

RECOMMENDED CUTTING CONDITIONS

Shoulder milling (grooving)

Material	Carbon steel, Alloy steel, Mild steel, Pre-hardened steel								Austenitic stainless steel, Titanium alloy, Hardened stainless steels, Cobalt chromium alloy, Ferritic and Martensitic stainless steels							
	Ck45, 41CrMo4, 36CrNiMo4, X5CrNi189, X5CrNiMo1810, X2CrNi1810, X2CrNiMoN1813								Inconel 718, NAK, X36CrMo17, X40CrMoV51, 55NiCrMoV6, X46Cr13							
R (mm)	$\alpha \leq 15^\circ$			$\alpha > 15^\circ$			Depth of cut ap (mm)	Pick feed pf (mm)	$\alpha \leq 15^\circ$			$\alpha > 15^\circ$			Depth of cut ap (mm)	Pick feed pf (mm)
	Cutting speed (m/min)	Revolution (min ⁻¹)	Feed rate (mm/min)	Cutting speed (m/min)	Revolution (min ⁻¹)	Feed rate (mm/min)			Cutting speed (m/min)	Revolution (min ⁻¹)	Feed rate (mm/min)	Cutting speed (m/min)	Revolution (min ⁻¹)	Feed rate (mm/min)		
R 1	250	40000	8000	201	40000	8000	0.1	0.5	230	36000	6500	150	24000	2900	0.1	0.5
R 1.5	300	32000	7700	198	32000	7700	0.2	0.7	230	24000	4800	150	16000	1900	0.2	0.7
R 2	300	24000	5800	201	24000	5800	0.3	1	230	18000	4000	150	12000	1700	0.3	1
R 2.5	300	19000	5300	199	19000	5300	0.4	1.2	230	14400	3500	150	9600	1500	0.4	1.2
R 3	300	16000	4800	200	16000	4800	0.5	1.5	230	12000	3200	150	8000	1400	0.5	1.5
R 4	300	12000	4300	201	12000	4300	0.8	2	230	9000	3200	150	6000	1400	0.8	2
R 5	300	9600	4100	201	9600	4100	1	2.5	230	7200	3000	150	4800	1300	1	2.5
R 6	300	8000	4000	200	8000	4000	1.2	3	230	6000	3000	150	4000	1300	1.2	3
Depth of cut																

R:Radius

Material	Copper, Copper alloy								Heat resistant alloys Inconel etc.							
R (mm)	$\alpha \leq 15^\circ$			$\alpha > 15^\circ$			Depth of cut ap (mm)	Pick feed pf (mm)	$\alpha \leq 15^\circ$			$\alpha > 15^\circ$			Depth of cut ap (mm)	Pick feed pf (mm)
	Cutting speed (m/min)	Revolution (min ⁻¹)	Feed rate (mm/min)	Cutting speed (m/min)	Revolution (min ⁻¹)	Feed rate (mm/min)			Cutting speed (m/min)	Revolution (min ⁻¹)	Feed rate (mm/min)	Cutting speed (m/min)	Revolution (min ⁻¹)	Feed rate (mm/min)		
R 1	250	40000	8000	240	38000	4500	0.1	0.5	60	9600	960	40	6400	510	0.08	0.2
R 1.5	360	38000	9100	240	25000	3800	0.2	0.7	60	6400	640	40	4200	340	0.1	0.3
R 2	360	29000	7000	240	19000	3300	0.3	1	60	4800	580	40	3200	260	0.1	0.4
R 2.5	360	23000	6400	240	15000	3100	0.4	1.2	60	3800	530	39	2500	250	0.2	0.5
R 3	360	19000	5700	240	13000	2600	0.5	1.5	60	3200	500	40	2100	210	0.2	0.6
R 4	360	14000	5000	240	9600	2300	0.8	2	60	2400	430	40	1600	190	0.4	0.8
R 5	360	12000	5100	240	7700	2200	1	2.5	63	2000	420	41	1300	180	0.5	1
R 6	360	9600	4800	240	6400	2200	1.2	3	64	1700	350	41	1100	150	0.6	1.2
Depth of cut																

R:Radius

- 1) VQ coating has less electrical conductivity; therefore an external contact type (electrically transmitted) tool setter may not work. When measuring the tool length, please use an internal contact type (non-electrical type) tool setter or a laser type tool setter.
- 2) Effective cutting of stainless steel, titanium alloys and heat-resistant alloys etc. can be achieved with the use of emulsion coolant.
- 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.

