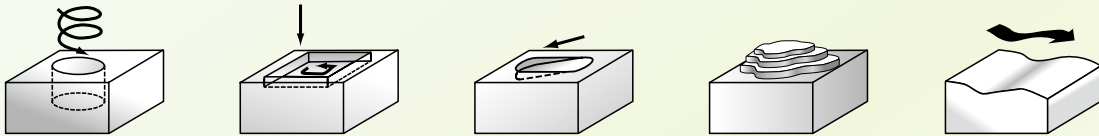


Type of machining Process



■ UMG- FHPMC Plus Heavy-duty operation type

4 flutes • Medium

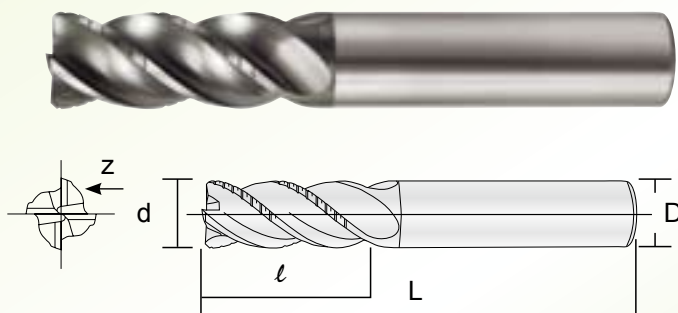
Tool Material : Ultra Micro Grain Carbide

Surface Treatment : AlCrSiN (nAcro)

Tolerance for outer diameter : 0 ~ -0.02mm

Helix Angle : 45°

Patent No : Nr.20 2007 008 896.5



UMG-FHPMC

MODE	d	L	l	D	Stock
FHPMC 060	6	60	20	6	○
FHPMC 080	8	75	25	8	○
FHPMC 100	10	80	30	10	○
FHPMC 120	12	100	35	12	○
FHPMC 160	16	110	45	16	○
FHPMC 200	20	125	50	20	○
FHPMC 250	25	125	60	25	★

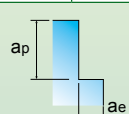
▲ Caution

1. Use a rigid and precise machine and holder.
2. Please adjust the speed and feed when the cutting depth is large or when machines with low rigidity are used.
3. Please use a suitable fluid with high smoke retardant properties.
4. During Dry (no fluid) milling, please use air blow to remove disposable chips from the milling area and the eliminate chip packing.


Recommended milling conditions

UMG-FHPC&UMG-CR-FHPC

Side Milling

Work material	Mild steels Carbon steels, Cast iron SS400, S55c, FC250 (-750N/mm ²)		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,													
Cutting Speed	100m/min		78m/min		66m/min		62m/min		60m/min		30m/min													
Mill DIA.(mm)	Speed(mm ⁻¹)	Speed (mm/min)	Speed(mm ⁻¹)	Speed(mm/min)	Speed(mm ⁻¹)	Speed(mm/min)	Speed(mm ⁻¹)	Speed(mm/min)	Speed(mm ⁻¹)	Speed(mm/min)	Speed(mm ⁻¹)	Speed(mm/min)												
3	8480	975	6640	760	5600	560	5280	555	4828	485	2560	190												
4	6360	1000	4960	820	4200	565	3960	590	3800	515	1920	190												
5	5080	1050	3960	845	3360	590	3160	630	3040	535	1520	190												
6	4240	1250	3320	945	2800	700	2640	660	2560	545	1280	190												
8	3200	1250	2480	895	2120	660	1960	640	1920	555	960	175												
10	2560	1100	2000	855	1680	605	1560	590	1520	525	764	160												
12	2120	1100	1640	850	1400	565	1320	535	1280	475	636	160												
16	1600	955	1240	745	1040	500	1000	445	960	400	476	160												
20	1280	765	1000	595	840	455	788	395	764	355	380	160												
Depth of cut	 <table border="1"> <tr><th>ap</th><th>ae</th></tr> <tr><td>1.5D</td><td>0.2D</td></tr> </table>						ap	ae	1.5D	0.2D	<table border="1"> <tr><th>ap</th><th>ae</th></tr> <tr><td>1.5D</td><td>0.1D</td></tr> </table>		ap	ae	1.5D	0.1D	<table border="1"> <tr><th>ap</th><th>ae</th></tr> <tr><td>1D</td><td>0.05D</td></tr> </table>				ap	ae	1D	0.05D
ap	ae																							
1.5D	0.2D																							
ap	ae																							
1.5D	0.1D																							
ap	ae																							
1D	0.05D																							

Slotting

Work material	Mild steels Carbon steels, Cast iron SS400, S55c, FC250 (-750N/mm ²)		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,	
Cutting Speed	100m/min		78m/min		66m/min		62m/min		60m/min		30m/min	
Mill DIA.(mm)	Speed(mm ⁻¹)	Speed (mm/min)	Speed(mm ⁻¹)	Speed(mm/min)	Speed(mm ⁻¹)	Speed(mm/min)	Speed(mm ⁻¹)	Speed(mm/min)	Speed(mm ⁻¹)	Speed(mm/min)	Speed(mm ⁻¹)	Speed(mm/min)
3	6800	705	5080	959	4680	455	4400	400	3560	320	1680	110
4	5080	705	3800	675	3520	455	3320	450	2680	360	1280	120
5	4080	715	3040	660	2800	475	2640	475	2120	385	1000	125
6	3400	715	2560	560	2320	500	2200	495	1800	400	840	125
8	2560	660	1920	550	1760	545	1640	515	1320	415	636	125
10	2040	610	1520	535	1400	475	1320	470	1080	380	508	115
12	1680	610	1280	475	1160	450	1120	440	880	355	424	115
16	1280	610	960	430	880	370	840	370	668	300	320	88
20	1000	510	764	380	700	350	664	330	536	265	256	89
Depth of cut	 $a_p=0.5D$								$a_p=0.05D$			

▲ Caution

- 1.Use a rigid and precise machine and holder.
- 2.Please adjust the speed and feed when the cutting depth is large or when machines with low rigidity are used.
- 3.Please use a suitable fluid with high smoke retardant properties.
- 4.During Dry (no fluid) milling, please use air blow to remove disposable chips from the milling area and the eliminate chip packing.

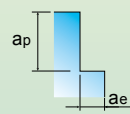
UMG-FHPC&UMG-CR-FHPC



Caution :
Sparks generated during operation or heat caused by tool breakage can cause fire. Be sure to use all proper fire-prevention measures.

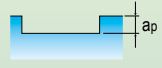
The conditions below are for high speed / high precision machining centers.

High Speed Side Milling

Work material	Mild steels Carbon steels, Cast iron SS400, S55c, FC250 (~750N/mm ²)		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,																																					
Cutting Speed	100m/min		78m/min		66m/min		62m/min		60m/min		30m/min																																					
Mill DIA.(mm)	Speed(mm ⁻¹)	Speed (mm/min)	Speed(mm ⁻¹)	Speed(mm/min)	Speed(mm ⁻¹)	Speed(mm/min)	Speed(mm ⁻¹)	Speed(mm/min)	Speed(mm ⁻¹)	Speed(mm/min)	Speed(mm ⁻¹)	Speed(mm/min)																																				
3	16960	2150	16960	2400	16960	1300	12720	1150	8480	680	6800	440																																				
4	12720	2050	12720	2300	12720	1300	9520	1250	6360	795	5080	460																																				
5	10160	1900	10160	2150	10160	1250	7640	1350	5080	840	4080	510																																				
6	8480	3050	8480	2650	8480	2000	6360	1450	4240	910	3400	610																																				
8	6360	2800	6360	2400	6360	1900	4760	1400	3200	860	2560	575																																				
10	5080	2550	5080	2200	5080	1850	3800	1350	2560	830	2040	510																																				
12	4240	2550	4240	2200	4240	1800	3200	1350	2120	830	1680	510																																				
16	3200	1900	3200	1900	3200	1700	2400	1350	1600	830	1280	510																																				
20	2560	1550	2560	1550	2560	1550	1920	1150	1280	730	1000	510																																				
Depth of cut	 <table border="1"> <thead> <tr><th></th><th>ap</th><th>ae</th></tr> </thead> <tbody> <tr><td>D<Ø6</td><td>1.5D</td><td>0.02D</td></tr> <tr><td>Ø6≤D</td><td>1.5D</td><td>0.05D</td></tr> <tr><td colspan="3">aeMax=0.5mm</td></tr> </tbody> </table>					ap	ae	D<Ø6	1.5D	0.02D	Ø6≤D	1.5D	0.05D	aeMax=0.5mm			<table border="1"> <thead> <tr><th></th><th>ap</th><th>ae</th></tr> </thead> <tbody> <tr><td>D<Ø6</td><td>1.5D</td><td>0.01D</td></tr> <tr><td>Ø6≤D</td><td>1.5D</td><td>0.02D</td></tr> <tr><td colspan="3">aeMax=0.5mm</td></tr> </tbody> </table>					ap	ae	D<Ø6	1.5D	0.01D	Ø6≤D	1.5D	0.02D	aeMax=0.5mm			<table border="1"> <thead> <tr><th></th><th>ap</th><th>ae</th></tr> </thead> <tbody> <tr><td>D<Ø6</td><td>1D</td><td>0.01D</td></tr> <tr><td>Ø6≤D</td><td>1D</td><td>0.02D</td></tr> <tr><td colspan="3">aeMax=0.5mm</td></tr> </tbody> </table>					ap	ae	D<Ø6	1D	0.01D	Ø6≤D	1D	0.02D	aeMax=0.5mm		
	ap	ae																																														
D<Ø6	1.5D	0.02D																																														
Ø6≤D	1.5D	0.05D																																														
aeMax=0.5mm																																																
	ap	ae																																														
D<Ø6	1.5D	0.01D																																														
Ø6≤D	1.5D	0.02D																																														
aeMax=0.5mm																																																
	ap	ae																																														
D<Ø6	1D	0.01D																																														
Ø6≤D	1D	0.02D																																														
aeMax=0.5mm																																																

The conditions below are for high speed / high precision machining centers.

High Speed Slotting

Work material	Mild steels Carbon steels, Cast iron SS400,S55c, FC250 (~750N/mm ²)		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	
Cutting Speed	100m/min		78m/min		66m/min		62m/min	
Mill DIA.(mm)	Speed(mm ⁻¹)	Speed (mm/min)	Speed(mm ⁻¹)	Speed(mm/min)	Speed(mm ⁻¹)	Speed(mm/min)	Speed(mm ⁻¹)	Speed(mm/min)
3	10160	1050	8480	935	7640	745	5080	460
4	7640	1150	6360	1000	5720	745	4120	560
5	6120	1200	5600	1100	5080	865	3320	595
6	2920	1550	4680	1150	4240	910	2960	670
8	3800	1450	3520	1300	3200	985	2240	690
10	3040	1400	2800	1200	2560	865	1800	635
12	2560	1250	2320	1150	2120	815	1480	595
16	1920	1050	1760	965	1600	675	1120	500
20	1520	840	1400	770	1280	635	880	445
Depth of cut					$a_p=0.2D$ $a_{pMax}=3mm$			



▲ Caution

1. Use a rigid and precise machine and holder.
2. Please adjust the speed and feed when the cutting depth is large or when machines with low rigidity are used.
3. Please use a suitable fluid with high smoke retardant properties.
4. During Dry (no fluid) milling, please use air blow to remove disposable chips from the milling area and the eliminate chip packing.