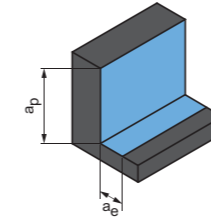


Cutting data recommendations for corner radius milling cutters

Feed and cutting speed

Roughing



Plunge angle
1.0° - 3.0°

Next page:
Finishing (3D, face milling)

OptiMill-3D-CR-Hardened | MCR106, 107, 108, 109

MMG*	Workpiece material	Strength/hardness [N/mm ²] [HRC]	Cooling			ap [mm]	ae [mm]	vc [m/min]	fz [mm]																				
			Dry	Air/MQL	KSS				Diameter of milling cutter [mm]																				
									0.10	0.20	0.30	0.40	0.50	0.60	0.80	1.00	1.50	1.80	2.00	2.50	3.00	4.00	5.00	6.00	8.00	10.00	12.00		
P	P1.1	Structural, machining, case hardened and tempering steels, unalloyed	< 700	✓	✓	✓	0.15xD	0.45xD	250-300	0.003	0.004	0.006	0.008	0.010	0.012	0.016	0.020	0.028	0.035	0.040	0.050	0.061	0.084	0.107	0.125	0.165	0.200	0.235	
	P1.2	Structural, machining, case hardened and tempering steels, unalloyed	< 1,200	✓	✓	✓	0.15xD	0.45xD	240-280	0.003	0.004	0.005	0.007	0.009	0.011	0.014	0.018	0.025	0.031	0.035	0.044	0.054	0.074	0.094	0.110	0.145	0.176	0.207	
	P2.1	Nitriding, hardening and tempering steels, alloyed	< 900	✓	✓	✓	0.15xD	0.45xD	250-300	0.003	0.004	0.006	0.008	0.010	0.012	0.016	0.020	0.028	0.035	0.040	0.050	0.061	0.084	0.107	0.125	0.165	0.200	0.235	
	P2.2	Nitriding, hardening and tempering steels, alloyed	< 1,400	✓	✓	✓	0.15xD	0.45xD	240-280	0.003	0.004	0.005	0.007	0.009	0.011	0.014	0.018	0.025	0.031	0.035	0.044	0.054	0.074	0.094	0.110	0.145	0.176	0.207	
	P3.1	Tool, bearing, spring and high-speed steels**	< 800	✓	✓	✓	0.15xD	0.45xD	250-300	0.003	0.004	0.006	0.008	0.010	0.011	0.015	0.019	0.027	0.033	0.038	0.048	0.058	0.080	0.102	0.119	0.157	0.190	0.223	
	P3.2	Tool, bearing, spring and high-speed steels**	< 1,000	✓	✓	✓	0.15xD	0.45xD	240-280	0.003	0.004	0.005	0.007	0.009	0.011	0.014	0.018	0.025	0.031	0.035	0.044	0.054	0.074	0.094	0.110	0.145	0.176	0.207	
	P3.3	Tool, bearing, spring and high-speed steels**	< 1,500	✓	✓	✓	0.15xD	0.45xD	220-260	0.002	0.003	0.004	0.006	0.007	0.009	0.012	0.015	0.020	0.026	0.029	0.037	0.045	0.061	0.078	0.091	0.120	0.146	0.172	
	P4	P4.1	Stainless steels, ferritic and martensitic		✓	✓	0.15xD	0.45xD	240-280	0.003	0.004	0.006	0.008	0.010	0.012	0.016	0.020	0.028	0.035	0.040	0.050	0.061	0.084	0.107	0.125	0.165	0.200	0.235	
	P5	P5.1	Cast steel		✓	✓	0.15xD	0.45xD	240-280	0.003	0.004	0.005	0.007	0.009	0.011	0.014	0.018	0.025	0.031	0.035	0.044	0.054	0.074	0.094	0.110	0.145	0.176	0.207	
	P6	P6.1	Stainless cast steels, ferritic and martensitic		✓	✓	0.15xD	0.45xD	200-250	0.002	0.003	0.004	0.006	0.007	0.009	0.012	0.015	0.020	0.026	0.029	0.037	0.045	0.061	0.078	0.091	0.120	0.146	0.172	
	K	K1.1	Cast iron with lamellar graphite (grey cast iron), GJL	< 300	✓	✓	✓	0.15xD	0.55xD	250-300	0.004	0.005	0.007	0.010	0.012	0.014	0.019	0.024	0.034	0.042	0.048	0.060	0.073	0.101	0.128	0.150	0.198	0.240	0.282
		K2.1	Cast iron with spheroidal graphite, GJS	< 500	✓	✓	✓	0.15xD	0.55xD	250-300	0.003	0.004	0.006	0.008	0.010	0.012	0.016	0.020	0.028	0.035	0.040	0.050	0.061	0.084	0.107	0.125	0.165	0.200	0.235
K2.2		Cast iron with spheroidal graphite, GJS	≤ 800	✓	✓	✓	0.15xD	0.55xD	240-280	0.003	0.004	0.006	0.008	0.010	0.012	0.016	0.020	0.028	0.035	0.040	0.050	0.061	0.084	0.107	0.125	0.165	0.200	0.235	
K2.3		Cast iron with spheroidal graphite, GJS	> 800	✓	✓	✓	0.15xD	0.55xD	240-280	0.003	0.004	0.005	0.007	0.009	0.011	0.014	0.018	0.025	0.031	0.035	0.044	0.054	0.074	0.094	0.110	0.145	0.176	0.207	
K3.1		Cast iron with vermicular graphite, GJV; malleable cast iron, GJM	< 500	✓	✓	✓	0.15xD	0.55xD	250-300	0.002	0.003	0.004	0.006	0.007	0.009	0.012	0.015	0.020	0.026	0.029	0.037	0.045	0.061	0.078	0.091	0.120	0.146	0.172	
K3.2		Cast iron with vermicular graphite, GJV; malleable cast iron, GJM	> 500	✓	✓	✓	0.15xD	0.55xD	240-280	0.002	0.002	0.004	0.005	0.006	0.007	0.010	0.012	0.017	0.022	0.025	0.031	0.038	0.052	0.066	0.078	0.102	0.124	0.146	
H	H1.1	Hardened steel / cast steel	< 44 HRC	✓	✓		0.06xD	0.35xD	200-250	0.002	0.003	0.004	0.006	0.007	0.009	0.012	0.015	0.020	0.026	0.029	0.037	0.045	0.061	0.078	0.091	0.120	0.146	0.172	
	H1.2	Hardened steel / cast steel	< 55 HRC	✓	✓		0.05xD	0.3xD	180-230	0.002	0.002	0.004	0.005	0.006	0.007	0.010	0.012	0.017	0.021	0.024	0.030	0.037	0.050	0.064	0.075	0.099	0.120	0.141	
	H2.1	Hardened steel / cast steel	< 60 HRC	✓	✓		0.025xD	0.25xD	140-180	0.001	0.002	0.002	0.003	0.004	0.005	0.006	0.008	0.011	0.014	0.016	0.020	0.024	0.034	0.043	0.050	0.066	0.080	0.094	

Working depth correction factor - kAT

AT	kAT		
	ap	n	vf
≤ 3xD	1,00	1,00	1,00
≤ 5xD	0,80	0,90	0,90
≤ 6xD	0,70	0,85	0,85
≤ 8xD	0,60	0,75	0,75
≤ 10xD	0,50	0,70	0,70
≤ 12xD	0,45***	0,65	0,65
≤ 15xD	0,40***	0,60	0,60
≤ 20xD	0,35***	0,60	0,60
≤ 25xD	0,35***	0,50	0,50
≤ 30xD	0,30***	0,50	0,50
≤ 35xD	0,30***	0,50	0,50

Cone angle correction factor - kKW

φ [°]	kKW		
	ap	n	vf
0	1,00	1,00	1,00
0,5	1,01	1,01	1,01
1	1,02	1,02	1,02
1,5	1,03	1,03	1,03
3	1,06	1,06	1,06

Note:
To determine cutting data, please observe the notes on page 548-551.

* MAPAL machining groups

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

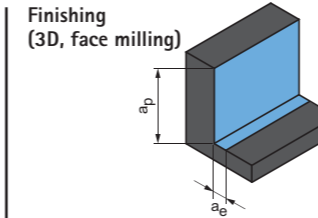
*** Consultation with a MAPAL application engineer.

The specified machining values are guide values.

The optimum data for the respective machining task should be determined during the test or machining.

Cutting data recommendations for corner radius milling cutters

Feed and cutting speed



Next page:
Finishing (flat areas)

OptiMill-3D-CR-Hardened | MCR106, 107, 108, 109

MMG*	Workpiece material	Strength/hardness [N/mm ²] [HRC]	Cooling			a _p [mm]	a _e [mm]	v _c [m/min]	f _z [mm]																			
			Dry	Air/MQL	KSS				Diameter of milling cutter [mm]																			
									0.10	0.20	0.30	0.40	0.50	0.60	0.80	1.00	1.50	1.80	2.00	2.50	3.00	4.00	5.00	6.00	8.00	10.00	12.00	
P	P1.1	Structural, machining, case hardened and tempering steels, unalloyed	< 700	✓	✓	✓	0.012xD	0.022xD	280-340	0.003	0.004	0.006	0.008	0.010	0.011	0.015	0.019	0.027	0.033	0.038	0.048	0.058	0.080	0.102	0.119	0.157	0.190	0.223
	P1.2	Structural, machining, case hardened and tempering steels, unalloyed	< 1,200	✓	✓	✓	0.012xD	0.022xD	280-320	0.003	0.003	0.005	0.007	0.008	0.010	0.013	0.017	0.023	0.029	0.033	0.042	0.051	0.070	0.089	0.105	0.138	0.167	0.196
	P2.1	Nitriding, hardening and tempering steels, alloyed	< 900	✓	✓	✓	0.012xD	0.022xD	270-320	0.003	0.004	0.006	0.008	0.010	0.011	0.015	0.019	0.027	0.033	0.038	0.048	0.058	0.080	0.102	0.119	0.157	0.190	0.223
	P2.2	Nitriding, hardening and tempering steels, alloyed	< 1,400	✓	✓	✓	0.012xD	0.022xD	260-300	0.003	0.003	0.005	0.007	0.008	0.010	0.013	0.017	0.023	0.029	0.033	0.042	0.051	0.070	0.089	0.105	0.138	0.167	0.196
	P3.1	Tool, bearing, spring and high-speed steels**	< 800	✓	✓	✓	0.012xD	0.022xD	280-320	0.003	0.004	0.005	0.007	0.009	0.011	0.014	0.018	0.025	0.032	0.036	0.045	0.055	0.076	0.097	0.113	0.149	0.181	0.212
	P3.2	Tool, bearing, spring and high-speed steels**	< 1,000	✓	✓	✓	0.012xD	0.022xD	260-300	0.003	0.003	0.005	0.007	0.008	0.010	0.013	0.017	0.023	0.029	0.033	0.042	0.051	0.070	0.089	0.105	0.138	0.167	0.196
P3.3	Tool, bearing, spring and high-speed steels**	< 1,500	✓	✓	✓	0.012xD	0.022xD	240-280	0.002	0.003	0.004	0.006	0.007	0.008	0.011	0.014	0.019	0.024	0.028	0.035	0.042	0.058	0.074	0.087	0.114	0.139	0.163	
P4	P4.1	Stainless steels, ferritic and martensitic			✓	0.012xD	0.022xD	260-300	0.003	0.004	0.006	0.008	0.010	0.011	0.015	0.019	0.027	0.033	0.038	0.048	0.058	0.080	0.102	0.119	0.157	0.190	0.223	
P5	P5.1	Cast steel			✓	0.012xD	0.022xD	260-300	0.003	0.003	0.005	0.007	0.008	0.010	0.013	0.017	0.023	0.029	0.033	0.042	0.051	0.070	0.089	0.105	0.138	0.167	0.196	
P6	P6.1	Stainless cast steels, ferritic and martensitic			✓	0.012xD	0.022xD	220-270	0.002	0.003	0.004	0.006	0.007	0.008	0.011	0.014	0.019	0.024	0.028	0.035	0.042	0.058	0.074	0.087	0.114	0.139	0.163	
K	K1.1	Cast iron with lamellar graphite (grey cast iron), GJL	< 300	✓	✓	✓	0.012xD	0.022xD	280-340	0.003	0.004	0.006	0.008	0.010	0.011	0.015	0.019	0.027	0.033	0.038	0.048	0.058	0.080	0.102	0.119	0.157	0.190	0.223
	K2.1	Cast iron with spheroidal graphite, GJS	< 500	✓	✓	✓	0.012xD	0.022xD	280-320	0.003	0.003	0.005	0.007	0.008	0.010	0.013	0.017	0.023	0.029	0.033	0.042	0.051	0.070	0.089	0.105	0.138	0.167	0.196
	K2.2	Cast iron with spheroidal graphite, GJS	≤ 800	✓	✓	✓	0.012xD	0.022xD	270-320	0.003	0.003	0.005	0.007	0.008	0.010	0.013	0.017	0.023	0.029	0.033	0.042	0.051	0.070	0.089	0.105	0.138	0.167	0.196
	K2.3	Cast iron with spheroidal graphite, GJS	> 800	✓	✓	✓	0.012xD	0.022xD	260-300	0.003	0.003	0.005	0.007	0.008	0.010	0.013	0.017	0.023	0.029	0.033	0.042	0.051	0.070	0.089	0.105	0.138	0.167	0.196
	K3.1	Cast iron with vermicular graphite, GJV; malleable cast iron, GJM	< 500	✓	✓	✓	0.012xD	0.022xD	280-320	0.002	0.003	0.004	0.006	0.007	0.008	0.011	0.014	0.019	0.024	0.028	0.035	0.042	0.058	0.074	0.087	0.114	0.139	0.163
	K3.2	Cast iron with vermicular graphite, GJV; malleable cast iron, GJM	> 500	✓	✓	✓	0.012xD	0.022xD	260-300	0.002	0.002	0.004	0.005	0.006	0.007	0.009	0.012	0.017	0.021	0.024	0.029	0.036	0.050	0.063	0.074	0.097	0.118	0.139
H	H1.1	Hardened steel / cast steel	< 44 HRC	✓	✓		0.012xD	0.022xD	220-250	0.002	0.003	0.004	0.006	0.007	0.009	0.012	0.014	0.020	0.025	0.029	0.036	0.044	0.061	0.077	0.090	0.119	0.144	0.170
	H1.2	Hardened steel / cast steel	< 55 HRC	✓	✓		0.01xD	0.02xD	190-220	0.002	0.003	0.004	0.005	0.007	0.008	0.011	0.014	0.019	0.024	0.027	0.034	0.042	0.058	0.073	0.086	0.113	0.137	0.161
	H2.1	Hardened steel / cast steel	< 60 HRC		✓		0.01xD	0.02xD	150-190	0.001	0.002	0.003	0.004	0.005	0.006	0.008	0.010	0.013	0.017	0.019	0.024	0.029	0.040	0.051	0.060	0.079	0.096	0.113
	H2.2	Hardened steel / cast steel	< 65 HRC		✓		0.007xD	0.017xD	120-150	0.001	0.002	0.003	0.003	0.004	0.005	0.007	0.008	0.012	0.015	0.017	0.021	0.025	0.035	0.045	0.052	0.069	0.084	0.098
	H2.3	Hardened steel / cast steel	< 68 HRC		✓		0.005xD	0.015xD	80-120	0.001	0.002	0.002	0.003	0.004	0.005	0.006	0.008	0.011	0.014	0.016	0.020	0.024	0.033	0.042	0.050	0.065	0.079	0.093
	H3	H3.1	Wear-resistant cast / chill casting, GJN		✓	✓		0.008xD	0.018xD	150-200	0.001	0.002	0.003	0.004	0.005	0.006	0.008	0.010	0.013	0.017	0.019	0.024	0.029	0.040	0.051	0.060	0.079	0.096

Working depth correction factor - k_{AT}

AT	k _{AT}		
	a _p	n	v _f
≤ 3xD	1,00	1,00	1,00
≤ 5xD	0,80	0,90	0,90
≤ 6xD	0,70	0,85	0,85
≤ 8xD	0,60	0,75	0,75
≤ 10xD	0,50	0,70	0,70
≤ 12xD	0,45***	0,65	0,65
≤ 15xD	0,40***	0,60	0,60
≤ 20xD	0,35***	0,60	0,60
≤ 25xD	0,35***	0,50	0,50
≤ 30xD	0,30***	0,50	0,50
≤ 35xD	0,30***	0,50	0,50

Cone angle correction factor - k_{KW}

φ [°]	k _{KW}		
	a _p	n	v _f
0	1,00	1,00	1,00
0,5	1,01	1,01	1,01
1	1,02	1,02	1,02
1,5	1,03	1,03	1,03
3	1,06	1,06	1,06

Note:
To determine cutting data, please observe the notes on page 548-551.

* MAPAL machining groups

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

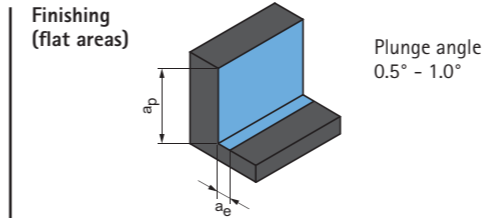
*** Consultation with a MAPAL application engineer.

The specified machining values are guide values.

The optimum data for the respective machining task should be determined during the test or machining.

Cutting data recommendations for corner radius milling cutters

Feed and cutting speed



OptiMill-3D-CR-Hardened | MCR106, 107, 108, 109

MMG*	Workpiece material	Strength/hardness [N/mm ²] [HRC]	Cooling			ap [mm]	ae [mm]	vc [m/min]	fz [mm]																			
			Dry	Air/MQL	KSS				Diameter of milling cutter [mm]																			
									0.10	0.20	0.30	0.40	0.50	0.60	0.80	1.00	1.50	1.80	2.00	2.50	3.00	4.00	5.00	6.00	8.00	10.00	12.00	
P	P1.1	Structural, machining, case hardened and tempering steels, unalloyed	< 700	✓	✓	✓	0.012xD	0.65xD	200-250	0.003	0.004	0.006	0.008	0.010	0.011	0.015	0.019	0.027	0.033	0.038	0.048	0.058	0.080	0.102	0.119	0.157	0.190	0.223
	P1.2	Structural, machining, case hardened and tempering steels, unalloyed	< 1,200	✓	✓	✓	0.012xD	0.65xD	190-240	0.003	0.003	0.005	0.007	0.008	0.010	0.013	0.017	0.023	0.029	0.033	0.042	0.051	0.070	0.089	0.105	0.138	0.167	0.196
	P2.1	Nitriding, hardening and tempering steels, alloyed	< 900	✓	✓	✓	0.012xD	0.65xD	200-250	0.003	0.004	0.006	0.008	0.010	0.011	0.015	0.019	0.027	0.033	0.038	0.048	0.058	0.080	0.102	0.119	0.157	0.190	0.223
	P2.2	Nitriding, hardening and tempering steels, alloyed	< 1,400	✓	✓	✓	0.012xD	0.65xD	190-240	0.003	0.003	0.005	0.007	0.008	0.010	0.013	0.017	0.023	0.029	0.033	0.042	0.051	0.070	0.089	0.105	0.138	0.167	0.196
	P3.1	Tool, bearing, spring and high-speed steels**	< 800	✓	✓	✓	0.012xD	0.65xD	200-250	0.003	0.004	0.005	0.007	0.009	0.011	0.014	0.018	0.025	0.032	0.036	0.045	0.055	0.076	0.097	0.113	0.149	0.181	0.212
	P3.2	Tool, bearing, spring and high-speed steels**	< 1,000	✓	✓	✓	0.012xD	0.65xD	190-240	0.003	0.003	0.005	0.007	0.008	0.010	0.013	0.017	0.023	0.029	0.033	0.042	0.051	0.070	0.089	0.105	0.138	0.167	0.196
P3.3	Tool, bearing, spring and high-speed steels**	< 1,500	✓	✓	✓	0.012xD	0.65xD	180-230	0.002	0.003	0.004	0.006	0.007	0.008	0.011	0.014	0.019	0.024	0.028	0.035	0.042	0.058	0.074	0.087	0.114	0.139	0.163	
P4	P4.1	Stainless steels, ferritic and martensitic			✓	0.012xD	0.65xD	180-230	0.003	0.004	0.006	0.008	0.010	0.011	0.015	0.019	0.027	0.033	0.038	0.048	0.058	0.080	0.102	0.119	0.157	0.190	0.223	
P5	P5.1	Cast steel			✓	0.012xD	0.65xD	180-230	0.003	0.003	0.005	0.007	0.008	0.010	0.013	0.017	0.023	0.029	0.033	0.042	0.051	0.070	0.089	0.105	0.138	0.167	0.196	
P6	P6.1	Stainless cast steels, ferritic and martensitic			✓	0.012xD	0.65xD	180-230	0.002	0.003	0.004	0.006	0.007	0.008	0.011	0.014	0.019	0.024	0.028	0.035	0.042	0.058	0.074	0.087	0.114	0.139	0.163	
K	K1.1	Cast iron with lamellar graphite (grey cast iron), GJL	< 300	✓	✓	✓	0.012xD	0.65xD	200-250	0.003	0.004	0.006	0.008	0.010	0.011	0.015	0.019	0.027	0.033	0.038	0.048	0.058	0.080	0.102	0.119	0.157	0.190	0.223
	K2.1	Cast iron with spheroidal graphite, GJS	< 500	✓	✓	✓	0.012xD	0.65xD	200-250	0.003	0.003	0.005	0.007	0.008	0.010	0.013	0.017	0.023	0.029	0.033	0.042	0.051	0.070	0.089	0.105	0.138	0.167	0.196
	K2.2	Cast iron with spheroidal graphite, GJS	≤ 800	✓	✓	✓	0.012xD	0.65xD	200-250	0.003	0.003	0.005	0.007	0.008	0.010	0.013	0.017	0.023	0.029	0.033	0.042	0.051	0.070	0.089	0.105	0.138	0.167	0.196
	K2.3	Cast iron with spheroidal graphite, GJS	> 800	✓	✓	✓	0.012xD	0.65xD	190-240	0.003	0.003	0.005	0.007	0.008	0.010	0.013	0.017	0.023	0.029	0.033	0.042	0.051	0.070	0.089	0.105	0.138	0.167	0.196
	K3.1	Cast iron with vermicular graphite, GJV; malleable cast iron, GJM	< 500	✓	✓	✓	0.012xD	0.65xD	200-250	0.002	0.003	0.004	0.006	0.007	0.008	0.011	0.014	0.019	0.024	0.028	0.035	0.042	0.058	0.074	0.087	0.114	0.139	0.163
	K3.2	Cast iron with vermicular graphite, GJV; malleable cast iron, GJM	> 500	✓	✓	✓	0.012xD	0.65xD	190-240	0.002	0.002	0.004	0.005	0.006	0.007	0.009	0.012	0.017	0.021	0.024	0.029	0.036	0.050	0.063	0.074	0.097	0.118	0.139
H	H1.1	Hardened steel / cast steel	< 44 HRC	✓	✓		0.012xD	0.65xD	160-200	0.002	0.003	0.004	0.006	0.007	0.009	0.012	0.014	0.020	0.025	0.029	0.036	0.044	0.061	0.077	0.090	0.119	0.144	0.170
	H1.2	Hardened steel / cast steel	< 55 HRC	✓	✓		0.01xD	0.65xD	120-160	0.002	0.003	0.004	0.005	0.007	0.008	0.011	0.014	0.019	0.024	0.027	0.034	0.042	0.058	0.073	0.086	0.113	0.137	0.161
	H2.1	Hardened steel / cast steel	< 60 HRC		✓		0.01xD	0.65xD	80-120	0.001	0.002	0.003	0.004	0.005	0.006	0.008	0.010	0.013	0.017	0.019	0.024	0.029	0.040	0.051	0.060	0.079	0.096	0.113
	H2.2	Hardened steel / cast steel	< 65 HRC		✓		0.006xD	0.45xD	50-80	0.001	0.002	0.003	0.003	0.004	0.005	0.007	0.008	0.012	0.015	0.017	0.021	0.025	0.035	0.045	0.052	0.069	0.084	0.098
	H2.3	Hardened steel / cast steel	< 68 HRC		✓		0.005xD	0.3xD	35-60	0.001	0.002	0.002	0.003	0.004	0.005	0.006	0.008	0.011	0.014	0.016	0.020	0.024	0.033	0.042	0.050	0.065	0.079	0.093
	H3	H3.1	Wear-resistant cast / chill casting, GJN		✓	✓		0.008xD	0.55xD	80-120	0.001	0.002	0.003	0.004	0.005	0.006	0.008	0.010	0.013	0.017	0.019	0.024	0.029	0.040	0.051	0.060	0.079	0.096

Working depth correction factor - kAT

AT	kAT		
	ap	n	vf
≤ 3xD	1,00	1,00	1,00
≤ 5xD	0,80	0,90	0,90
≤ 6xD	0,70	0,85	0,85
≤ 8xD	0,60	0,75	0,75
≤ 10xD	0,50	0,70	0,70
≤ 12xD	0,45***	0,65	0,65
≤ 15xD	0,40***	0,60	0,60
≤ 20xD	0,35***	0,60	0,60
≤ 25xD	0,35***	0,50	0,50
≤ 30xD	0,30***	0,50	0,50
≤ 35xD	0,30***	0,50	0,50

Cone angle correction factor - kKW

φ [°]	kKW		
	ap	n	vf
0	1,00	1,00	1,00
0,5	1,01	1,01	1,01
1	1,02	1,02	1,02
1,5	1,03	1,03	1,03
3	1,06	1,06	1,06

Note:
To determine cutting data, please observe the notes on page 548-551.

* MAPAL machining groups

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

*** Consultation with a MAPAL application engineer.

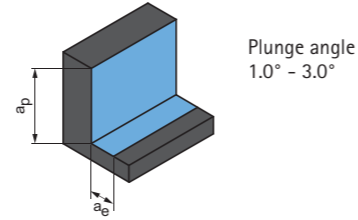
The specified machining values are guide values.

The optimum data for the respective machining task should be determined during the test or machining.

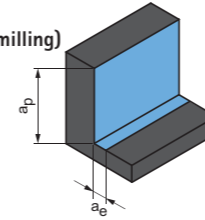
Cutting data recommendations for corner radius milling cutters

Feed and cutting speed

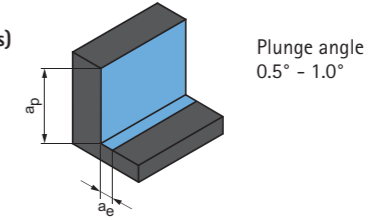
Roughing



Finishing (3D, face milling)



Finishing (flat areas)



OptiMill-3D-CR-Hardened | MCR110

MMG*	Workpiece material	Strength/hardness [N/mm ²] [HRC]	Cooling			a _p [mm]	a _e [mm]	v _c [m/min]	f _z [mm]						a _p [mm]	a _e [mm]	v _c [m/min]	f _z [mm]						a _p [mm]	a _e [mm]	v _c [m/min]	f _z [mm]						
			Dry	Air/MQL	KSS				Diameter of milling cutter [mm]									Diameter of milling cutter [mm]									Diameter of milling cutter [mm]						
									4.00	5.00	6.00	8.00	10.00	12.00				4.00	5.00	6.00	8.00	10.00	12.00				4.00	5.00	6.00	8.00	10.00	12.00	
P	P1.1	Structural, machining, case hardened and tempering steels, unalloyed	< 700	✓	✓	✓	0.15xD	0.35xD	220-270	0.080	0.090	0.100	0.120	0.150	0.180	0.012xD	0.022xD	260-320	0.050	0.060	0.080	0.090	0.110	0.130	0.012xD	0.65xD	200-250	0.050	0.060	0.080	0.090	0.110	0.130
	P1.2	Structural, machining, case hardened and tempering steels, unalloyed	< 1,200	✓	✓	✓	0.15xD	0.35xD	210-260	0.080	0.090	0.100	0.120	0.150	0.180	0.012xD	0.022xD	250-300	0.050	0.060	0.080	0.090	0.110	0.130	0.012xD	0.65xD	190-240	0.050	0.060	0.080	0.090	0.110	0.130
	P2.1	Nitriding, hardening and tempering steels, alloyed	< 900	✓	✓	✓	0.15xD	0.35xD	220-270	0.080	0.090	0.100	0.120	0.150	0.180	0.012xD	0.022xD	260-320	0.050	0.060	0.080	0.090	0.110	0.130	0.012xD	0.65xD	200-250	0.050	0.060	0.080	0.090	0.110	0.130
	P2.2	Nitriding, hardening and tempering steels, alloyed	< 1,400	✓	✓	✓	0.15xD	0.35xD	210-260	0.070	0.080	0.090	0.110	0.130	0.160	0.012xD	0.022xD	250-300	0.050	0.060	0.080	0.090	0.110	0.130	0.012xD	0.65xD	190-240	0.050	0.060	0.080	0.090	0.110	0.130
	P3.1	Tool, bearing, spring and high-speed steels**	< 800	✓	✓	✓	0.15xD	0.35xD	220-270	0.080	0.090	0.100	0.120	0.150	0.180	0.012xD	0.022xD	260-320	0.050	0.060	0.080	0.090	0.110	0.130	0.012xD	0.65xD	200-250	0.050	0.060	0.080	0.090	0.110	0.130
	P3.2	Tool, bearing, spring and high-speed steels**	< 1,000	✓	✓	✓	0.15xD	0.35xD	200-250	0.070	0.080	0.090	0.110	0.130	0.160	0.012xD	0.022xD	240-300	0.050	0.060	0.080	0.090	0.110	0.130	0.012xD	0.65xD	180-230	0.050	0.060	0.080	0.090	0.110	0.130
P3.3	Tool, bearing, spring and high-speed steels**	< 1,500	✓	✓	✓	0.15xD	0.35xD	200-250	0.070	0.080	0.090	0.110	0.130	0.160	0.012xD	0.022xD	240-300	0.050	0.060	0.080	0.090	0.110	0.130	0.012xD	0.65xD	180-230	0.050	0.060	0.080	0.090	0.110	0.130	
P4	P4.1	Stainless steels, ferritic and martensitic		✓	✓		0.15xD	0.35xD	200-250	0.070	0.080	0.090	0.110	0.130	0.160	0.012xD	0.022xD	240-300	0.050	0.060	0.080	0.090	0.110	0.130	0.012xD	0.65xD	180-230	0.050	0.060	0.080	0.090	0.110	0.130
P5	P5.1	Cast steel		✓	✓		0.15xD	0.35xD	200-250	0.070	0.080	0.090	0.110	0.130	0.160	0.012xD	0.022xD	240-300	0.050	0.060	0.080	0.090	0.110	0.130	0.012xD	0.65xD	180-230	0.050	0.060	0.080	0.090	0.110	0.130
P6	P6.1	Stainless cast steels, ferritic and martensitic		✓	✓		0.15xD	0.35xD	200-250	0.070	0.080	0.090	0.110	0.130	0.160	0.012xD	0.022xD	240-300	0.050	0.060	0.080	0.090	0.110	0.130	0.012xD	0.65xD	180-230	0.050	0.060	0.080	0.090	0.110	0.130
K	K1.1	Cast iron with lamellar graphite (grey cast iron), GJL	< 300	✓	✓	✓	0.15xD	0.4xD	220-270	0.080	0.090	0.100	0.120	0.150	0.180	0.012xD	0.022xD	260-320	0.050	0.060	0.080	0.090	0.110	0.130	0.012xD	0.65xD	200-250	0.050	0.060	0.080	0.090	0.110	0.130
	K2.1	Cast iron with spheroidal graphite, GJS	< 500	✓	✓	✓	0.15xD	0.4xD	220-270	0.080	0.090	0.100	0.120	0.150	0.180	0.012xD	0.022xD	260-320	0.050	0.060	0.080	0.090	0.110	0.130	0.012xD	0.65xD	220-250	0.050	0.060	0.080	0.090	0.110	0.130
	K2.2	Cast iron with spheroidal graphite, GJS	≤ 800	✓	✓	✓	0.15xD	0.4xD	220-270	0.080	0.090	0.100	0.120	0.150	0.180	0.012xD	0.022xD	260-320	0.050	0.060	0.080	0.090	0.110	0.130	0.012xD	0.65xD	200-250	0.050	0.060	0.080	0.090	0.110	0.130
	K2.3	Cast iron with spheroidal graphite, GJS	> 800	✓	✓	✓	0.15xD	0.4xD	200-250	0.080	0.090	0.100	0.120	0.150	0.180	0.012xD	0.022xD	250-300	0.050	0.060	0.080	0.090	0.110	0.130	0.012xD	0.65xD	190-240	0.050	0.060	0.080	0.090	0.110	0.130
	K3.1	Cast iron with vermicular graphite, GJV; malleable cast iron, GJM	< 500	✓	✓	✓	0.15xD	0.4xD	220-270	0.080	0.090	0.100	0.120	0.150	0.180	0.012xD	0.022xD	260-320	0.050	0.060	0.080	0.090	0.110	0.130	0.012xD	0.65xD	200-250	0.050	0.060	0.080	0.090	0.110	0.130
	K3.2	Cast iron with vermicular graphite, GJV; malleable cast iron, GJM	> 500	✓	✓	✓	0.15xD	0.4xD	200-250	0.080	0.090	0.100	0.120	0.150	0.180	0.012xD	0.022xD	240-300	0.050	0.060	0.080	0.090	0.110	0.130	0.012xD	0.65xD	190-240	0.050	0.060	0.080	0.090	0.110	0.130
H	H1.1	Hardened steel / cast steel	< 44 HRC	✓	✓		0.06xD	0.35xD	200-250	0.060	0.080	0.090	0.110	0.130	0.160	0.012xD	0.022xD	240-300	0.050	0.060	0.080	0.090	0.110	0.130	0.012xD	0.65xD	180-230	0.050	0.060	0.080	0.090	0.110	0.130
	H1.2	Hardened steel / cast steel	< 55 HRC	✓	✓		0.05xD	0.3xD	180-230	0.050	0.070	0.080	0.095	0.110	0.140	0.01xD	0.02xD	210-280	0.050	0.060	0.080	0.090	0.110	0.130	0.01xD	0.65xD	160-220	0.050	0.060	0.080	0.090	0.110	0.130
	H2.1	Hardened steel / cast steel	< 60 HRC	✓	✓		0.025xD	0.25xD	140-180	0.040	0.060	0.070	0.085	0.095	0.120	0.01xD	0.02xD	200-270	0.040	0.050	0.070	0.080	0.100	0.120	0.01xD	0.65xD	140-200	0.040	0.050	0.070	0.080	0.100	0.120
	H2.2	Hardened steel / cast steel	< 65 HRC	✓	✓											0.007xD	0.017xD	120-220	0.035	0.045	0.060	0.075	0.090	0.110	0.006xD	0.45xD	100-140	0.035	0.045	0.060	0.075	0.090	0.110
	H2.3	Hardened steel / cast steel	< 68 HRC	✓	✓											0.005xD	0.015xD	80-140	0.020	0.030	0.040	0.050	0.080	0.090	0.005xD	0.3xD	50-100	0.020	0.030	0.040	0.050	0.080	0.090
	H3	H3.1	Wear-resistant cast / chill casting, GJN		✓	✓										0.008xD	0.018xD	100-180	0.040	0.050	0.070	0.080	0.100	0.120	0.008xD	0.55xD	80-140	0.040	0.050	0.070	0.080	0.100	0.120

Working depth correction factor - k_{AT}

AT	k _{AT}		
	a _p	n	v _f
≤ 3xD	1,00	1,00	1,00
≤ 5xD	0,80	0,90	0,90
≤ 6xD	0,70	0,85	0,85
≤ 8xD	0,60	0,75	0,75
≤ 10xD	0,50	0,70	0,70
≤ 12xD	0,45***	0,65	0,65
≤ 15xD	0,40***	0,60	0,60
≤ 20xD	0,35***	0,60	0,60
≤ 25xD	0,35***	0,50	0,50
≤ 30xD	0,30***	0,50	0,50
≤ 35xD	0,30***	0,50	0,50

Cone angle correction factor - k_{KW}

φ [°]	k _{KW}		
	a _p	n	v _f
0	1,00	1,00	1,00
0,5	1,01	1,01	1,01
1	1,02	1,02	1,02
1,5	1,03	1,03	1,03
3	1,06	1,06	1,06

Note:
To determine cutting data, please observe the notes on page 548-551.

* MAPAL machining groups

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

*** Consultation with a MAPAL application engineer.

The specified machining values are guide values.

The optimum data for the respective machining task should be determined during the test or machining.