

# SMART MIRACLE END MILLS

CARBIDE

**VQJHV** NEW

End mill, Medium cut length, 4 flute, Irregular helix flutes

## RECOMMENDED CUTTING CONDITIONS

### Side milling

Work material	Carbon steel, Alloy steel, Mild steel					Pre-hardened steel, Carbon steel, Alloy steel, Alloy tool steel					Austenitic, Ferritic and Martensitic stainless steels, Titanium alloys					Hardened stainless steels, Cobalt chromium alloy				
	AISI 1045, AISI 4140, ASTM A36, AISI 1010					AISI P21, AISI P20, AISI 4340					AISI 304, AISI 306, Ti-6Al-4V					SUS630, SUS631, 15-5PH, 17-4PH				
Dia. DC (mm)	Cutting speed (m/min)	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Cutting speed (m/min)	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Cutting speed (m/min)	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Cutting speed (m/min)	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)
2	130	21000	700	5	0.2	100	16000	510	5	0.2	80	13000	390	5	0.1	75	12000	360	5	0.1
3	130	14000	960	7.5	0.3	100	11000	680	7.5	0.3	80	8500	490	7.5	0.15	75	8000	460	7.5	0.15
4	130	10000	1000	10	0.4	100	8000	690	10	0.4	80	6400	540	10	0.2	75	6000	510	10	0.2
5	130	8300	1100	12.5	0.5	100	6400	730	12.5	0.5	80	5100	570	12.5	0.25	75	4800	540	12.5	0.25
6	130	6900	1200	15	0.6	100	5300	810	15	0.6	80	4200	630	15	0.3	75	4000	600	15	0.3
8	130	5200	1200	20	0.8	100	4000	840	20	0.8	80	3200	640	20	0.4	75	3000	600	20	0.4
10	130	4100	1100	25	1	100	3200	810	25	1	80	2500	590	25	0.5	75	2400	570	25	0.5
12	130	3400	1100	30	1.2	100	2700	780	30	1.2	80	2100	550	30	0.6	75	2000	520	30	0.6
16	130	2600	920	40	1.6	100	2000	640	40	1.6	80	1600	450	40	0.8	75	1500	420	40	0.8
20	130	2100	820	50	2	100	1600	570	50	2	80	1300	420	50	1	75	1200	390	50	1

Work material	Copper, Copper alloy					Heat resistant alloys				
	Inconel718									
Dia. DC (mm)	Cutting speed (m/min)	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Cutting speed (m/min)	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)
2	160	25000	830	5	0.2	40	6400	90	5	0.04
3	160	17000	1200	7.5	0.3	40	4200	130	7.5	0.06
4	160	13000	1300	10	0.4	40	3200	190	10	0.08
5	160	10000	1300	12.5	0.5	40	2500	180	12.5	0.1
6	160	8500	1500	15	0.6	40	2100	180	15	0.12
8	160	6400	1500	20	0.8	40	1600	170	20	0.16
10	160	5100	1300	25	1	40	1300	170	25	0.2
12	160	4200	1300	30	1.2	40	1100	140	30	0.24
16	160	3200	1100	40	1.6	40	800	110	40	0.32
20	160	2500	970	50	2	40	640	80	50	0.4

SOLID END MILLS

- 1) SMART MIRACLE Coating is not energized because of its nature. Therefore, an external contact (voltaic type) tool setter cannot be used. An internal contact (non-voltaic) type or laser type tool setter is recommended to measure the length of the tool.
- 2) Effective cutting of stainless steel, titanium alloys and heat-resistant alloys etc. can be achieved with the use of emulsion.
- 3) Chattering can still occur if the machine rigidity and clamping method are insufficient. In these cases the feed and speed should be reduced proportionately.
- 4) When the depth of cut is smaller than shown the revolution and feed rate can be increased.