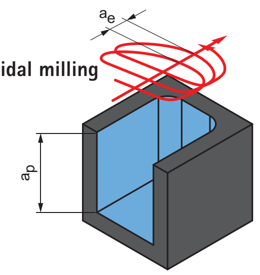
Cutting data recommendations for trochoidal milling cutters

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-PM | SCM590, 820, 930

MMG*			Workpiece material	Strength/hardness [N/mm²] [HRC]	Cooling MQL/Air	Cooling Dry	Cooling Coolant	v_c [m/min]	f_z [mm] in % of D	a_e [mm] in % of D	h_m max. [mm] in % of D
P	P1	P1.1	Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 700	✓	✓	✓	**380 - 520**	1.4 - 2.0	14 - 18	0.66 - 0.80
		P1.2	Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 1200	✓	✓	✓	**320 - 460**	1.2 - 1.8	12 - 16	0.62 - 0.76
	P2	P2.1	Nitrided, case hardened and heat-treated steels, alloy	< 900	✓	✓	✓	**340 - 480**	1.2 - 1.8	10 - 14	0.58 - 0.71
		P2.2	Nitrided, case hardened and heat-treated steels, alloy	< 1400	✓		✓	**280 - 380**	1.0 - 1.6	8 - 12	0.56 - 0.68
	P3	P3.1	Tool, bearing, spring and high-speed steels**	< 800	✓	✓	✓	**250 - 360**	1.1 - 1.7	9 - 15	0.56 - 0.67
		P3.2	Tool, bearing, spring and high-speed steels**	< 1000	✓		✓	**230 - 340**	0.9 - 1.5	8 - 13	0.54 - 0.64
		P3.3	Tool, bearing, spring and high-speed steels**	< 1500	✓		✓	**210 - 320**	0.8 - 1.4	6 - 12	0.52 - 0.62
	P4	P4.1	Stainless steels, ferritic and martensitic		✓		✓	**180 - 260**	0.8 - 1.2	6 - 12	0.50 - 0.60
	P5	P5.1	Cast steel					**220 - 300**	1.2 - 1.8	8 - 12	0.54 - 0.62
	P6	P6.1	Stainless cast steel, 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
		M1.2	Stainless steels, ferritic/austenitic (duplex)	< 1000			✓	**110 - 180**	0.6 - 1.0	5 - 10	0.46 - 0.58
	M2	M2.1	Stainless/heat-resistant cast steel, austenitic	< 700	✓		✓	**130 - 200**	0.8 - 1.2	6 - 12	0.52 - 0.60
	M3	M3.1	Stainless cast steel, ferritic/austenitic (duplex)	< 1000			✓	**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
	K2	K2.1	Cast iron with spheroidal graphite, GJS	< 500	✓	✓	✓	**340 - 500**	1.8 - 2.4	12 - 16	0.62 - 0.7
		K2.2	Cast iron with spheroidal graphite, GJS	≤ 800	✓	✓	✓	**300 - 440**	1.6 - 2.2	10 - 14	0.58 - 0.68
		K2.3	Cast iron with spheroidal graphite, GJS	> 800	✓	✓	✓	**180 - 260**	1.4 - 2.0	8 - 12	0.56 - 0.68
	K3	K3.1	Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	< 500	✓	✓	✓	**280 - 360**	1.6 - 2.2	10 - 16	0.6 - 0.68
		K3.2	Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	> 500	✓	✓	✓	**210 - 340**	1.4 - 2.0	10 - 16	0.58 - 0.66

Machining example

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

X5CrNi18-8
ø = 12 mm
v_c = 180 m/min
f_z = 0.09 mm
a_e = 1.2 mm
a_p = 32 mm

Calculation example for 42CrMo4 ø 12 mm:

f_z | a_e | h_m max. = $\frac{D}{100}$ · See table for value

						1	2	3
P2.2	Nitrided, case hardened and heat-treated steels, alloy	< 1400	✓		✓	**280 - 380**	1.0 - 1.6	8 - 12	0.56 - 0.68

1. $f_z = \frac{12\ mm}{100} \cdot 1{,}2 = 0{,}144\ mm$
2. $a_e = \frac{12\ mm}{100} \cdot 10 = 1{,}2\ mm$
3. $h_m\ max. = \frac{12\ mm}{100} \cdot 0{,}6 = 0{,}072\ mm$

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.

* MAPAL machining groups
** If the alloy parts Cr, Mo, Ni, V, W in total > 8%, then select the next highest MAPAL machining group.

The specified machining values are guide values.
The optimum data for the respective machining task should be determined during the test or machining.