

KCR SH Super High Hardness & Super High Speed Cutting

End Mill Series For High Performance roughing

Super Hardness Steel Coating "SH" - SH Power Radius

Features

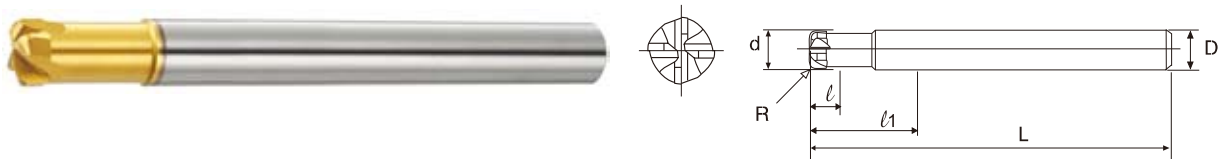
Developed NaNo SH Coating of high adhesion and high hardness is adopted.

- Long Tool Life • The tool life has drastically been improved
- High Accuracy • Less dimensional change, It's suitable for finishing

A new geometry is adopted to ensure rigidity and excellent R accuracy & specially cutting edge.

- High Efficient • A powerful roughing is available
- High Accuracy • Highly accurate finish cutting is possible

- The tool exhibits its power to various materials from pre-hardened steel (45 HRC class to high hardness 65 HRC class)
- Especially for to make possible the high performance roughing process on molds milling (3 times or more efficient than of a general radius endmill)
- R tolerance: ± 0.01 mm. Highly accurate finish cutting is possible



Dimensions

MODE	dxR	l	l_1	Neck Dia	Flute	L	D
KCR 0203	2XR0.3	0.8	5	1.8	4	60	6
KCR 0205	2XR0.5	0.8	5	1.8	4	60	6
KCR 0307	3XR0.75	1.2	7.5	2.7	4	60	6
KCR 0310	3XR1	1.2	7.5	2.7	4	60	6
KCR 0405	4XR0.5	1.6	10	3.6	4	75	6
KCR 0410	4XR1	1.6	10	3.6	4	75	6
KCR 0510	5XR1	2	12	4.5	4	75	6
KCR 0512	5XR1.2	2	12	4.5	4	75	6
KCR 0610	6XR1	2.5	13	5.4	4	100	6
KCR 0615	6XR1.5	2.5	13	5.4	4	100	6
KCR 0810	8XR1	3.5	16	7.2	4	100	8
KCR 0820	8XR2	3.5	16	7.2	4	100	8
KCR 0920	9XR2	4	-	-	4	100	8
KCR 1010	10XR1	4	20	9	4	100	10
KCR 1020	10XR2	4	20	9	4	100	10
KCR 1210	12XR1	5	24	11	4	100	12
KCR 1220	12XR2	5	24	11	4	100	12
KCR 1230	12XR3	5	24	11	4	100	12

KCRSH Super High Hardness & Super High Speed Cutting

End Mill Series For High Performance roughing

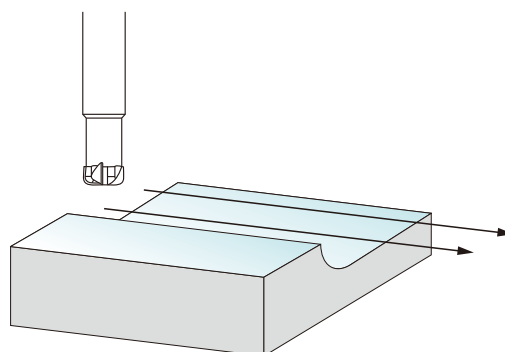
High speed milling

Caution:

Sparks generated during operation or heat caused by tool breakage can cause fire. Be sure to use all proper fire-prevention measures.
The conditions below are for high speed/high precision machining centers.

Work material	Mild steels, Carbom steels, Cast iron SS400, S55c, FC250 (~750N/mm²)		Alloy steels, Tool steels, SCM, SKT, SKS, SKD (~30HRC)		Hardened steels, Prehardened steels, (Free-cutting) SKT, SKD, NAK55, HPM1		Hardened steels, Stainless steels SUS304, SKD		Hardened steels, Titanium alloys, Heat resistant alloys steels,		Hardened steels,																			
MILL DIA. (mm)	Speed (min ⁻¹)	Feed (mm/min)	Speed (min ⁻¹)	Feed (mm/min)	Speed (min ⁻¹)	Feed (mm/min)	Speed (min ⁻¹)	Feed (mm/min)	Speed (min ⁻¹)	Feed (mm/min)	Speed (min ⁻¹)	Feed (mm/min)																		
2xR0.5	30250	9970	30400	9070	30400	9070	22800	6800	22800	6130	15200	2710																		
3xR0.75	19950	11870	19950	11400	19950	11400	15200	7980	15200	7450	9980	3130																		
4xR1	15200	12350	15200	11400	15200	11400	11400	8550	11400	7790	7550	3370																		
5xR1.2	11870	13300	11870	11870	11870	11870	9070	9070	9070	8170	6030	3610																		
6xR1.5	10070	13300	10070	12060	10070	12060	7550	9070	7550	8170	5030	3610																		
7xR1.5	8650	11400	8640	10350	8640	10350	6460	7790	6460	6980	4320	3090																		
8xR2	7550	13300	7550	12060	7550	12060	5650	9070	5650	8170	3800	3610																		
9xR2	6700	11780	6700	10730	6700	10730	5030	8075	5030	7270	3370	3230																		
10xR2	6030	13300	6030	12060	6030	12060	4510	9070	4510	8170	3040	3610																		
11xR2	5510	12060	5510	11020	5510	11020	4130	8260	4130	7410	2750	3320																		
12xR3	5030	13300	5030	12060	5030	12060	3800	9070	3800	8170	2520	3610																		
13xR3	4650	12250	4650	11210	4650	11210	3460	8360	3460	7550	2330	3370																		
Depth of cut	<table><tr><th>aa</th><th>ar</th></tr><tr><td>0.1 x R</td><td>0.3D</td></tr></table> <table><tr><th></th><th>aa</th><th>ar</th></tr><tr><td>R ≤ 2</td><td>0.1 x R</td><td>0.3D</td></tr><tr><td>2 < R</td><td>0.2mm</td><td>0.3D</td></tr></table> <table><tr><th></th><th>aa</th><th>ar</th></tr><tr><td>R ≤ 2</td><td>0.05 x R</td><td>0.3D</td></tr><tr><td>2 < R</td><td>0.1mm</td><td>0.3D</td></tr></table>								aa	ar	0.1 x R	0.3D		aa	ar	R ≤ 2	0.1 x R	0.3D	2 < R	0.2mm	0.3D		aa	ar	R ≤ 2	0.05 x R	0.3D	2 < R	0.1mm	0.3D
aa	ar																													
0.1 x R	0.3D																													
	aa	ar																												
R ≤ 2	0.1 x R	0.3D																												
2 < R	0.2mm	0.3D																												
	aa	ar																												
R ≤ 2	0.05 x R	0.3D																												
2 < R	0.1mm	0.3D																												

1. Use a rigid and precise machine and holder.
2. These milling conditions are based on milling with circular interpolation at corners. For milling without circular interpolation (such as right angle corners), reduce the speed to 50-70% and the cutting depth to 50-80% of the above conditions.
3. We recommend using an air blow or MQL(mist).
4. Please adjust the speed, feed and cutting depth according to actual cutting conditions.
5. When KCR enters in Z axis, reduce the feed speed to 30-60% of the above conditions with machining incline angle (β) $\leq 2^\circ$.
6. These milling conditions are for a tool extension length : less than 4xD. For a longer tool extension, reduce the speed, feed rate, and the cutting depth in accordance with the respective coefficients, to prevent chattering.



Tool extension coefficients

Overshang Length	Milling Speed	a _a	Feed Speed
L/D ≤ 4	100	100	100
L/D ≤ 5	60~80	60~80	70~90
L/D ≤ 6	40~60	40~60	60~80

Ultra-high speed conditions

When milling flat areas with a stable load, the speed and the feed rate of the high-speed conditions can be further increased to 150-200%. The ultra-high speed conditions are for a tool extension length:less than 4xD. If the tool extension length is over 4 D, do not refer to it.



Super High Hardness & Super High Speed Cutting

End Mill Series For High Performance roughing

Regular Milling (Low-speed, high-feed milling)

Caution:

Sparks generated during operation or heat caused by tool breakage can cause fire. Be sure to use all proper fire-prevention measures.
The conditions below are for high speed/high precision machining centers.

Work material	Mild steels, Carbom steels, Cast iron SS400, S55c, FC250 (~750N/mm²)		Alloy steels, Tool steels, SCM, SKT, SKS, SKD (~30HRC)		Hardened steels, Prehardened steels, (Free-cutting) SKT, SKD, NAK55, HPM1		Hardened steels, Stainless steels SUS304, SKD		Hardened steels, Titanium alloys, Heat resistant alloys steels,		Hardened steels,																												
MILL DIA. (mm)	Speed (mm ⁻¹)	Feed (mm/min)	Speed (mm ⁻¹)	Feed (mm/min)	Speed (mm ⁻¹)	Feed (mm/min)	Speed (mm ⁻¹)	Feed (mm/min)	Speed (mm ⁻¹)	Feed (mm/min)	Speed (mm ⁻¹)	Feed (mm/min)																											
2xR0.5	15200	4990	15200	4510	11870	3610	10450	3180	7550	2040	4510	820																											
3XR0.75	9970	5940	9970	5320	8070	4270	7080	3705	5030	2470	3040	940																											
4XR1	7550	6270	7550	5700	6030	4560	5270	3990	3800	2610	2280	1000																											
5XR1.2	6030	6650	6030	6030	4840	4840	4230	4230	3040	2710	1800	1090																											
6XR1.5	5030	6650	5030	6030	4040	4840	3510	4230	2520	2710	1520	1090																											
7XR1.5	4320	5700	4320	5180	3470	4130	3040	3610	2140	2330	1280	930																											
8XR2	3800	6650	3800	6030	3040	4840	2660	4230	1900	2710	1140	1090																											
9XR2	3370	5890	3370	5370	2710	4320	2370	3750	1660	2420	1000	950																											
10XR2	3040	6650	3040	6030	2420	4840	2140	4230	1520	2710	910	1090																											
11XR2	2750	6030	2750	5510	2180	4420	1950	3840	1380	2470	830	1000																											
12XR3	2520	6650	2520	6030	2000	4840	1760	4230	1280	2710	750	1090																											
13XR3	2330	6130	2330	5600	1850	4460	1610	3900	1140	2520	700	1000																											
Depth of cut							<table><tr><td></td><td>a_a</td><td>a_r</td></tr><tr><td>R ≤ 2</td><td>0.2 x R</td><td>0.5D</td></tr><tr><td>2 < R</td><td>0.5mm</td><td>0.5D</td></tr></table>			a _a	a _r	R ≤ 2	0.2 x R	0.5D	2 < R	0.5mm	0.5D	<table><tr><td></td><td>a_a</td><td>a_r</td></tr><tr><td>R ≤ 2</td><td>0.2 x R</td><td>0.5D</td></tr><tr><td>2 < R</td><td>0.4mm</td><td>0.5D</td></tr></table>			a _a	a _r	R ≤ 2	0.2 x R	0.5D	2 < R	0.4mm	0.5D	<table><tr><td></td><td>a_a</td><td>a_r</td></tr><tr><td>R ≤ 2</td><td>0.1 x R</td><td>0.5D</td></tr><tr><td>2 < R</td><td>0.2mm</td><td>0.5D</td></tr></table>			a _a	a _r	R ≤ 2	0.1 x R	0.5D	2 < R	0.2mm	0.5D
								a _a	a _r																														
							R ≤ 2	0.2 x R	0.5D																														
							2 < R	0.5mm	0.5D																														
	a _a	a _r																																					
R ≤ 2	0.2 x R	0.5D																																					
2 < R	0.4mm	0.5D																																					
	a _a	a _r																																					
R ≤ 2	0.1 x R	0.5D																																					
2 < R	0.2mm	0.5D																																					

1. Use a rigid and precise machine and holder.
2. These milling conditions are based on milling with circular interpolation at corners. For milling without circular interpolation (such as right angle corners), reduce the speed to 50-70% and the cutting depth to 50-80% of the above conditions.
3. We recommend using an air blow or MQL(mist).
4. Please adjust the speed, feed and cutting depth according to actual cutting conditions.
5. When KCR enters in Z axis, reduce the feed speed to 30-60% of the above conditions with machining incline angle (β) $\leq 2^\circ$.
6. These milling conditions are for a tool extension length : less than 4xD. For a longer tool extension, reduce the speed, feed rate, and the cutting depth in accordance with the respective coefficients, to prevent chattering.

Tool extension coefficients

Overshang Length	Milling Speed	a _a	Feed Speed
L/D ≤ 4	100	100	100
L/D ≤ 5	80~100	70~90	80~90
L/D ≤ 6	60~80	50~70	60~80