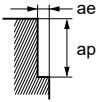


RECOMMENDED CUTTING CONDITIONS

■ Side milling

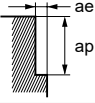
Work material	P								M				S		H			
	Carbon steel, Alloy steel (180–280HB), Ductile Cast Iron				Carbon steel, Alloy steel (280–350HB), Pre-hardened steel, Alloy tool steel				Austenitic stainless steels ($\leq 200\text{HB}$), Titanium alloys						Hardened Steel (45–55HRC)			
Dia. DC (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)		
1	38000	910	1.7	0.2	31000	500	1.7	0.2	25000	500	1.7	0.2	18000	290	1.7	0.05		
1.5	27000	970	2.5	0.3	22000	530	2.5	0.3	18000	500	2.5	0.3	13000	310	2.5	0.08		
2	21000	1500	3.5	0.4	17000	820	3.5	0.4	14000	640	3.5	0.4	10000	320	3.5	0.1		
2.5	18000	1700	4.2	0.5	15000	900	4.2	0.5	12000	820	4.2	0.5	8500	360	4.2	0.13		
3	16000	1800	5	0.6	13000	940	5	0.6	11000	880	5	0.6	7400	380	5	0.15		
4	12000	1700	7	0.8	9500	950	7	0.8	8000	900	7	0.8	5600	400	7	0.2		
5	9500	1800	8.5	1	7600	1100	8.5	1	6400	900	8.5	1	4500	430	8.5	0.25		
6	8000	2100	10	1.2	6400	1300	10	1.2	5300	1100	10	1.2	3700	440	10	0.3		
7	6800	2000	12	1.4	5500	1400	12	1.4	4500	1200	12	1.4	3200	450	12	0.35		
8	6000	2000	13.5	1.6	4800	1400	13.5	1.6	4000	1200	13.5	1.6	2800	450	13.5	0.4		
10	4800	2100	17	2	3800	1500	17	2	3200	1100	17	2	2200	440	17	0.5		
12	4000	1900	20.5	2.4	3200	1400	20.5	2.4	2700	1100	20.5	2.4	1900	380	20.5	0.6		
16	3000	1400	27.2	3.2	2400	1100	27.2	3.2	2000	840	27.2	3.2	1400	340	27.2	0.8		
20	2400	1200	34	4	1900	840	34	4	1600	670	34	4	1100	260	34	1		



Note 1) Wet cutting mode is recommended for cutting stainless steels and titanium alloys, and air blow is recommended for carbon steels.
 Note 2) The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abnormal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.

■ Side milling (Slim Shank)

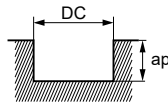
Work material	P								M				S		H			
	Carbon steel, Alloy steel (180–280HB), Ductile Cast Iron				Carbon steel, Alloy steel (280–350HB), Pre-hardened steel, Alloy tool steel				Austenitic stainless steel ($\leq 200\text{HB}$), Titanium alloy						Hardened Steel (45–55HRC)			
Dia. DC (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Depth of cut ae (mm)		
7	4100	1200	12	0.7	3300	860	12	0.7	2700	700	12	0.7	1900	270	12	0.35		
8	3600	1200	13.5	0.8	2900	870	13.5	0.8	2400	720	13.5	0.8	1700	270	13.5	0.4		
9	3200	1200	15	0.9	2500	900	15	0.9	2100	660	15	0.9	1500	270	15	0.45		
10	2900	1300	17	1	2300	920	17	1	1900	670	17	1	1300	260	17	0.5		
11	2600	1200	18.5	1.1	2100	880	18.5	1.1	1700	520	18.5	1.1	1200	190	18.5	0.55		
12	2400	1200	20.5	1.2	1900	840	20.5	1.2	1600	650	20.5	1.2	1100	220	20.5	0.6		
13	2200	1100	22	1.3	1800	790	22	1.3	1500	490	22	1.3	1000	160	22	0.65		
14	2000	960	24	1.4	1600	700	24	1.4	1400	460	24	1.4	950	150	24	0.7		
18	1600	770	31	1.8	1300	570	31	1.8	1100	360	31	1.8	740	120	31	0.9		
22	1300	620	37.5	2.2	1000	440	37.5	2.2	870	280	37.5	2.2	610	98	37.5	1.2		



Note 1) Wet cutting mode is recommended for cutting stainless steels and titanium alloys, and air blow is recommended for carbon steels.
 Note 2) The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is poor, vibration or abnormal sound can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.

■ Slotting

Work material	P						M	S	H			
	Carbon steel, Alloy steel (180–280HB), Ductile Cast Iron			Carbon steel, Alloy steel (280–350HB), Pre-hardened steel, Alloy tool steel			Austenitic stainless steels ($\leq 200\text{HB}$), Titanium alloys	Hardened Steel (45–55HRC)				
Dia. DC (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)
1	31000	620	0.5	24000	380	0.5	20000	320	0.5	9500	110	0.2
1.5	22000	630	0.8	17000	410	0.8	14000	340	0.8	6400	130	0.3
2	17000	650	2	14000	450	2	11000	350	2	4800	130	0.4
2.5	15000	830	2.5	12000	580	2.5	9700	470	2.5	3800	130	0.5
3	13000	940	3	10000	660	3	8500	510	3	3200	140	0.6
4	9500	820	4	7600	600	4	6400	460	4	2400	150	0.8
5	7600	910	5	6100	670	5	5100	510	5	1900	170	1
6	6400	860	6	5100	630	6	4200	470	6	1600	190	1.2
7	5500	960	7	4400	710	7	3600	530	7	1400	190	1.4
8	4800	1000	8	3800	750	8	3200	580	8	1200	190	1.6
10	3800	910	10	3100	680	10	2500	500	10	950	150	2
12	3200	920	12	2500	660	12	2100	500	12	800	160	2.4
16	2400	690	16	1900	500	16	1600	380	16	600	120	3.2
20	1900	550	20	1500	400	20	1300	310	20	480	96	4



Note 1) Slim shank type is not recommended for slotting.

DC:Dia.