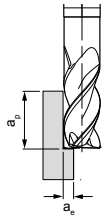
Cutting data recommendations for shoulder milling cutters

Feed and cutting speed

Tool length/ correction factor:	
Length	f_z & v_c
Short	1
Long	1
Overlong	0.8
Extra long	-

Roughing



a_p = 1.5xD
a_e = 0.25xD

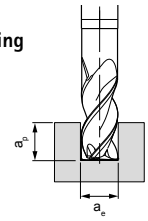
OptiMill-Uni-HPC-Pocket | SCM800, 810, 840

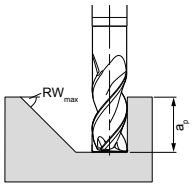
MMG*			Workpiece material	Strength/ hardness [N/mm²] [HRC]	Coolant supply			v_c [m/min]	f_z [mm/tooth]						
									Diameter of milling cutter [mm]						
					MQL/Air	Dry	Wet		3.80	6.00	8.00	10.00	12.00	16.00	20.00
P	P1	P1.1	Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 700	✓	✓	✓	**465**	0.053	0.079	0.101	0.122	0.140	0.171	0.195
		P1.2	Structural, free-cutting, case hardened and heat-treated steels, non-alloy	< 1200	✓	✓	✓	**380**	0.049	0.074	0.095	0.113	0.130	0.159	0.182
	P2	P2.1	Nitrided, case hardened and heat-treated steels, alloy	< 900	✓	✓	✓	**425**	0.053	0.079	0.101	0.122	0.140	0.171	0.195
		P2.2	Nitrided, case hardened and heat-treated steels, alloy	< 1400	✓		✓	**295**	0.044	0.066	0.085	0.101	0.116	0.142	0.163
	P3	P3.1	Tool, bearing, spring and high-speed steels**	< 800	✓	✓	✓	**275**	0.051	0.077	0.098	0.117	0.135	0.165	0.189
		P3.2	Tool, bearing, spring and high-speed steels**	< 1000	✓		✓	**255**	0.048	0.073	0.093	0.111	0.128	0.156	0.179
		P3.3	Tool, bearing, spring and high-speed steels**	< 1500	✓		✓	**235**	0.046	0.069	0.088	0.105	0.121	0.148	0.169
	P4	P4.1	Stainless steels, ferritic and martensitic		✓		✓	**190**	0.035	0.053	0.068	0.081	0.093	0.114	0.130
	P5	P5.1	Cast steel				✓	**285**	0.051	0.077	0.098	0.117	0.135	0.165	0.189
	P6	P6.1	Stainless cast steel, ferritic and martensitic				✓	**190**	0.025	0.037	0.047	0.057	0.065	0.080	0.091
M	M1	M1.1	Stainless steels, austenitic	< 700	✓		✓	**125**	0.031	0.046	0.059	0.071	0.081	0.100	0.114
		M1.2	Stainless steels, ferritic/austenitic (duplex)	< 1000			✓	**120**	0.025	0.038	0.049	0.059	0.068	0.082	0.094
	M2	M2.1	Stainless/heat-resistant cast steel, austenitic	< 700	✓		✓	**140**	0.033	0.050	0.064	0.077	0.088	0.108	0.124
	M3	M3.1	Stainless cast steel, ferritic/austenitic (duplex)	< 1000			✓	**125**	0.026	0.040	0.051	0.061	0.070	0.085	0.098
K	K1	K1.1	Cast iron with lamellar graphite (grey cast iron), GJL	< 300	✓	✓	✓	**510**	0.088	0.132	0.169	0.203	0.233	0.284	0.325
	K2	K2.1	Cast iron with spheroidal graphite, GJS	< 500	✓	✓	✓	**465**	0.075	0.113	0.144	0.172	0.198	0.242	0.276
		K2.2	Cast iron with spheroidal graphite, GJS	≤ 800	✓	✓	✓	**380**	0.062	0.093	0.118	0.142	0.163	0.199	0.228
		K2.3	Cast iron with spheroidal graphite, GJS	> 800	✓	✓	✓	**210**	0.035	0.053	0.068	0.081	0.093	0.114	0.130
	K3	K3.1	Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	< 500	✓	✓	✓	**340**	0.062	0.093	0.118	0.142	0.163	0.199	0.228
		K3.2	Cast iron with spheroidal graphite, GJV; malleable cast iron, GJM	> 500	✓	✓	✓	**315**	0.053	0.079	0.101	0.122	0.140	0.171	0.195

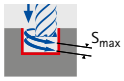
* MAPAL machining groups
** If the alloy parts Cr, Mo, Ni, V, W in total > 8 % then select the next highest MAPAL machining group.

Groove milling

a_p = 1xD
a_e = 1xD







v_c [m/min]	f_z [mm/tooth]							Ramps	Helix milling			Drilling
	Diameter of milling cutter [mm]							RW_{max}	S_{max}	EW_{max}		f_z factor
	3.80	6.00	8.00	10.00	12.00	16.00	20.00			G = 1.5	G = 1.8	
230	0.031	0.047	0.060	0.072	0.082	0.101	0.115	45 °	0.75xD	25 °	16 °	0.9
185	0.029	0.044	0.056	0.067	0.077	0.094	0.107	45 °	0.75xD	25 °	16 °	0.8
205	0.031	0.047	0.060	0.072	0.082	0.101	0.115	45 °	0.75xD	25 °	16 °	0.8
145	0.026	0.039	0.050	0.060	0.069	0.084	0.096	45 °	0.75xD	25 °	16 °	0.7
135	0.030	0.045	0.058	0.069	0.080	0.097	0.111	30 °	0.5xD	18 °	11 °	0.8
125	0.029	0.043	0.055	0.066	0.075	0.092	0.105	30 °	0.5xD	18 °	11 °	0.7
115	0.027	0.041	0.052	0.062	0.071	0.087	0.100	30 °	0.5xD	18 °	11 °	0.7
95	0.021	0.031	0.040	0.048	0.055	0.067	0.077	15 °	0.5xD	18 °	11 °	
140	0.030	0.045	0.058	0.069	0.080	0.097	0.111	30 °	0.5xD	18 °	11 °	
95	0.015	0.022	0.028	0.033	0.038	0.047	0.054	15 °	0.5xD	18 °	11 °	
60	0.018	0.027	0.035	0.042	0.048	0.059	0.067	15 °	0.5xD	18 °	11 °	
60	0.015	0.023	0.029	0.035	0.040	0.049	0.056	15 °	0.5xD	18 °	11 °	
70	0.020	0.030	0.038	0.045	0.052	0.064	0.073	15 °	0.5xD	18 °	11 °	
60	0.016	0.023	0.030	0.036	0.041	0.050	0.058	15 °	0.5xD	18 °	11 °	
250	0.052	0.078	0.100	0.119	0.137	0.168	0.192	45 °	0.75xD	25 °	16 °	0.8
230	0.044	0.066	0.085	0.102	0.117	0.143	0.163	45 °	0.75xD	25 °	16 °	0.8
185	0.036	0.055	0.070	0.084	0.096	0.117	0.134	45 °	0.75xD	25 °	16 °	0.8
105	0.021	0.031	0.040	0.048	0.055	0.067	0.077	45 °	0.75xD	25 °	16 °	0.8
165	0.036	0.055	0.070	0.084	0.096	0.117	0.134	45 °	0.75xD	25 °	16 °	0.8
155	0.031	0.047	0.060	0.072	0.082	0.101	0.115	45 °	0.75xD	25 °	16 °	0.8

Explanation of terms:

RW_{max} = Maximum angle of the ramp
S_{max} = Maximum slope of the helix
G = Ratio circular pocket Ø when plunging into the tool Ø
E.g.: Tool Ø 12 mm at G=1.5 results in a pocket Ø of 18 mm
EW_{max} = Slope angle of the helix (results from G and S_{max})

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