed: 300 times / min
- Product burr requirement: less than 0.05mm

#### Test result:

- The stamping life of xr124 is 6 million times, and that of xr126 is 12 million times.

## Material Characteristics and Application of Stamping Die



### ► Progressive stamping die motor with carbide material -- FM and M series

The material is widely used in high speed stamping of silicon steel sheet, and the product is widely used in the field of motor.

#### Feature

- Adopting mixed grain structure, it has excellent wear resistance and collapse resistance.
- The latest design concept of bonding phase composition, carbide has corrosion resistance characteristics, suitable for discharge machining.

#### Application

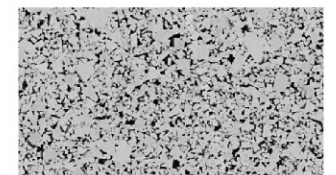
##### XR126

#### Feature:

Medium fine grain structure, 12% corrosion resistant bonding phase, good toughness, wear resistance and corrosion resistance.

#### Application:

Suitable for electric tools, automobile motor, washing machine, air conditioner, ballast, electric meter and other motor iron core mold production.



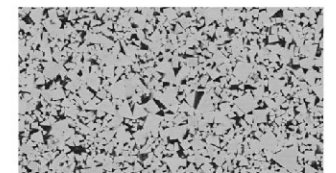
##### XR123

#### Feature:

Medium particle tungsten carbide, 12% corrosion resistant bonding phase, good resistance and wear resistance.

#### Application:

Suitable for electric tools, automobile motor, washing machine, air conditioner, ballast, electric meter and other motor iron core mold production.



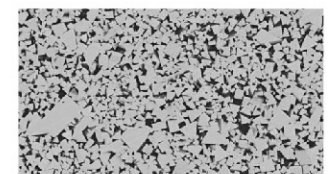
##### XR141

#### Feature:

Medium particle tungsten carbide, 15% corrosion resistant bonding phase, good resistance.

#### Application:

Suitable for electric tools, automobile motor, washing machine, air conditioner, ballast, electric meter and other motor iron core mold production.



## ► Cemented carbide material for electronic progressive stamping die – S and FM series

The materials are widely used in the high-speed stamping of thin material belts such as stainless steel, copper alloy, aluminum alloy, copper foil, aluminum foil, nano-crystal soft magnetic alloy material and absorbing material. The products are widely used in the 3C field, integrated circuit field, new energy vehicle field, wireless charging field and electromagnetic shielding field.

### Feature

- It adopts sub-fine grain and has good edge sharpness.
- Anti-collapse property of the material can be improved effectively by adopting proper binder content.
- The latest design concept of bonding phase composition, alloy has corrosion resistance characteristics, suitable for discharge machining.

### Application

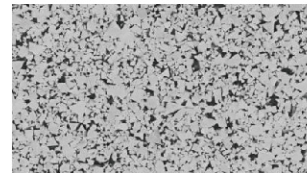
#### XR125

##### Feature:

Medium fine grain structure, 12% corrosion resistant bonding phase, good toughness.

##### Application:

Strong versatility, suitable for high speed stamping of stainless steel material belt, copper belt and other materials with thickness below 1mm.



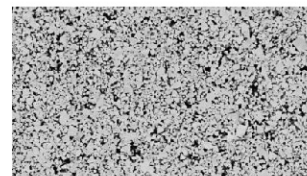
#### XR15X

##### Feature:

Submicro grain structure, 15% corrosion resistant bonding phase, both toughness and wear resistance.

##### Application:

Strong versatility, suitable for the thickness of less than 0.5mm stainless steel tape, copper tape and other materials of high speed stamping.



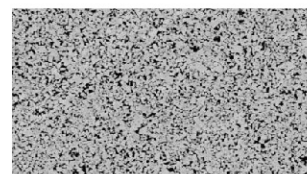
#### XR12ST

##### Feature:

Submicro grain structure, 12% corrosion resistant bonding phase, good wear resistance.

##### Application:

Suitable for high speed stamping of stainless steel tape, copper foil, aluminum foil, nano-crystal soft magnetic material, absorbing material and other materials with thickness of less than 0.2mm.



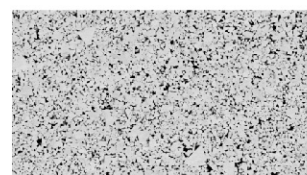
#### XR10ST

##### Feature:

Submicro grain structure, 10% corrosion resistant bonding phase, good wear resistance.

##### Application:

Suitable for high speed stamping of materials such as stainless steel belt with thickness below 0.15mm.



## ► Cemented carbide material for soft metal stamping die – XR06C

### Feature

- The adhesion between soft metal and cobalt was improved by reducing the content of cobalt in the bonding phase.
- Adopting mixed grain structure, it has excellent wear resistance and collapse resistance.
- The latest design concept of bonding phase composition, alloy has corrosion resistance characteristics, suitable for discharge machining.

### Application

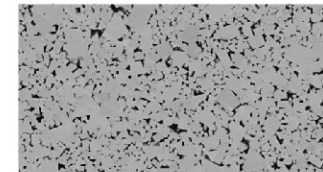
#### XR06C

##### Feature:

Medium coarse grain structure, 6% corrosion resistant bonding phase, good toughness and wear resistance.

##### Application:

Suitable for high speed stamping of soft metals such as pure iron, pure copper and SPCC.



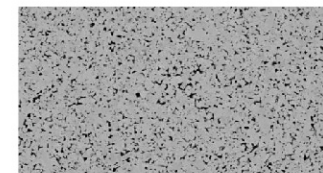
#### XR06X

##### Feature:

Fine grain structure, 6% corrosion resistant bonding phase, good edge sharpness and wear resistance.

##### Application:

Suitable for high speed stamping of pure iron and copper soft metal.



## ► Common sheet specifications

### Motor progressive die material specification

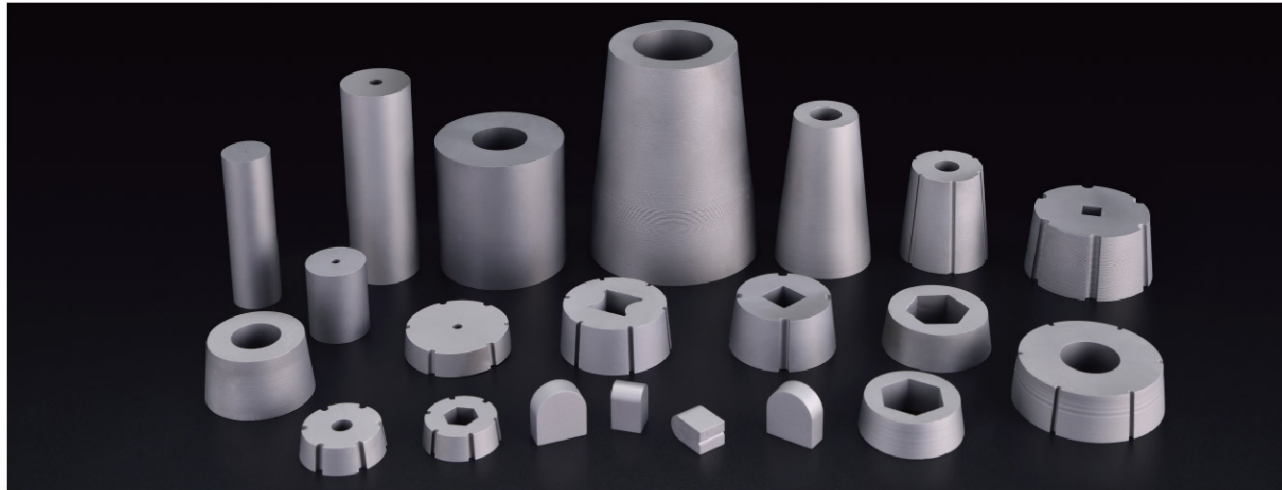
Length/mm	Width/mm	Thickness/mm	Thickness tolerance/mm	Notes
150	150	≤90	0.6 ± 0.1	<ul style="list-style-type: none"> <li>○ Thickness surface flat grinding processing</li> <li>○ Detection processing</li> <li>○ Stress treatment</li> <li>○ Magnetic treatment</li> </ul>
200	200	≤40		
250	250	≤40		
300	300	≤30		

### Electronic progressive die material specification

Length/mm	Width/mm	Thickness/mm	Thickness tolerance/mm	Notes
105	105	≤60	0.6 ± 0.1	<ul style="list-style-type: none"> <li>○ Thickness surface flat grinding processing</li> <li>○ Detection processing</li> <li>○ Stress treatment</li> <li>○ Magnetic treatment</li> </ul>
110	110	≤60		
120	120	≤60		

★ Other size sheet can negotiate.

## Material Characteristics and Application of Forging Die



### ► Cemented carbide materials for cold heading—XR151、XR201、XR203、XR22C、XR25K

#### Characteristics

- ◎The mixed grain structure has excellent wear resistance and good collapse resistance.

#### Application

- ◎Fasteners, ball bearings and other automotive, mechanical industry parts

### ► Cemented carbide materials for cold extrusion—XR18K、XR22K、XR25K

#### Characteristics

- ◎The alloy has excellent impact resistance by using coarse grain WC.
- ◎With the latest design concept of binder phase composition, the alloy has corrosion-resistant characteristics and is suitable for EDM.

#### Application

- ◎Cross shaft, bevel gear and other automotive industry parts

### ► Cemented carbide materials for hot heading—XR151、XR18K、XR22K、XR25K

#### Characteristics

- ◎The alloy has excellent impact resistance by using coarse grain WC.
- ◎With the latest design concept of binder phase composition, the alloy has corrosion-resistant characteristics and is suitable for EDM.

#### Application

- ◎Titanium alloy parts, transmission shaft or steering shaft and other automotive and aerospace components.

## Characteristics and Application of Materials for Powder Forming Mould



### ► Cemented carbide materials for powder compaction—XR12UF、XR10ST、XR08X、XR123、XR141

#### Characteristics

- ◎The mixed grain structure has excellent wear resistance and good collapse resistance.
- ◎With the latest design concept of binder phase composition, the alloy has corrosion-resistant characteristics and is suitable for EDM.

#### Application

- ◎Metal powder forming female mold, punch and up and down punch, such as iron powder, copper powder, etc.
- ◎Ceramic powder molding female mold, punch and up and down punch, such as: silicon carbide, tungsten carbide, etc.
- ◎Magnetic material powder molding female mold, punch and up and down punch, such as: ferrite, NdFeB, etc.

## Characteristic and Application of Gear Hobbing Cutter Material



### ► Carbide material for gear hobbing cutter —— XR09U、XR12UF、XR10ST

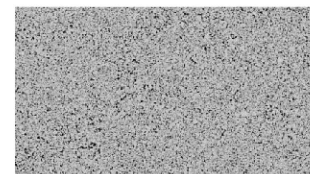
#### XR09U

**Characteristic:**

Ultra-fine tungsten carbide particles, sharp edge, extreme wear resistance.

**Application:**

For processing gears with hardness above HRC60.



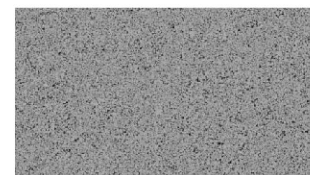
#### XR12UF

**Characteristic:**

Ultra-fine tungsten carbide particles, sharp edge, extreme wear resistance.

**Application:**

For processing gear products with hardness up to HRC55.



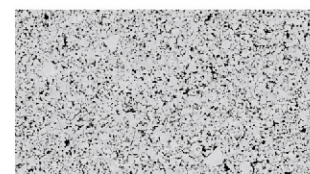
#### XR10ST

**Characteristic:**

Sub-micron tungsten carbide particles, sharp edge, good collapse prevention.

**Application:**

For processing gear products with hardness up to HRC35.



### ► Gear hobbing cutter product series

Hole type hob	<ul style="list-style-type: none"> <li>The number and angle of the customizable grooves. (It is also possible not to slot according to actual requirements)</li> <li>Customizable bevel of tooth end.</li> <li>Customizable chamfers for bores (single 45 degree chamfer, double 45 degree chamfer, sinking chamfer, etc.)</li> </ul>		Handle type hob	<ul style="list-style-type: none"> <li>Various handled hobs with or without grooves</li> <li>Customizable two-end center holes, standard (A, B, partial C) and non-standard</li> <li>Various shank tapers can be machined</li> <li>Locking groove or keyway can be machined</li> </ul>	
	<ul style="list-style-type: none"> <li>Customizable positive or negative rake angles for hobs. (Negative front corner in right picture)</li> </ul>			<ul style="list-style-type: none"> <li>Outer diameter, length, number of teeth and angle can be customized</li> </ul>	
	<ul style="list-style-type: none"> <li>Customizable spiral grooves</li> </ul>			<ul style="list-style-type: none"> <li>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.</li> </ul>	
Milling insert (worm and worm milling cutter)	<ul style="list-style-type: none"> <li>Foil products with multiple grooves.</li> <li>Both side steps can be made according to actual requirements.</li> </ul>		Bowl shaper cutter	<ul style="list-style-type: none"> <li>Cutters with bowl shape for front and rear angles</li> <li>Chamfer protection for non-working face</li> <li>The inner support surface makes a yield groove</li> </ul>	
Key broach	<ul style="list-style-type: none"> <li>Rough blank profile machining with periodic grooves to minimize accumulated errors.</li> </ul>		Taper shank gear shaper cutter	<ul style="list-style-type: none"> <li>One end (edge) with a central hole and one end with a threaded taper shank</li> <li>Machinable sinking centre hole</li> </ul>	
	<ul style="list-style-type: none"> <li>It can machine inner hole avoidance.</li> </ul>			<ul style="list-style-type: none"> <li>Tail can be machined, M6 or higher to meet the 6H pass gauge inspection of internal threads</li> <li>Can also process US threads</li> </ul>	

★ Customized production can be made according to customer drawings.



## Preformed Products

Provide customers with various non-standard pre-formed products, which can process the pre-formed products in various shapes such as threaded holes, step holes and grooves, so as to realize the post-processing of products, with less wire cutting, spark and grinding processing, shorten the processing time of customers and save your manufacturing costs.



### ► Preformed threaded holes Tab

Threaded hole	M3	M4	M5	M6	M8	M10	M12
Maximum depth/mm	10	16	25	30	30	30	30

★ If you need other specifications of threaded holes or high-precision threaded holes, please consult technicians.

## 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	94.4
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

## Notes 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 is 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- electrode 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 starting 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 carbide 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.