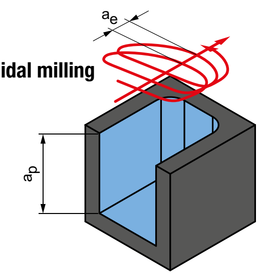
Cutting data recommendations for trochoidal milling cutters

Feed and cutting speed

Correction factors

Factor	v_c (P, K)	v_c (M)	a_e	h_m max.
2xD	1.10	1.05	1.05	1.05
3xD	1.00	1.00	1.00	1.00
4xD	0.85	0.92	0.90	0.94
5xD	0.60	0.80	0.80	0.87

Trochoidal milling



a_p = depending on max. machining depth of the tool
a_e = depending on the workpiece material

OptiMill-Tro-Uni I M3099
OptiMill-Tro-PM I M3299

MMG*			Workpiece material	Strength/hardness [N/mm²] [HRC]	Cooling MQL/Air	Cooling Dry	Cooling KSS	v_c [m/min]	f_z [mm] in % of D	a_e [mm] in % of D	h_m max. [mm] in % of D	Machining example
P	P1	P1.1	Structural, machining, case hardened and tempering steels, unalloyed	< 700	✓	✓	✓	**380 - 520**	1.4 - 2.0	14 - 18	0.66 - 0.80	**16MnCr5** ø = 12 mm v_c = 500 m/min f_z = 0.28 mm a_e = 1.8 mm a_p = 32 mm **42CrMo4** ø = 12 mm v_c = 375 m/min f_z = 0.17 mm a_e = 1.2 mm a_p = 32 mm
P	P1	P1.2	Structural, machining, case hardened and tempering steels, unalloyed	< 1,200	✓	✓	✓	**320 - 460**	1.2 - 1.8	12 - 16	0.62 - 0.76	
P	P2	P2.1	Nitriding, hardening and tempering steels, alloyed	< 900	✓	✓	✓	**340 - 480**	1.2 - 1.8	10 - 14	0.58 - 0.71	
P	P2	P2.2	Nitriding, hardening and tempering steels, alloyed	< 1,400	✓		✓	**280 - 380**	1.0 - 1.6	8 - 12	0.56 - 0.68	
P	P3	P3.1	Tool, bearing, spring and high-speed steels**	< 800	✓	✓	✓	**250 - 360**	1.1 - 1.7	9 - 15	0.56 - 0.67	
P	P3	P3.2	Tool, bearing, spring and high-speed steels**	< 1,000	✓		✓	**230 - 340**	0.9 - 1.5	8 - 13	0.54 - 0.64	
P	P3	P3.3	Tool, bearing, spring and high-speed steels**	< 1,500	✓		✓	**210 - 320**	0.8 - 1.4	6 - 12	0.52 - 0.62	
P	P4	P4.1	Stainless steels, ferritic and martensitic		✓		✓	**180 - 260**	0.8 - 1.2	6 - 12	0.50 - 0.60	
P	P5	P5.1	Cast steel					**220 - 300**	1.2 - 1.8	8 - 12	0.54 - 0.62	
P	P6	P6.1	Stainless cast steels, ferritic and martensitic				✓	**160 - 240**	0.8 - 1.4	6 - 12	0.50 - 0.60	
M	M1	M1.1	Stainless steels, austenitic	< 700	✓		✓	**140 - 220**	0.6 - 1.0	5 - 10	0.48 - 0.60	**X5CrNi18-8** ø = 12 mm v_c = 180 m/min f_z = 0.09 mm a_e = 1.2 mm a_p = 32 mm
M	M1	M1.2	Stainless steels, ferritic/austenitic (duplex)	< 1,000			✓	**110 - 180**	0.6 - 1.0	5 - 10	0.46 - 0.58	
M	M2	M2.1	Stainless cast steel, austenitic	< 700	✓		✓	**130 - 200**	0.8 - 1.2	6 - 12	0.52 - 0.60	
M	M3	M3.1	Stainless cast steel, ferritic/austenitic (duplex)	< 1,000			✓	**120 - 180**	0.8 - 1.2	5 - 10	0.46 - 0.56	
K	K1	K1.1	Cast iron with lamellar graphite (grey cast iron), GJL	< 300	✓	✓	✓	**400 - 500**	2.0 - 2.6	15 - 20	0.64 - 0.78	
K	K2	K2.1	Cast iron with spheroidal graphite, GJS	< 500	✓	✓	✓	**340 - 500**	1.8 - 2.4	12 - 16	0.62 - 0.7	
K	K2	K2.2	Cast iron with spheroidal graphite, GJS	≤ 800	✓	✓	✓	**300 - 440**	1.6 - 2.2	10 - 14	0.58 - 0.68	
K	K2	K2.3	Cast iron with spheroidal graphite, GJS	> 800	✓	✓	✓	**180 - 260**	1.4 - 2.0	8 - 12	0.56 - 0.68	
K	K3	K3.1	Cast iron with vermicular graphite, GJV; malleable cast iron, GJM	< 500	✓	✓	✓	**280 - 360**	1.6 - 2.2	10 - 16	0.6 - 0.68	
K	K3	K3.2	Cast iron with vermicular graphite, GJV; malleable cast iron, GJM	> 500	✓	✓	✓	**210 - 340**	1.4 - 2.0	10 - 16	0.58 - 0.66	

Calculation example for 42CrMo4 ø 12 mm:

$$f_z \mid a_e \mid h_m \text{ max.} = \frac{D}{100} \cdot \text{See table for value}$$

							①	②	③
P2.2	Nitriding, hardening and tempering steels, alloyed	< 1400	✓		✓	**280 - 380**	1.0 - 1.6	8 - 12	0.56 - 0.68

① $f_z = \frac{12 \text{ mm}}{100} \cdot 1.2 = 0.144 \text{ mm}$

② $a_e = \frac{12 \text{ mm}}{100} \cdot 10 = 1.2 \text{ mm}$

③ $h_m \text{ max.} = \frac{12 \text{ mm}}{100} \cdot 0.6 = 0.072 \text{ mm}$

Note:
In the case of trochoidal milling, the specified cutting conditions change during the machining process. This also depends on the CAM software used and the machining position of the tool in the workpiece. The feed and cutting width or contact angle are constantly changing during machining in order to achieve, as far as is possible, the most constant average chip thickness depending on the contour.