Advanced Engineering

MMC Hitachi Tool

No. 444.2

Epoch21 PN Coating

EPSM-CR-PN /-W-PN
Epoch Multi Series

Corner Radius Type
Micro Grain Solid Carbide End Mill

Extended Product Range:
New Types with & without Weldon Shank

Suitable for:
- Soft to hard materials
- Roughing to Finishing
- 2D ~ 3D applications:
  - Side milling
  - Slotting
  - Z constant

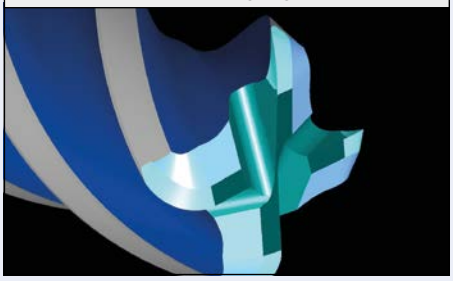
MMC Hitachi Tool Engineering Europe GmbH
www.high-speed-cutting.com

Micro Grain Solid Carbide End Mill

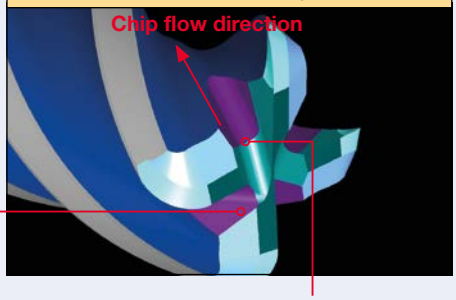
EPSM-CR-W-PN | Epoch Multi Series Corner Radius

Double Gash achieves perfect balance with rigidity and chip evacuation. It guarantees high performance in vertical and horizontal milling.

Conventional single gash type



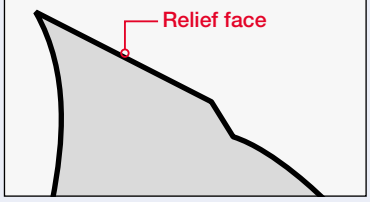
EPSM-CR double gash



Double relief face avoids chipping even in aggressive cutting parameter

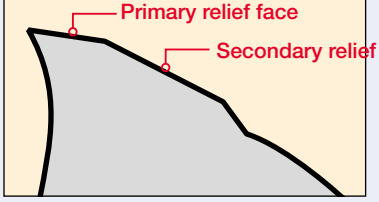
Strengthens cutting edge and avoids excessive contact between cutter and workpiece. For higher efficiency and longer tool life

Conventional relief face



Cutting edge cross section

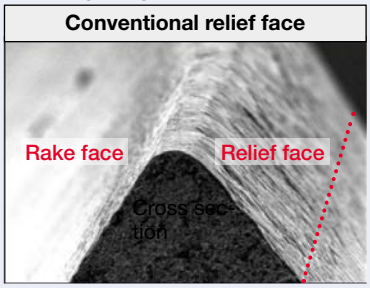
EPSM-CR double relief face



Cutting edge cross section

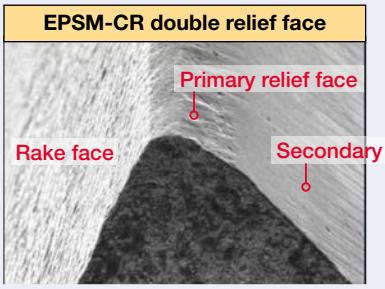
Cutting edge picture after steel cutting

Conventional relief face



Flank wear extended to the dotted line

EPSM-CR double relief face

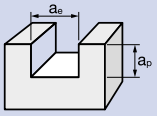


Wear is restricted by first eccentric relief face

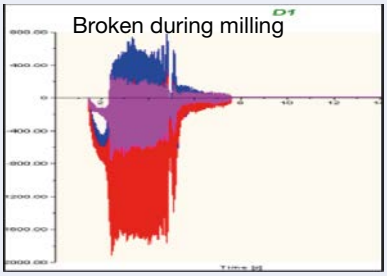
Optimized unequal pitch: Dramatically suppressing vibration by irregular frequency

For longer tool life and better surface quality, especially in thin wall machining

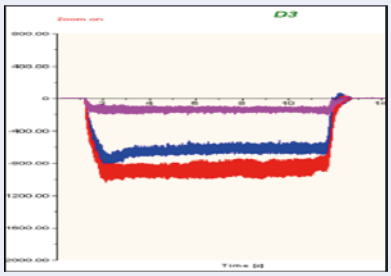
Testing tool size: D = 8 mm, Workpiece material: 1.4301
n = 2,100 min^{-1} , Feed rate V_f=230mm/min, a_p = 6.4 mm, a_e = 8 mm, Machine: Makino V33 (HSK63A)
OH = 24 mm, Coolant: Wet, Work size: 100 × 50 × 50 mm



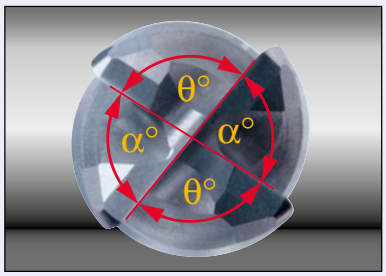
Cutting force in slotting



Conventional Equal pitch



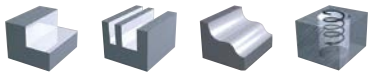
EPSM Unequal pitch



Micro Grain Solid Carbide End Mill

EPSM-CR-W-PN | Epoch Multi Series Corner Radius

V max	Q max	▽	▽▽	▽▽▽	HRC	No. of Teeth
High Speed	High Efficient	Roughing	Semi Finishing	Finishing	55	4



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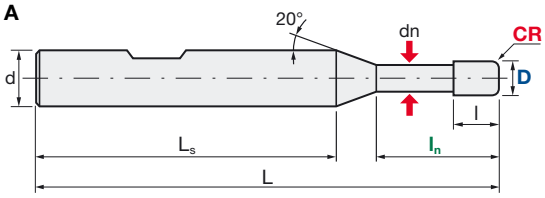
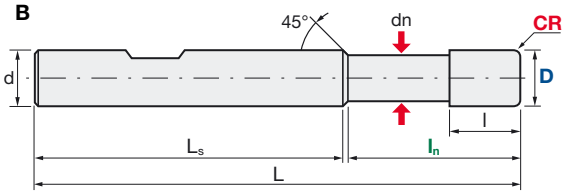


B



D	(D1-D6) (D8-D20)	0 / -0.015 mm 0 / -0.020 mm
CR	(D1-D2) (D3-D20)	+/-0.005 mm +/-0.010 mm
d	(D1–16) (D16–20)	h5 h6
Helix angle		40°

Carbide	PN	Rake Angle
Micro Grain	PaNacea Coating	Positive

3D underneck corner radius type with weldon shank

ID Code	Item Code (M-type)	Z	D	CR	l_n	l	dn	L	L_s	d	Type
EP1563	**EPSM-4010-3-R0.1-W-PN**	4	1	0.1	3	2.2	0.96	56	41.24	6	A
EP1566	**EPSM-4020-6-R0.2-W-PN**		2	0.2	6	4.4	1.92		40.59		
EP1568	**EPSM-4030-9-R0.2-W-PN**		3		9	6.6	2.88		39.94		
EP1569	**EPSM-4040-12-R0.5-W-PN**		4	0.5	12	8.8	3.7		39.30		
EP1571	**EPSM-4050-15-R0.5-W-PN**		5		15	11.0	4.6		38.65		
EP1573	**EPSM-4060-18-R0.5-W-PN**		6	0.5	18	13.2	5.5		38.00		B
EP1574	**EPSM-4060-18-R1.0-W-PN**			1.0					38.00		
EP1575	**EPSM-4060-18-R1.5-W-PN**			1.5					38.00		
EP1577	**EPSM-4080-24-R0.5-W-PN**		8	0.5	24	17.6	7.3	63	39.00	8	
EP1578	**EPSM-4080-24-R1.0-W-PN**			1.0					39.00		
EP1579	**EPSM-4080-24-R2.0-W-PN**			2.0					39.00		
EP1581	**EPSM-4100-30-R0.5-W-PN**		10	0.5	30	22.0	9.1	74	44.00	10	
EP1582	**EPSM-4100-30-R1.0-W-PN**			1.0					44.00		
EP1583	**EPSM-4100-30-R2.0-W-PN**			2.0					44.00		
EP1585	**EPSM-4120-36-R0.5-W-PN**		12	0.5	36	26.4	11	86	50.00	12	
EP1586	**EPSM-4120-36-R1.0-W-PN**			1.0					50.00		
EP1587	**EPSM-4120-36-R2.0-W-PN**			2.0					50.00		
EP1589	**EPSM-4160-48-R1.0-W-PN**		16	1.0	48	35.2	14.5	110	62.00	16	
EP1590	**EPSM-4160-48-R3.0-W-PN**			3.0					62.00		
EP1593	**EPSM-4200-60-R1.0-W-PN**		20	1.0	60	44.0	18.2	125	65.00	20	
EP1594	**EPSM-4200-60-R3.0-W-PN**			3.0					65.00		

5D underneck corner radius type with weldon shank

ID Code	Item Code (M-type)	Z	D	CR	l_n	l	dn	L	L_s	d	Type
EP1564	**EPSM-4010-5-R0.1-W-PN**	4	1	0.1	5	2.2	0.96	56	39.24	6	A
EP1565	**EPSM-4020-10-R0.2-W-PN**		2	0.2	10	4.4	1.92		36.59		
EP1567	**EPSM-4030-15-R0.2-W-PN**		3		15	6.6	2.88		33.94		
EP1570	**EPSM-4040-20-R0.5-W-PN**		4	0.5	20	8.8	3.7	63	38.30		
EP1572	**EPSM-4050-25-R0.5-W-PN**		5		25	11.0	4.6	68	40.65		
EP1576	**EPSM-4060-30-R0.5-W-PN**		6		30	13.2	5.5		38.00		B
EP1580	**EPSM-4080-40-R0.5-W-PN**		8		40	17.6	7.3	80	40.00	8	
EP1584	**EPSM-4100-50-R1.0-W-PN**		10	1.0	50	22.0	9.1	94	44.00	10	
EP1588	**EPSM-4120-60-R1.0-W-PN**		12		60	26.4	11	110	50.00	12	
EP1591	**EPSM-4160-80-R1.0-W-PN**		16		80	35.2	14.5	135	55.00	16	
EP1592	**EPSM-4200-100-R1.0-W-PN**		20		100	44.0	18.2	155	55.00	20	

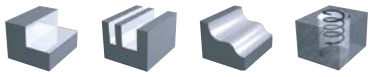
Cutting Conditions | Schnittwerte | Condizioni di taglio | Condiciones de Corte | Conditions de coupe | Valores de corte:

High Efficient Side Milling: Page 6 | High Efficient Finishing: Page 7 | Z-Constant Roughing: Page 8 | 3D finishing: Page 9 | Standard Slot Milling: Page 10

Micro Grain Solid Carbide End Mill

EPSM-CR-PN | Epoch Multi Series Corner Radius

V max	Q max	▽	▽▽	▽▽▽	HRC	No. of Teeth
High Speed	High Efficient	Roughing	Semi Finishing	Finishing	55	4



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B

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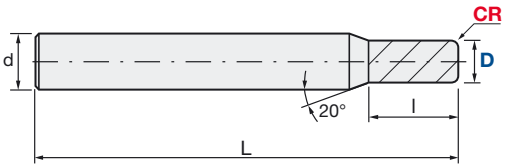

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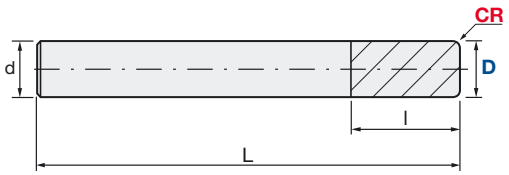


D	(D1-D6) (D8-D20)	0 / -0.015 mm 0 / -0.020 mm
CR	(D1-D2) (D3-D20)	+/-0.005 mm +/-0.010 mm
d	(D1–16) (D16–20)	h5 h6
Helix angle		40°

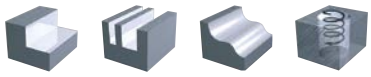
Carbide	PN	Rake Angle
Micro Grain	PaNacea Coating	Positive

Regular corner radius type without weldon shank									
ID Code	Item Code	Z	D	CR	l	L	Ls	d	Type
EP1701	**EPSM-4010-R0.1-PN**	4	1	0.1	2.5	56		6	A
EP1703	**EPSM-4020-R0.1-PN**		2		5				
EP1704	**EPSM-4020-R0.2-PN**			0.2					
EP1707	**EPSM-4030-R0.2-PN**		3		7.5				
EP1708	**EPSM-4030-R0.5-PN**			0.5					
EP1711	**EPSM-4040-R0.2-PN**		4	0.2	10				
EP1712	**EPSM-4040-R0.5-PN**			0.5					
EP1713	**EPSM-4040-R1.0-PN**			1					
EP1717	**EPSM-4050-R0.2-PN**		5	0.2	12.5				
EP1718	**EPSM-4050-R0.5-PN**			0.5					
EP1721	**EPSM-4060-R0.3-PN**		6	0.3	15				B
EP1722	**EPSM-4060-R0.5-PN**			0.5					
EP1723	**EPSM-4060-R1.0-PN**			1					
EP1724	**EPSM-4060-R1.5-PN**			1.5					
EP1729	**EPSM-4080-R0.3-PN**		8	0.3	20	63		8	
EP1730	**EPSM-4080-R0.5-PN**			0.5					
EP1731	**EPSM-4080-R1.0-PN**			1					
EP1732	**EPSM-4080-R2.0-PN**			2					
EP1737	**EPSM-4100-R0.3-PN**		10	0.3	25	74		10	
EP1738	**EPSM-4100-R0.5-PN**			0.5					
EP1739	**EPSM-4100-R1.0-PN**			1					
EP1740	**EPSM-4100-R2.0-PN**			2					
EP1745	**EPSM-4120-R0.3-PN**		12	0.3	30	86		12	
EP1746	**EPSM-4120-R0.5-PN**			0.5					
EP1747	**EPSM-4120-R1.0-PN**			1					
EP1748	**EPSM-4120-R1.5-PN**			1.5					
EP1749	**EPSM-4120-R2.0-PN**			2					
EP1755	**EPSM-4160-R0.5-PN**		16	0.5	40	110		16	
EP1756	**EPSM-4160-R1.0-PN**			1					
EP1759	**EPSM-4200-R0.5-PN**		20	0.5	50	125		20	
EP1760	**EPSM-4200-R1.0-PN**			1					

Micro Grain Solid Carbide End Mill

EPSM-CR-PN | Epoch Multi Series Corner Radius

V max	Q max	▽	▽▽	▽▽▽	HRC	No. of Teeth
High Speed	High Efficient	Roughing	Semi Finishing	Finishing	55	4



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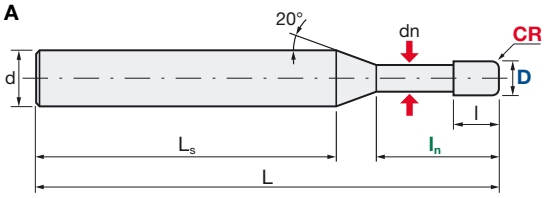

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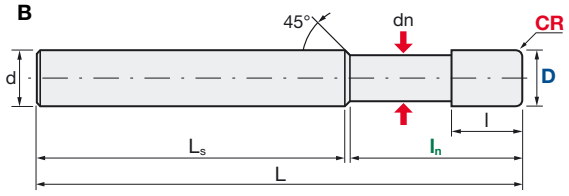


D	(D1-D6) (D8-D20)	0 / -0.015 mm 0 / -0.020 mm
CR	(D1-D2) (D3-D20)	+/-0.005 mm +/-0.010 mm
d	(D1–16) (D16–20)	h5 h6
Helix angle		40°

Carbide	PN	Rake Angle
Micro Grain	PaNacea Coating	Positive

5D underneck corner radius type without weldon shank											
ID Code	Item Code	Z	D	CR	l_n	l	dn	L	Ls	d	Type
EP1702	**EPSM-4010-5-R0.1-PN**	4	1	0.1	5	1.5	0.96	68		6	A
EP1705	**EPSM-4020-10-R0.1-PN**		2		10	3	1.92				
EP1706	**EPSM-4020-10-R0.2-PN**			0.2							
EP1709	**EPSM-4030-15-R0.2-PN**		3		15	4.5	2.88				
EP1710	**EPSM-4030-15-R0.5-PN**			0.5							
EP1714	**EPSM-4040-20-R0.2-PN**		4	0.2	20	6	3.7				
EP1715	**EPSM-4040-20-R0.5-PN**			0.5							
EP1716	**EPSM-4040-20-R1.0-PN**			1							
EP1719	**EPSM-4050-25-R0.2-PN**		5	0.2	25	7.5	4.6				
EP1720	**EPSM-4050-25-R0.5-PN**			0.5							
EP1725	**EPSM-4060-30-R0.3-PN**		6	0.3	30	9	5.5				B
EP1726	**EPSM-4060-30-R0.5-PN**			0.5							
EP1727	**EPSM-4060-30-R1.0-PN**			1							
EP1728	**EPSM-4060-30-R1.5-PN**			1.5							
EP1733	**EPSM-4080-40-R0.3-PN**		8	0.3	40	12	7.3	80		8	
EP1734	**EPSM-4080-40-R0.5-PN**			0.5							
EP1735	**EPSM-4080-40-R1.0-PN**			1							
EP1736	**EPSM-4080-40-R2.0-PN**			2							
EP1741	**EPSM-4100-50-R0.3-PN**		10	0.3	50	15	9.1	94		10	
EP1742	**EPSM-4100-50-R0.5-PN**			0.5							
EP1743	**EPSM-4100-50-R1.0-PN**			1							
EP1744	**EPSM-4100-50-R2.0-PN**			2							
EP1750	**EPSM-4120-60-R0.3-PN**		12	0.3	60	18	11	110		12	
EP1751	**EPSM-4120-60-R0.5-PN**			0.5							
EP1752	**EPSM-4120-60-R1.0-PN**			1							
EP1753	**EPSM-4120-60-R1.5-PN**			1.5							
EP1754	**EPSM-4120-60-R2.0-PN**			2							
EP1757	**EPSM-4160-80-R0.5-PN**		16	0.5	80	24	14.5	135		16	
EP1758	**EPSM-4160-80-R1.0-PN**			1							
EP1761	**EPSM-4200-100-R0.5-PN**		20	0.5	100	30	18.2	155		20	
EP1762	**EPSM-4200-100-R1.0-PN**			1							

Cutting Conditions | Schnittwerte | Condizioni di taglio | Condiciones de Corte | Conditions de coupe | Valores de corte:

High Efficient Side Milling: Page 6 | High Efficient Finishing: Page 7 | Z-Constant Roughing: Page 8 | 3D finishing: Page 9 | Standard Slot Milling: Page 10

Micro Grain Solid Carbide End Mill

EPSM-CR-[W]-PN | Recommended Cutting Conditions High Efficient Side Milling

Material group	Example	Tensile strength	Parameter		Tool Diameter (mm)										
					D 1	D 2	D 3	D 4	D 5	D 6	D 8	D 10	D 12	D 16	D 20
Carbon Steels Alloy Steels Cast Irons EN-JL(GG) Ductile Cast Iron: EN-JS (GGG) (-300HB)			V_c	m/min	100	200	300	350	350	350	350	350	350	350	350
			n	min^{-1}	31.800	31.800	31.800	27.900	22.300	18.600	13.900	11.100	9.300	7.000	5.600
			f_z	mm/tooth	0,015	0,030	0,045	0,060	0,075	0,090	0,120	0,150	0,180	0,240	0,300
			V_f	mm/min	1910	3820	5720	6700	6690	6700	6670	6660	6700	6720	6720
			a_p	mm	2	4	6	8	10	12	16	20	24	24	30
			a_e	mm	0,15	0,3	0,45	0,6	0,75	0,9	1,2	1,5	1,8	2,4	3
			Q	cm^3/min	0,57	4,58	15,44	32,16	50,18	72,36	128,06	199,80	289,44	387,07	604,80
Tool Steels Alloy Steels (35-45HRC)			V_c	m/min	100	200	220	220	220	220	220	220	220	220	220
			n	min^{-1}	31.800	31.800	23.400	17.500	14.000	11.700	8.800	7.000	5.800	4.400	3.500
			f_z	mm/tooth	0,013	0,025	0,038	0,050	0,063	0,075	0,100	0,125	0,150	0,200	0,250
			V_f	mm/min	1590	3180	3510	3500	3500	3510	3520	3500	3480	3520	3500
			a_p	mm	2	4	6	8	10	12	16	20	24	24	30
			a_e	mm	0,1	0,2	0,3	0,4	0,5	0,6	0,8	1,0	1,2	1,6	2,0
			Q	cm^3/min	0,32	2,54	6,32	11,20	17,50	25,27	45,06	70,00	100,22	135,17	210,00
Tool Steels Pre-Hardened Steels (45-55HRC)			V_c	m/min	100	120	120	120	120	120	120	120	120	120	120
			n	min^{-1}	31.800	19.100	12.700	9.600	7.600	6.400	4.800	3.800	3.200	2.400	1.900
			f_z	mm/tooth	0,009	0,018	0,026	0,035	0,044	0,053	0,070	0,088	0,105	0,140	0,175
			V_f	mm/min	1110	1340	1330	1340	1330	1340	1340	1330	1340	1340	1330
			a_p	mm	2	4	6	8	10	12	16	20	24	24	30
			a_e	mm	0,0625	0,125	0,1875	0,25	0,3125	0,375	0,5	0,625	0,75	1	1,25
			Q	cm^3/min	0,14	0,67	1,50	2,68	4,16	6,03	10,72	16,63	24,12	32,16	49,88
Stainless Steel Ferritic, Martensitic	1.4034 (X46Cr13), 1.4021 (X20Cr13), 1.4112 (X90CrMoV18)	<750 N/mm²	V_c	m/min	100	200	300	350	350	350	350	350	350	350	350
			n	min^{-1}	31800	31800	31800	27900	22300	18600	13900	11100	9300	7000	5600
			f_z	mm/tooth	0,015	0,03	0,045	0,06	0,075	0,09	0,12	0,15	0,18	0,24	0,3
			V_f	mm/min	1910	3820	5720	6700	6690	6700	6670	6660	6700	6720	6720
			a_p	mm	2	4	6	8	10	12	16	20	24	24	30
			a_e	mm	0,15	0,3	0,45	0,6	0,75	0,9	1,2	1,5	1,8	2,4	3
			Q	cm^3/min	0,57	4,58	15,44	32,16	50,18	72,36	128,06	199,80	289,44	387,07	604,80
Stainless Steel Austenitic	1.4301 (X5CrNi18-10), 1.4404 (X2CrNi-Mo17-12-2), 1.4571 (X6CrNiMo-Ti17-12-2)	750-850 N/mm²	V_c	m/min	100	120	120	120	120	120	120	120	120	120	120
			n	min^{-1}	31.800	19.100	12.700	9.600	7.600	6.400	4.800	3.800	3.200	2.400	1.900
			f_z	mm/tooth	0,010	0,020	0,030	0,040	0,050	0,060	0,080	0,100	0,120	0,160	0,200
			V_f	mm/min	1270	1530	1520	1540	1520	1540	1540	1520	1540	1540	1520
			a_p	mm	2	4	6	8	10	12	16	20	24	24	30
			a_e	mm	0,1	0,2	0,3	0,4	0,5	0,6	0,8	1,0	1,2	1,6	2,0
			Q	cm^3/min	0,25	1,22	2,74	4,93	7,60	11,09	19,71	30,40	44,35	59,14	91,20
Stainless Steel Duplex, Precipitation-hardenable	1.4542 (X5CrNi-CuNb16-4), 1.4501 (X2CrNiMoCu-WN25-7-4)	850-1100 N/mm²	V_c	m/min	80	80	80	80	80	80	80	80	80	80	80
			n	min^{-1}	25.500	12.700	8.500	6.400	5.100	4.200	3.200	2.500	2.100	1.600	1.300
			f_z	mm/tooth	0,009	0,018	0,026	0,035	0,044	0,053	0,070	0,088	0,105	0,140	0,175
			V_f	mm/min	920	910	880	900	900	890	900	880	880	900	910
			a_p	mm	2	4	6	8	10	12	16	20	24	24	30
			a_e	mm	0,0625	0,125	0,1875	0,25	0,3125	0,375	0,5	0,625	0,75	1	1,25
			Q	cm^3/min	0,12	0,46	0,99	1,80	2,81	4,01	7,20	11,00	15,84	21,60	34,13
Titanium, Ti alloys	3.7164 (TiAl6V4)	1100-1300 N/mm²	V_c	m/min	100	120	120	120	120	120	120	120	120	120	120
			n	min^{-1}	31800	19100	12700	9600	7600	6400	4800	3800	3200	2400	1900
			f_z	mm/tooth	0,010	0,020	0,030	0,040	0,050	0,060	0,080	0,100	0,120	0,160	0,200
			V_f	mm/min	1270	1530	1520	1540	1520	1540	1540	1520	1540	1540	1520
			a_p	mm	2	4	6	8	10	12	16	20	24	24	30
			a_e	mm	0,07	0,14	0,21	0,28	0,35	0,42	0,56	0,70	0,84	1,12	1,40
			Q	cm^3/min	0,18	0,86	1,92	3,45	5,32	7,76	13,80	21,28	31,05	41,40	63,84
Super alloy, Heat-resist-ance alloy	Inconel 718 Hastelloy	>1300 N/mm²	V_c	m/min	55	55	55	55	55	55	55	55	55	55	55
			n	min^{-1}	17.500	8.800	5.800	4.400	3.500	2.900	2.200	1.800	1.500	1.100	900
			f_z	mm/tooth	0,005	0,01	0,015	0,02	0,025	0,03	0,04	0,05	0,06	0,08	0,1
			V_f	mm/min	350	350	350	350	350	350	350	360	360	350	360
			a_p	mm	2	4	6	8	10	12	16	20	24	24	30
			a_e	mm	0,05	0,1	0,15	0,2	0,25	0,3	0,4	0,5	0,6	0,8	1
			Q	cm^3/min	0,040	0,14	0,32	0,56	0,88	1,26	2,24	3,60	5,18	6,72	10,80

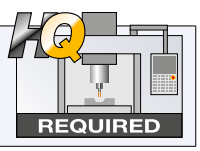
In the case of 5D underneck, please reduce V_c to 85% and keep 100% f_z, reduce 50% a_p and 50% a_e

Please Note:

1. Please confirm your material type first.

- If hardness harder than value in the same column: please follow by real hardness
- If hardness is lower than that value: please follow material type.

2. Use the high-rigidity and high accuracy machine as possible



Micro Grain Solid Carbide End Mill

EPSM-CR-[W]-PN | Recommended Cutting Conditions High Efficient Finishing

High Efficient

Material group	Example	Tensile strength	Parameter		Tool Diameter (mm)										
					D 1	D 2	D 3	D 4	D 5	D 6	D 8	D 10	D 12	D 16	D 20
Carbon Steels Alloy Steels Cast Irons EN-JL(GG) Ductile Cast Iron: EN-JS (GGG) (-300HB)			V_c	m/min	100	200	300	300	300	300	300	300	300	300	300
			n	min^{-1}	31.800	31.800	31.800	23.900	19.100	15.900	11.900	9.600	8.000	6.000	4.800
			f_z	mm/tooth	0,009	0,018	0,027	0,036	0,045	0,054	0,072	0,090	0,108	0,144	0,180
			V_f	mm/min	1140	2290	3430	3440	3440	3430	3430	3460	3460	3460	3460
			a_p	mm	2	4	6	8	10	12	16	20	24	32	40
			a_e	mm	0,02	0,04	0,06	0,08	0,1	0,12	0,16	0,2	0,24	0,32	0,4
			Q	cm^3/min	0,05	0,37	1,23	2,20	3,44	4,94	8,78	13,84	19,93	35,43	55,36
Tool Steels Alloy Steels (35-45HRC)			V_c	m/min	100	200	200	200	200	200	200	200	200	200	200
			n	min^{-1}	31.800	31.800	21.200	15.900	12.700	10.600	8.000	6.400	5.300	4.000	3.200
			f_z	mm/tooth	0,007	0,014	0,021	0,028	0,035	0,042	0,056	0,070	0,084	0,112	0,140
			V_f	mm/min	890	1780	1780	1780	1780	1780	1790	1790	1780	1790	1790
			a_p	mm	2	4	6	8	10	12	16	20	24	32	40
			a_e	mm	0,02	0,04	0,06	0,08	0,1	0,12	0,16	0,2	0,24	0,32	0,4
			Q	cm^3/min	0,04	0,28	0,64	1,14	1,78	2,56	4,58	7,16	10,25	18,33	28,64
Tool Steels Pre-Hardened Steels (45-55HRC)			V_c	m/min	100	150	150	150	150	150	150	150	150	150	150
			n	min^{-1}	31.800	23.900	15.900	11.900	9.600	8.000	6.000	4.800	4.000	3.000	2.400
			f_z	mm/tooth	0,006	0,012	0,018	0,024	0,030	0,036	0,048	0,060	0,072	0,096	0,120
			V_f	mm/min	760	1150	1140	1140	1150	1150	1150	1150	1150	1150	1150
			a_p	mm	2	4	6	8	10	12	16	20	24	32	40
			a_e	mm	0,02	0,04	0,06	0,08	0,1	0,12	0,16	0,2	0,24	0,32	0,4
			Q	cm^3/min	0,03	0,18	0,41	0,73	1,15	1,66	2,94	4,60	6,62	11,78	18,40
Stainless Steel Ferritic, Martensitic	1.4034 (X46Cr13), 1.4021 (X20Cr13), 1.4112 (X90CrMoV18)	<750 N/mm²	V_c	m/min	119	119	119	119	119	120	118	121	118	121	121
			n	min^{-1}	37.900	18.900	12.600	9.500	7.600	6.400	4.700	3.900	3.100	2.400	1.900
			f_z	mm/tooth	0,005	0,01	0,014	0,02	0,028	0,032	0,043	0,054	0,059	0,073	0,086
			V_f	mm/min	760	760	710	760	850	820	810	840	730	700	650
			a_p	mm	1,5	3	4,5	6	7,5	9	12	15	18	24	30
			a_e	mm	0,02	0,04	0,06	0,08	0,1	0,12	0,16	0,2	0,24	0,32	0,4
			Q	cm^3/min	0,02	0,09	0,19	0,36	0,64	0,89	1,56	2,52	3,15	5,38	7,8
Stainless Steel Austenitic	1.4301 (X5CrNi18-10), 1.4404 (X2CrNi-Mo17-12-2), 1.4571 (X6CrNiMo-Ti17-12-2)	750-850 N/mm²	V_c	m/min	99	99	99	99	99	100	98	101	98	101	101
			n	min^{-1}	31500	15800	10500	7900	6300	5300	3900	3200	2600	2000	1600
			f_z	mm/tooth	0,004	0,008	0,012	0,017	0,023	0,027	0,036	0,045	0,049	0,061	0,072
			V_f	mm/min	450	480	510	540	570	570	560	580	510	490	460
			a_p	mm	1,5	3	4,5	6	7,5	9	12	15	18	24	30
			a_e	mm	0,02	0,04	0,06	0,08	0,1	0,12	0,16	0,2	0,24	0,32	0,4
			Q	cm^3/min	0,01	0,06	0,14	0,26	0,43	0,62	1,08	1,74	2,2	3,76	5,52
Stainless Steel Duplex, Precipitation-hardenable	1.4542 (X5CrNi-CuNb16-4), 1.4501 (X2CrNiMoCu-WN25-7-4)	850-1100 N/mm²	V_c	m/min	79	79	79	79	79	80	78	81	78	81	81
			n	min^{-1}	25.100	12.600	8.400	6.300	5.000	4.200	3.100	2.600	2.100	1.600	1.300
			f_z	mm/tooth	0,003	0,006	0,01	0,014	0,018	0,022	0,029	0,036	0,039	0,049	0,058
			V_f	mm/min	300	300	340	350	360	370	360	370	330	310	300
			a_p	mm	1,5	3	4,5	6	7,5	9	12	15	18	24	30
			a_e	mm	0,02	0,04	0,06	0,08	0,1	0,12	0,16	0,2	0,24	0,32	0,4
			Q	cm^3/min	0,01	0,04	0,09	0,17	0,27	0,4	0,69	1,11	1,43	2,38	3,6
Titanium, Ti alloys	3.7164 (TiAl6V4)	1100-1300 N/mm²	V_c	m/min	74	74	74	74	74	75	74	76	74	76	76
			n	min^{-1}	23.600	11.800	7.900	5.900	4.700	4.000	2.900	2.400	2.000	1.500	1.200
			f_z	mm/tooth	0,004	0,008	0,011	0,016	0,022	0,026	0,034	0,043	0,047	0,058	0,068
			V_f	mm/min	380	380	350	380	410	420	390	410	380	350	330
			a_p	mm	1,5	3	4,5	6	7,5	9	12	15	18	24	30
			a_e	mm	0,02	0,04	0,06	0,08	0,1	0,12	0,16	0,2	0,24	0,32	0,4
			Q	cm^3/min	0,01	0,05	0,09	0,18	0,31	0,45	0,75	1,23	1,64	2,69	3,96
Super alloy, Heat-resist-ance alloy	Inconel 718 Hastelloy	>1300 N/mm²	V_c	m/min	40	40	40	40	40	40	39	40	39	40	40
			n	min^{-1}	12.700	6.400	4.200	3.200	2.500	2.100	1.600	1.300	1.000	800	600
			f_z	mm/tooth	0,002	0,005	0,007	0,01	0,014	0,016	0,022	0,027	0,029	0,037	0,043
			V_f	mm/min	100	130	120	130	140	130	140	140	120	120	100
			a_p	mm	1,5	3	4,5	6	7,5	9	12	15	18	24	30
			a_e	mm	0,02	0,04	0,06	0,08	0,1	0,12	0,16	0,2	0,24	0,32	0,4
			Q	cm^3/min	0	0,02	0,03	0,06	0,11	0,14	0,27	0,42	0,52	0,92	1,2

In the case of 5D underneck, please reduce both V_c and f_z to 70%

3. These conditions are for general guidance; in actual machining conditions adjust the parameters according to your actual machine and work-piece conditions.

4. Please adjust it if chatter or abnormal vibration occurs.

5. Please setup feed 1/3 that of slotting parameter and step 0.1Dc for drilling application.

6. Please setup feed 70% of slotting parameter and ramping angle 3° for ramping application.

Micro Grain Solid Carbide End Mill

EPSM-CR-[W]-PN | Recommended Cutting Conditions Z-Constant Roughing

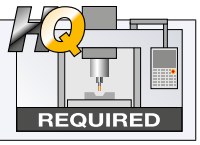
Material group	Example	Tensile strength	Parameter		Tool Diameter (mm)										
					D 1	D 2	D 3	D 4	D 5	D 6	D 8	D 10	D 12	D 16	D 20
Carbon Steels Alloy Steels Cast Irons EN-JL(GG) Ductile Cast Iron: EN-JS (GGG) (-300HB)			V_c	m/min	100	120	120	120	120	120	120	120	120	120	120
			n	min^{-1}	31.800	19.100	12.700	9.600	7.600	6.400	4.800	3.800	3.200	2.400	1.900
			f_z	mm/tooth	0,050	0,100	0,150	0,200	0,250	0,300	0,400	0,500	0,600	0,800	1,000
			V_f	mm/min	6360	7640	7620	7680	7600	7680	7680	7600	7680	7680	7600
			a_p	mm	0,06	0,11	0,17	0,23	0,28	0,34	0,45	0,56	0,68	0,90	1,13
			a_e	mm	0,75	1,50	2,25	3,00	3,75	4,50	6,00	7,50	9,00	12,00	15,00
			Q	cm^3/min	0,27	1,29	2,89	5,18	8,02	11,66	20,74	32,06	46,66	82,94	128,25
Tool Steels Alloy Steels (35-45HRC)			V_c	m/min	100	100	100	100	100	100	100	100	100	100	100
			n	min^{-1}	31.800	15.900	10.600	8.000	6.400	5.300	4.000	3.200	2.700	2.000	1.600
			f_z	mm/tooth	0,038	0,075	0,113	0,150	0,188	0,225	0,300	0,375	0,450	0,600	0,750
			V_f	mm/min	4770	4770	4770	4800	4800	4770	4800	4800	4860	4800	4800
			a_p	mm	0,06	0,11	0,17	0,23	0,28	0,34	0,45	0,56	0,68	0,90	1,13
			a_e	mm	0,75	1,50	2,25	3,00	3,75	4,50	6	7,50	9,00	12,00	15,00
			Q	cm^3/min	0,20	0,80	1,81	3,24	5,06	7,24	12,96	20,25	29,52	51,84	81,00
Tool Steels Pre-Hardened Steels (45-55HRC)			V_c	m/min	80	80	80	80	80	80	80	80	80	80	80
			n	min^{-1}	25.500	12.700	8.500	6.400	5.100	4.200	3.200	2.500	2.100	1.600	1.300
			f_z	mm/tooth	0,038	0,075	0,113	0,150	0,188	0,225	0,300	0,375	0,450	0,600	0,750
			V_f	mm/min	3830	3810	3830	3840	3830	3780	3840	3750	3780	3840	3900
			a_p	mm	0,04	0,08	0,11	0,15	0,19	0,23	0,30	0,38	0,45	0,60	0,75
			a_e	mm	0,4	0,8	1,2	1,6	2	2,4	3,2	4	4,8	6,4	8
			Q	cm^3/min	0,06	0,23	0,52	0,92	1,44	2,04	3,69	5,63	8,16	14,75	23,40
Stainless Steel Ferritic, Martensitic	1.4034 (X46Cr13), 1.4021 (X20Cr13), 1.4112 (X90CrMoV18)	<750 N/mm²	V_c	m/min	100	120	120	120	120	120	120	120	120	120	120
			n	min^{-1}	31800	19100	12700	9600	7600	6400	4800	3800	3200	2400	1900
			f_z	mm/tooth	0,05	0,1	0,15	0,2	0,25	0,3	0,4	0,5	0,6	0,8	1
			V_f	mm/min	6360	7640	7620	7680	7600	7680	7680	7600	7680	7680	7600
			a_p	mm	0,06	0,11	0,17	0,23	0,28	0,34	0,45	0,56	0,68	0,90	1,13
			a_e	mm	0,75	1,5	2,25	3	3,75	4,5	6	7,5	9	12	15
			Q	cm^3/min	0,27	1,29	2,89	5,18	8,02	11,66	20,74	32,06	46,66	82,94	128,25
Stainless Steel Austenitic	1.4301 (X5CrNi18-10), 1.4404 (X2CrNi-Mo17-12-2), 1.4571 (X6CrNiMo-Ti17-12-2)	750-850 N/mm²	V_c	m/min	80	80	80	80	80	80	80	80	80	80	80
			n	min^{-1}	25478	12739	8493	6369	5096	4246	3185	2548	2123	1592	1274
			f_z	mm/tooth	0,038	0,075	0,113	0,150	0,188	0,225	0,300	0,375	0,450	0,600	0,750
			V_f	mm/min	3822	3822	3822	3822	3822	3822	3822	3822	3822	3822	3822
			a_p	mm	0,04	0,08	0,11	0,15	0,19	0,23	0,30	0,38	0,45	0,60	0,75
			a_e	mm	0,5	1	1,5	2	2,5	3	4	5	6	8	10
			Q	cm^3/min	0,07	0,29	0,64	1,15	1,79	2,58	4,59	7,17	10,32	18,34	28,66
Stainless Steel Duplex, Precipitation-hardenable	1.4542 (X5CrNi-CuNb16-4), 1.4501 (X2CrNiMoCu-WN25-7-4)	850-1100 N/mm²	V_c	m/min	60	60	60	60	60	60	60	60	60	60	60
			n	min^{-1}	19108	9554	6369	4777	3822	3185	2389	1911	1592	1194	955
			f_z	mm/tooth	0,03	0,06	0,09	0,13	0,16	0,19	0,250	0,31	0,38	0,50	0,63
			V_f	mm/min	2390	2390	2390	2390	2390	2390	2390	2390	2390	2390	2390
			a_p	mm	0,03	0,06	0,09	0,13	0,16	0,19	0,25	0,31	0,38	0,50	0,63
			a_e	mm	0,4	0,8	1,2	1,6	2	2,4	3,2	4	4,8	6,4	8
			Q	cm^3/min	0,03	0,12	0,27	0,48	0,75	1,08	1,91	2,99	4,30	7,65	11,95
Titanium, Ti alloys	3.7164 (TiAl6V4)	1100-1300 N/mm²	V_c	m/min	100	100	100	100	100	100	100	100	100	100	100
			n	min^{-1}	31800	15900	10600	8000	6400	5300	4000	3200	2700	2000	1600
			f_z	mm/tooth	0,04	0,08	0,11	0,15	0,19	0,23	0,30	0,38	0,45	0,60	0,75
			V_f	mm/min	4770	4770	4770	4800	4800	4770	4800	4800	4860	4800	4800
			a_p	mm	0,06	0,11	0,17	0,23	0,28	0,34	0,45	0,56	0,68	0,90	1,13
			a_e	mm	0,5	1	1,5	2	2,5	3	4	5	6	8	10
			Q	cm^3/min	0,13	0,54	1,21	2,16	3,38	4,83	12,96	13,50	19,68	34,56	54,00
Super alloy, Heat-resist-ance alloy	Inconel 718 Hastelloy	>1300 N/mm²	V_c	m/min	50	50	50	50	50	50	50	50	50	50	50
			n	min^{-1}	15.900	8.000	5.300	4.000	3.200	2.700	2.000	1.600	1.300	1.000	800
			f_z	mm/tooth	0,025	0,050	0,075	0,100	0,125	0,150	0,200	0,250	0,300	0,400	0,500
			V_f	mm/min	1590	1600	1590	1600	1600	1620	1600	1600	1560	1600	1600
			a_p	mm	0,025	0,050	0,075	0,100	0,125	0,150	0,2	0,250	0,300	0,400	0,500
			a_e	mm	0,35	0,7	1,05	1,4	1,75	2,1	2,8	3,5	4,2	5,6	7
			Q	cm^3/min	0,01	0,06	0,13	0,22	0,35	0,51	0,90	1,40	1,97	3,58	5,60

In the case of 5D underneck, please reduce Vc to 85% and keep 100% fz, reduce 50% ap

Please Note:

1. Please confirm your material type first.
- If hardness harder than value in the same column: please follow by real hardness
- If hardness is lower than that value: please follow material type.

2. Use the high-rigidity and high accuracy machine as possible



Micro Grain Solid Carbide End Mill

EPSM-CR-W-PN | Recommended Cutting Conditions 3D Finishing („Z constant finishing“)

Material group	Example	Tensile strength	Parameter		Tool Diameter (mm)										
					D 1	D 2	D 3	D 4	D 5	D 6	D 8	D 10	D 12	D 16	D 20
Carbon Steels Alloy Steels Cast Irons EN-JL(GG) Ductile Cast Iron: EN-JS (GGG) (-300HB)			V_c	m/min	130	130	130	130	130	130	130	130	130	130	130
			n	min^{-1}	41.400	20.700	13.800	10.400	8.300	6.900	5.200	4.100	3.500	2.600	2.100
			f_z	mm/tooth	0,011	0,022	0,032	0,043	0,054	0,065	0,086	0,108	0,130	0,173	0,216
			V_f	mm/min	1790	1790	1790	1800	1790	1790	1800	1770	1810	1800	1810
			a_p	mm	0,2*CR- 0,5CR										
			a_e	mm	0,2*CR- 0,5CR										
Tool Steels Alloy Steels (35-45HRC)			V_c	m/min	110	110	110	110	110	110	110	110	110	110	110
			n	min^{-1}	35.000	17.500	11.700	8.800	7.000	5.800	4.400	3.500	2.900	2.200	1.800
			f_z	mm/tooth	0,008	0,017	0,025	0,034	0,042	0,050	0,067	0,084	0,101	0,134	0,168
			V_f	mm/min	1180	1180	1180	1180	1180	1170	1180	1180	1170	1180	1210
			a_p	mm	0,1*CR- 0,3CR										
			a_e	mm	0,1*CR- 0,3CR										
Tool Steels Pre-Hardened Steels (45-55HRC)			V_c	m/min	70	70	70	70	70	70	70	70	70	70	70
			n	min^{-1}	22.300	11.100	7.400	5.600	4.500	3.700	2.800	2.200	1.900	1.400	1.100
			f_z	mm/tooth	0,007	0,014	0,021	0,028	0,035	0,041	0,055	0,069	0,083	0,110	0,138
			V_f	mm/min	620	610	610	620	620	610	620	610	630	620	610
			a_p	mm	0,1*CR- 0,3CR										
			a_e	mm	0,1*CR- 0,3CR										
Stainless Steel Ferritic, Martensitic	1.4034 (X46Cr13), 1.4021 (X20Cr13), 1.4112 (X90CrMoV18)	<750 N/mm²	V_c	m/min	120	120	120	120	120	120	120	120	120	120	120
			n	min^{-1}	38.200	19.100	12.700	9.500	7.600	6.400	4.800	3.800	3.200	2.400	1.900
			f_z	mm/tooth	0,006	0,012	0,017	0,024	0,034	0,038	0,052	0,065	0,071	0,088	0,103
			V_f	mm/min	920	920	850	910	1020	980	990	980	910	840	780
			a_p	mm	0,1*CR- 0,3CR										
			a_e	mm	0,2*CR- 0,5CR										
Stainless Steel Austenitic	1.4301 (X5CrNi18-10), 1.4404 (X2CrNi-Mo17-12-2), 1.4571 (X6CrNiMo-Ti17-12-2)	750-850 N/mm²	V_c	m/min	80	80	80	80	80	80	80	80	80	80	80
			n	min^{-1}	17500	8800	5800	4400	3500	2900	2200	1800	1500	1100	900
			f_z	mm/tooth	0,005	0,010	0,014	0,020	0,028	0,032	0,043	0,054	0,059	0,073	0,086
			V_f	mm/min	210	220	230	250	260	260	260	270	240	220	220
			a_p	mm	0,1*CR- 0,3CR										
			a_e	mm	0,1*CR- 0,3CR										
Stainless Steel Duplex, Precipitation-hardenable	1.4542 (X5CrNi-CuNb16-4), 1.4501 (X2CrNiMoCu-WN25-7-4)	850-1100 N/mm²	V_c	m/min	60	60	60	60	60	60	60	60	60	60	60
			n	min^{-1}	19.100	9.500	6.400	4.800	3.800	3.200	2.400	1.900	1.600	1.200	1.000
			f_z	mm/tooth	0,004	0,007	0,012	0,017	0,022	0,026	0,035	0,043	0,047	0,059	0,070
			V_f	mm/min	280	270	310	320	330	340	330	330	300	280	280
			a_p	mm	0,1*CR- 0,3CR										
			a_e	mm	0,1*CR- 0,3CR										
Titanium, Ti alloys	3.7164 (TiAl6V4)	1100-1300 N/mm²	V_c	m/min	70	70	70	70	70	70	70	70	70	70	70
			n	min^{-1}	22.300	11.100	7.400	5.600	4.500	3.700	2.800	2.200	1.900	1.400	1.100
			f_z	mm/tooth	0,005	0,010	0,013	0,019	0,026	0,031	0,041	0,052	0,056	0,070	0,082
			V_f	mm/min	430	430	390	430	480	460	460	450	430	390	360
			a_p	mm	0,1*CR- 0,3CR										
			a_e	mm	0,1*CR- 0,3CR										
Super alloy, Heat-resist-ance alloy	Inconel 718 Hastelloy	>1300 N/mm²	V_c	m/min	40	40	40	40	40	40	40	40	40	40	40
			n	min^{-1}	12.700	6.400	4.200	3.200	2.500	2.100	1.600	1.300	1.100	800	600
			f_z	mm/tooth	0,002	0,006	0,008	0,012	0,017	0,019	0,026	0,032	0,035	0,044	0,052
			V_f	mm/min	120	150	140	150	170	160	170	170	150	140	120
			a_p	mm	0,1*CR- 0,2CR										
			a_e	mm	0,1*CR- 0,2CR										

Theoretical cusp height:

Feed pitch and cusp height

$$h = R - \sqrt{\frac{(2 \cdot R)^2 - a_{p,e}^{\,2}}{4}}$$

$$h = \frac{a_p^{\,2}}{8 \cdot CR}$$

In the case of 5D underneck, please reduce V_c to 85% and keep 100% f_z, reduce 50% a_p

3. These conditions are for general guidance; in actual machining conditions adjust the parameters according to your actual machine and work-piece conditions.

4. Please adjust it if chatter or abnormal vibration occurs.

5. Please setup feed 1/3 that of slotting parameter and step 0.1Dc for drilling application.

6. Please setup feed 70% of slotting parameter and ramping angle 3° for ramping application.

Micro Grain Solid Carbide End Mill

EPSM-CR-[W]-PN | Recommended Cutting Conditions Standard Slot Milling

Material group	Example	Tensile strength	Parameter		Tool Diameter (mm)										
					D 1	D 2	D 3	D 4	D 5	D 6	D 8	D 10	D 12	D 16	D 20
Carbon Steels Alloy Steels Cast Irons EN-JL(GG) Ductile Cast Iron: EN-JS (GGG) (-300HB)			V_c	m/min	90	90	90	90	90	90	90	90	90	90	90
			n	min^{-1}	28.700	14.300	9.600	7.200	5.700	4.800	3.600	2.900	2.400	1.800	1.400
			f_z	mm/tooth	0,007	0,013	0,018	0,025	0,032	0,034	0,049	0,061	0,069	0,087	0,096
			V_f	mm/min	790	760	680	730	720	650	710	710	660	630	540
			a_p	mm	1	2	3	4	5	6	8	10	12	16	20
			a_e	mm	1	2	3	4	5	6	8	10	12	16	20
			Q	cm^3/min	0,8	3,0	6,1	11,7	18,0	23,4	45,4	71,0	95,0	161,3	216,0
Tool Steels Alloy Steels (35-45HRC)			V_c	m/min	70	70	70	70	70	70	70	70	70	70	70
			n	min^{-1}	22.300	11.100	7.400	5.600	4.500	3.700	2.800	2.200	1.900	1.400	1.100
			f_z	mm/tooth	0,004	0,008	0,011	0,016	0,020	0,022	0,031	0,039	0,044	0,055	0,061
			V_f	mm/min	390	370	340	360	370	330	350	340	330	310	270
			a_p	mm	0,6	1,2	1,8	2,4	3	3,6	4,8	6	7,2	9,6	12
			a_e	mm	1	2	3	4	5	6	8	10	12	16	20
			Q	cm^3/min	0,2	0,9	1,8	3,5	5,6	7,1	13,4	20,4	28,5	47,6	64,8
Stainless Steel Ferritic, Martensitic	1.4034 (X46Cr13), 1.4021 (X20Cr13), 1.4112 (X90CrMoV18)	<750N/ mm2	V_c	m/min	80	80	80	80	80	80	80	80	80	80	80
			n	min^{-1}	25.500	12.700	8.500	6.400	5.100	4.200	3.200	2.500	2.100	1.600	1.300
			f_z	mm/tooth	0,004	0,007	0,013	0,018	0,024	0,028	0,038	0,048	0,05	0,064	0,077
			V_f	mm/min	410	360	440	460	490	470	490	480	420	410	400
			a_p	mm	1	2	3	4	5	6	8	10	12	16	20
			a_e	mm	1	2	3	4	5	6	8	10	12	16	20
			Q	cm^3/min	0,41	1,44	3,96	7,36	12,25	16,92	31,36	48	60,48	104,96	160
Stainless Steel Austenitic	1.4301 (X5CrNi18-10), 1.4404 (X2CrNi-Mo17-12-2), 1.4571 (X6CrNiMo-Ti17-12-2)	750-850N/ mm2	V_c	m/min	70	70	70	70	70	70	70	70	70	70	70
			n	min^{-1}	17500	8800	5800	4400	3500	2900	2200	1800	1500	1100	900
			f_z	mm/tooth	0,003	0,006	0,011	0,015	0,02	0,023	0,032	0,04	0,042	0,053	0,064
			V_f	mm/min	210	220	230	250	260	260	260	270	240	220	220
			a_p	mm	1	2	3	4	5	6	8	10	12	16	20
			a_e	mm	1	2	3	4	5	6	8	10	12	16	20
			Q	cm^3/min	0,21	0,88	2,07	4	6,5	9,36	16,64	27	34,56	56,32	88
Stainless Steel Duplex, Precipitation-hardenable	1.4542 (X5CrNi-CuNb16-4), 1.4501 (X2CrNiMoCu-WN25-7-4)	850-1100N/ mm2	V_c	m/min	50	50	50	50	50	50	50	50	50	50	50
			n	min^{-1}	15.900	8.000	5.300	4.000	3.200	2.700	2.000	1.600	1.300	1.000	800
			f_z	mm/tooth	0,002	0,005	0,009	0,012	0,016	0,018	0,026	0,032	0,034	0,042	0,051
			V_f	mm/min	130	160	190	190	200	190	210	200	180	170	160
			a_p	mm	1	2	3	4	5	6	8	10	12	16	20
			a_e	mm	1	2	3	4	5	6	8	10	12	16	20
			Q	cm^3/min	0,13	0,64	1,71	3,04	5	6,84	13,44	20	25,92	43,52	64
Titanium, Ti alloys	3.7164 (TiAl6V4)	1100-1300N/ mm2	V_c	m/min	60	60	60	60	60	60	60	60	60	60	60
			n	min^{-1}	19.100	9.500	6.400	4.800	3.800	3.200	2.400	1.900	1.600	1.200	1.000
			f_z	mm/tooth	0,003	0,006	0,01	0,014	0,019	0,022	0,03	0,038	0,04	0,05	0,061
			V_f	mm/min	230	230	260	270	290	280	290	290	260	240	240
			a_p	mm	1	2	3	4	5	6	8	10	12	16	20
			a_e	mm	1	2	3	4	5	6	8	10	12	16	20
			Q	cm^3/min	0,23	0,92	2,34	4,32	7,25	10,08	18,56	29	37,44	61,44	96
Super alloy, Heat-resist-ance alloy	Inconel 718 Hastelloy	>1300N/ mm2	V_c	m/min	20	20	20	20	20	20	20	20	20	20	20
			n	min^{-1}	6.400	3.200	2.100	1.600	1.300	1.100	800	600	500	400	300
			f_z	mm/tooth	0,002	0,004	0,007	0,009	0,012	0,014	0,019	0,024	0,025	0,032	0,038
			V_f	mm/min	50	50	60	60	60	60	60	60	50	50	50
			a_p	mm	0,5	1	1,5	2	2,5	3	4	5	6	8	10
			a_e	mm	1	2	3	4	5	6	8	10	12	16	20
			Q	cm^3/min	0,03	0,1	0,27	0,48	0,75	1,08	1,92	3	3,6	6,4	10

Note: For finishing and precise tool definition for the CAM system please download DXF data (QuickFinder), or contact your local Hitachi Tool staff for more details.

Nota: Per lavorazioni di finitura e per una precisa e corretta definizione del profilo dell'utensile per l'utilizzo CAM si prega di richiedere file DXF tramite QuickFinder o rivolgendosi al personale Hitachi Tool.

Remarque : Pour les opérations de finition et une définition précise de l'outil dans votre système FAO, demandez nous le fichier DXF des outils, téléchargez les via notre logiciel QuickFinder, ou contactez votre interlocuteur commercial pour plus de détails.

Achtung: Bitte laden Sie sich für die Schlichtbearbeitung und die präzise Definition der Werkzeuge die DXF Daten herunter (QuickFinder) oder wenden Sie sich an Ihren Hitachi Anwendungstechniker.

Nota: En procesos de acabado y para una más precisa definición de la herramienta en el sistema de CAM por favor solicite los ficheros DXF (QuickFinder), o póngase en contacto con Hitachi Tool para obtener más detalles.

Nota: Para o acabamento e precisão assim como melhor definição da ferramenta para o sistema CAM por favor solicitar dados DXF (QuickFinder), ou entre em contato com sua equipe de ferramentas Hitachi local para obter mais detalhes.

In the case of 5D underneck, please reduce V_c to 85% and keep 100% f_z, reduce 50% a_p

Notes

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