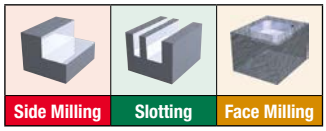
Micro Grain Solid Carbide End Mill

EPPP-TH | Epoch TH Power Mill Precision | Recommended Cutting Conditions



				D1				D1.5				D2				D2	
				Side Roughing	Side Finishing	Slot Roughing	Face Finishing	Side Roughing	Side Finishing	Slot Roughing	Face Finishing	Side Roughing	Side Finishing	Slot Roughing	Face Finishing	Side Roughing	Side Finishing
				Air blow	Mist	Air blow	Mist	Air blow	Mist	Air blow	Mist	Air blow	Mist	Air blow	Mist	Air blow	Mist
I	Construction Steel Carbon Steels Alloy Steels (~200HB)	V_c	(m/min)	125	110	105	125	150	110	105	125	170	110	105	125	195	110
		n	(min^{-1})	39,800	35,000	33,400	39,800	31,800	23,300	22,300	26,500	27,100	17,500	16,700	19,900	24,800	14,000
		f_z	(mm/tooth)	0.011	0.005	0.007	0.007	0.017	0.008	0.011	0.011	0.023	0.012	0.016	0.016	0.030	0.015
		V_f	(mm/min)	1,750	700	940	1,110	2,160	750	980	1,170	2,490	810	1,070	1,270	2,980	840
		a_p	(mm)	1	1	0.5	0.01-0.02	1.5	1.5	0.75	0.015-0.03	2	2	1	0.02-0.04	2.5	2.5
		a_e	(mm)	0.1	0.01	1	0.7-0.8	0.15	0.015	1.5	1.05-1.2	0.2	0.02	2	1.4-1.6	0.25	0.025
II	Alloy Steels Case Hardened Steels Heat Treatable Steels (200~300HB)	V_c	(m/min)	125	100	93	115	140	100	93	115	150	100	93	115	160	100
		n	(min^{-1})	39,800	31,800	29,600	36,600	29,700	21,200	19,700	24,400	23,900	15,900	14,800	18,300	20,400	12,700
		f_z	(mm/tooth)	0.009	0.005	0.006	0.006	0.014	0.008	0.009	0.009	0.019	0.011	0.013	0.013	0.025	0.015
		V_f	(mm/min)	1,430	570	710	880	1,660	640	710	880	1,820	700	770	950	2,040	760
		a_p	(mm)	1	1	0.5	0.01-0.02	1.5	1.5	0.75	0.015-0.03	2	2	1	0.02-0.04	2.5	2.5
		a_e	(mm)	0.1	0.01	1	0.7-0.8	0.15	0.015	1.5	1.05-1.2	0.2	0.02	2	1.4-1.6	0.25	0.025
III	Alloy Steels (30~45HRC)	V_c	(m/min)	115	85	55	66	118	85	55	66	121	85	55	66	124	85
		n	(min^{-1})	36,600	27,100	17,500	21,000	25,000	18,000	11,700	14,000	19,300	13,500	8,800	10,500	15,800	10,800
		f_z	(mm/tooth)	0.006	0.004	0.005	0.005	0.010	0.007	0.007	0.007	0.014	0.010	0.010	0.010	0.018	0.013
		V_f	(mm/min)	880	430	350	420	1,000	470	330	390	1,080	510	350	420	1,140	560
		a_p	(mm)	1	1	0.3	0.01-0.02	1.5	1.5	0.45	0.015-0.03	2	2	0.6	0.02-0.04	2.5	2.5
		a_e	(mm)	0.08	0.008	1	0.7-0.8	0.12	0.012	1.5	1.05-1.2	0.16	0.016	2	1.4-1.6	0.2	0.02
IV	Tool Steels (hot & cold) Hardened Steels (45~55HRC)	V_c	(m/min)	100	70	45	55	100	70	45	55	100	70	45	55	100	70
		n	(min^{-1})	31,800	22,300	14,300	17,500	21,200	14,900	9,500	11,700	15,900	11,100	7,200	8,800	12,700	8,900
		f_z	(mm/tooth)	0.004	0.003	0.004	0.004	0.006	0.005	0.006	0.006	0.009	0.008	0.008	0.008	0.012	0.010
		V_f	(mm/min)	510	270	230	280	510	300	230	280	570	330	230	280	610	360
		a_p	(mm)	1	1	0.15	0.01-0.02	1.5	1.5	0.225	0.015-0.03	2	2	0.3	0.02-0.04	2.5	2.5
		a_e	(mm)	0.05	0.005	1	0.7-0.8	0.075	0.0075	1.5	1.05-1.2	0.1	0.01	2	1.4-1.6	0.125	0.0125
V	Hardened Steels (55~70HRC)	V_c	(m/min)	65	50	25	30	65	50	25	30	65	50	25	30	65	50
		n	(min^{-1})	20,700	15,900	8,000	9,500	13,800	10,600	5,300	6,400	10,300	8,000	4,000	4,800	8,300	6,400
		f_z	(mm/tooth)	0.003	0.002	0.003	0.003	0.005	0.004	0.004	0.004	0.007	0.006	0.006	0.006	0.009	0.009
		V_f	(mm/min)	250	130	80	100	280	170	80	100	270	190	90	110	300	230
		a_p	(mm)	1	1	0.1	0.01-0.02	1.5	1.5	0.15	0.015-0.03	2	2	0.2	0.02-0.04	2.5	2.5
		a_e	(mm)	0.04	0.004	1	0.7-0.8	0.06	0.006	1.5	1.05-1.2	0.08	0.008	2	1.4-1.6	0.1	0.01
VI	Stainless Steels (20~40HRC)	V_c	(m/min)	110	70	60	72	120	70	60	72	126	70	60	72	133	70
		n	(min^{-1})	35,000	22,300	19,100	22,900	25,500	14,900	12,700	15,300	20,100	11,100	9,500	11,500	16,900	8,900
		f_z	(mm/tooth)	0.009	0.003	0.003	0.003	0.014	0.005	0.005	0.005	0.019	0.008	0.006	0.006	0.025	0.010
		V_f	(mm/min)	1,260	270	190	230	1,430	300	230	280	1,530	330	230	280	1,690	360
		a_p	(mm)	1	1	0.15	0.01-0.02	1.5	1.5	0.225	0.015-0.03	2	2	0.3	0.02-0.04	2.5	2.5
		a_e	(mm)	0.05	0.005	1	0.7-0.8	0.075	0.0075	1.5	1.05-1.2	0.1	0.01	2	1.4-1.6	0.125	0.0125
VII	Heat Resisting Steels Titanium, Inconel Nickel & Cobalt Alloys (25~60HRC)	V_c	(m/min)	65	50	25	30	65	50	25	30	65	50	25	30	65	50
		n	(min^{-1})	20,700	15,900	8,000	9,500	13,800	10,600	5,300	6,400	10,300	8,000	4,000	4,800	8,300	6,400
		f_z	(mm/tooth)	0.004	0.002	0.002	0.002	0.006	0.004	0.004	0.004	0.009	0.006	0.006	0.006	0.012	0.009
		V_f	(mm/min)	330	130	70	80	350	170	80	100	370	190	100	120	400	230
		a_p	(mm)	1	1	0.15	0.01-0.02	1.5	1.5	0.225	0.015-0.03	2	2	0.3	0.02-0.04	2.5	2.5
		a_e	(mm)	0.05	0.005	1	0.7-0.8	0.075	0.0075	1.5	1.05-1.2	0.1	0.01	2	1.4-1.6	0.125	0.0125
VIII	Cast Irons: EN-JL (GG) Ductile Cast Iron: EN-JS (GGG) (EN-JL ~ 120HB) (EN-JS ~ 240HB)	V_c	(m/min)	125	110	80	96	150	110	80	96	170	110	80	96	195	110
		n	(min^{-1})	39,800	35,000	25,500	30,600	31,800	23,300	17,000	20,400	27,100	17,500	12,700	15,300	24,800	14,000
		f_z	(mm/tooth)	0.010	0.005	0.007	0.007	0.016	0.008	0.011	0.011	0.022	0.012	0.016	0.016	0.029	0.015
		V_f	(mm/min)	1,590	700	710	860	2,040	750	750	900	2,380	810	810	980	2,880	840
		a_p	(mm)	1	1	0.3	0.01-0.02	1.5	1.5	0.45	0.015-0.03	2	2	0.6	0.02-0.04	2.5	2.5
		a_e	(mm)	0.08	0.008	1	0.7-0.8	0.12	0.012	1.5	1.05-1.2	0.16	0.016	2	1.4-1.6	0.2	0.02
IX	Aluminium Copper Alloys	V_c	(m/min)	125	120	125	125	163	120	140	140	200	120	155	155	240	110
		n	(min^{-1})	39,800	38,200	39,800	39,800	34,600	25,500	29,700	29,700	31,800	19,100	24,700	24,700	30,600	14,000
		f_z	(mm/tooth)	0.011	0.005	0.006	0.006	0.017	0.008	0.011	0.011	0.023	0.012	0.016	0.016	0.030	0.015
		V_f	(mm/min)	1,750	760	960	960	2,350	820	1,310	1,310	2,930	880	1,580	1,580	3,670	840
		a_p	(mm)	1	1	0.5	0.01-0.02	1.5	1.5	0.75	0.015-0.03	2	2	1	0.02-0.04	2.5	2.5
		a_e	(mm)	0.1	0.01	1	0.7-0.8	0.15	0.015	1.5	1.05-1.2	0.2	0.02	2	1.4-1.6	0.25	0.025

PLEASE NOTE:

The values in these tables are only recommended under the following conditions:

1. The use of a machining centre and toolholder with highest precision, concentricity and rigidity
2. All components – including machine and controller – are of the latest technology

2.5		D3				D4				D5				D6				
																		
Slot Roughing ▽	Face Finishing ▽▽▽	Side Roughing ▽	Side Finishing ▽▽▽	Slot Roughing ▽	Face Finishing ▽▽▽	Side Roughing ▽	Side Finishing ▽▽▽	Slot Roughing ▽	Face Finishing ▽▽▽	Side Roughing ▽	Side Finishing ▽▽▽	Slot Roughing ▽	Face Finishing ▽▽▽	Side Roughing ▽	Side Finishing ▽▽▽	Slot Roughing ▽	Face Finishing ▽▽▽	
Air blow	Mist	Air blow	Mist	Air blow	Mist	Air blow	Mist	Air blow	Mist	Air blow	Mist	Air blow	Mist	Air blow	Mist	Air blow	Mist	
105	125	215	110	105	125	215	110	105	125	215	110	105	125	215	110	105	125	
13,400	15,900	22,800	11,700	11,100	13,300	17,100	8,800	8,400	9,900	13,700	7,000	6,700	8,000	11,400	5,800	5,600	6,600	
0.021	0.021	0.036	0.020	0.025	0.025	0.050	0.028	0.035	0.035	0.065	0.036	0.050	0.050	0.080	0.045	0.060	0.060	I
1,130	1,340	3,280	940	1,110	1,330	3,420	990	1,180	1,390	3,560	1,010	1,340	1,600	3,650	1,040	1,340	1,580	
1.25	0.025-0.05	3	3	1.5	0.03-0.06	4	4	2	0.04-0.08	5	5	2.5	0.05-0.1	6	6	3	0.06-0.12	
2.5	1.75-2	0.3	0.03	3	2.1-2.4	0.4	0.04	4	2.8-3.2	0.5	0.05	5	3.5-4	0.6	0.06	6	4.2-4.8	
93	115	170	100	93	115	170	100	93	115	170	100	93	115	170	100	93	115	
11,800	14,600	18,000	10,600	9,900	12,200	13,500	8,000	7,400	9,200	10,800	6,400	5,900	7,300	9,000	5,300	4,900	6,100	
0.017	0.017	0.030	0.019	0.020	0.020	0.040	0.026	0.030	0.030	0.550	0.034	0.040	0.040	0.070	0.042	0.050	0.050	II
800	990	2,160	810	790	980	2,160	830	890	1,100	23,760	870	940	1,170	2,520	890	980	1,220	
1.25	0.025-0.05	3	3	1.5	0.03-0.06	4	4	2	0.04-0.08	5	5	2.5	0.05-0.1	6	6	3	0.06-0.12	
2.5	1.75-2	0.3	0.03	3	2.1-2.4	0.4	0.04	4	2.8-3.2	0.5	0.05	5	3.5-4	0.6	0.06	6	4.2-4.8	
55	66	128	85	55	66	128	85	55	66	128	85	55	66	128	85	55	66	
7,000	8,400	13,600	9,000	5,800	7,000	10,200	6,800	4,400	5,300	8,100	5,400	3,500	4,200	6,800	4,500	2,900	3,500	
0.013	0.013	0.021	0.0165	0.015	0.015	0.028	0.023	0.025	0.025	0.035	0.031	0.031	0.031	0.045	0.039	0.038	0.038	III
360	440	1,140	590	350	420	1,140	630	440	530	1,130	670	430	520	1,220	700	440	530	
0.75	0.025-0.05	3	3	0.9	0.03-0.06	4	4	1.2	0.04-0.08	5	5	1.5	0.05-0.1	6	6	1.8	0.06-0.12	
2.5	1.75-2	0.24	0.024	3	2.1-2.4	0.32	0.032	4	2.8-3.2	0.4	0.04	5	3.5-4	0.48	0.048	6	4.2-4.8	
45	55	100	70	45	55	100	70	45	55	100	70	45	55	100	70	45	55	
5,700	7,000	10,600	7,400	4,800	5,800	8,000	5,600	3,600	4,400	6,400	4,500	2,900	3,500	5,300	3,700	2,400	2,900	
0.011	0.011	0.015	0.014	0.013	0.013	0.020	0.021	0.018	0.018	0.025	0.027	0.025	0.025	0.030	0.035	0.030	0.030	IV
250	310	640	410	250	300	640	470	260	320	640	490	290	350	640	520	290	350	
0.375	0.025-0.05	3	3	0.45	0.03-0.06	4	4	0.6	0.04-0.08	5	5	0.75	0.05-0.1	6	6	0.9	0.06-0.12	
2.5	1.75-2	0.15	0.015	3	2.1-2.4	0.2	0.02	4	2.8-3.2	0.25	0.025	5	3.5-4	0.3	0.03	6	4.2-4.8	
25	30	65	50	25	30	65	50	25	30	65	50	25	30	65	50	25	30	
3,200	3,800	6,900	5,300	2,700	3,200	5,200	4,000	2,000	2,400	4,100	3,200	1,600	1,900	3,400	2,700	1,300	1,600	
0.008	0.008	0.011	0.012	0.009	0.009	0.014	0.017	0.013	0.013	0.018	0.023	0.018	0.018	0.021	0.030	0.021	0.021	V
100	110	290	250	100	120	290	270	100	120	290	290	110	130	290	320	110	130	
0.25	0.025-0.05	3	3	0.3	0.03-0.06	4	4	0.4	0.04-0.08	5	5	0.5	0.05-0.1	6	6	0.6	0.06-0.12	
2.5	1.75-2	0.12	0.012	3	2.1-2.4	0.16	0.016	4	2.8-3.2	0.2	0.02	5	3.5-4	0.24	0.024	6	4.2-4.8	
60	72	140	70	60	72	140	70	60	72	140	70	60	72	140	70	60	72	
7,600	9,200	14,900	7,400	6,400	7,600	11,100	5,600	4,800	5,700	8,900	4,500	3,800	4,600	7,400	3,700	3,200	3,800	
0.009	0.009	0.030	0.014	0.010	0.010	0.040	0.021	0.015	0.015	0.055	0.027	0.018	0.018	0.070	0.035	0.025	0.025	VI
260	310	1,790	410	260	300	1,780	470	290	340	1,960	490	270	330	2,070	520	320	380	
0.375	0.025-0.05	3	3	0.45	0.03-0.06	4	4	0.6	0.04-0.08	5	5	0.75	0.05-0.1	6	6	0.9	0.06-0.12	
2.5	1.75-2	0.15	0.015	3	2.1-2.4	0.2	0.02	4	2.8-3.2	0.25	0.025	5	3.5-4	0.3	0.03	6	4.2-4.8	
25	30	65	50	25	30	65	50	25	30	65	50	25	30	65	50	25	30	
3,200	3,800	6,900	5,300	2,700	3,200	5,200	4,000	2,000	2,400	4,100	3,200	1,600	1,900	3,400	2,700	1,300	1,600	
0.008	0.008	0.015	0.012	0.010	0.010	0.020	0.017	0.015	0.015	0.025	0.023	0.018	0.018	0.030	0.030	0.023	0.023	VII
100	120	410	250	110	130	420	270	120	140	410	290	120	140	410	320	120	150	
0.375	0.025-0.05	3	3	0.45	0.03-0.06	4	4	0.6	0.04-0.08	5	5	0.75	0.05-0.1	6	6	0.9	0.06-0.12	
2.5	1.75-2	0.15	0.015	3	2.1-2.4	0.2	0.02	4	2.8-3.2	0.25	0.025	5	3.5-4	0.3	0.03	6	4.2-4.8	
80	96	215	110	80	96	215	110	80	96	215	110	80	96	215	110	80	96	
10,200	12,200	22,800	11,700	8,500	10,200	17,100	8,800	6,400	7,600	13,700	7,000	5,100	6,100	11,400	5,800	4,200	5,100	
0.021	0.021	0.035	0.020	0.025	0.025	0.050	0.028	0.035	0.035	0.065	0.036	0.050	0.050	0.080	0.045	0.060	0.060	VIII
860	1,020	3,190	940	850	1,020	3,420	990	900	1,060	3,560	1,010	1,020	1,220	3,650	1,040	1,010	1,220	
0.75	0.025-0.05	3	3	0.9	0.03-0.06	4	4	1.2	0.04-0.08	5	5	1.5	0.05-0.1	6	6	1.8	0.06-0.12	
2.5	1.75-2	0.24	0.024	3	2.1-2.4	0.32	0.032	4	2.8-3.2	0.4	0.04	5	3.5-4	0.48	0.048	6	4.2-4.8	
168	168	285	120	180	180	285	120	180	180	285	120	180	180	285	120	180	180	
21,400	21,400	30,200	12,700	19,100	19,100	22,700	9,500	14,300	14,300	18,100	7,600	11,500	11,500	15,100	6,400	9,500	9,500	
0.021	0.021	0.036	0.020	0.025	0.025	0.050	0.028	0.035	0.035	0.065	0.036	0.050	0.050	0.080	0.045	0.060	0.060	IX
1,800	1,800	4,350	1,020	1,910	1,910	4,540	1,060	2,000	2,000	4,710	1,090	2,300	2,300	4,830	1,150	2,280	2,280	
1.25	0.025-0.05	3	3	1.5	0.03-0.06	4	4	2	0.04-0.08	5	5	2.5	0.05-0.1	6	6	3	0.06-0.12	
2.5	1.75-2	0.3	0.03	3	2.1-2.4	0.4	0.04	4	2.8-3.2	0.5	0.05	5	3.5-4	0.6	0.06	6	4.2-4.8	

Modification if too high:

- Keep f_z stable
- Reduce rpm to set best result on non-HQ machines