



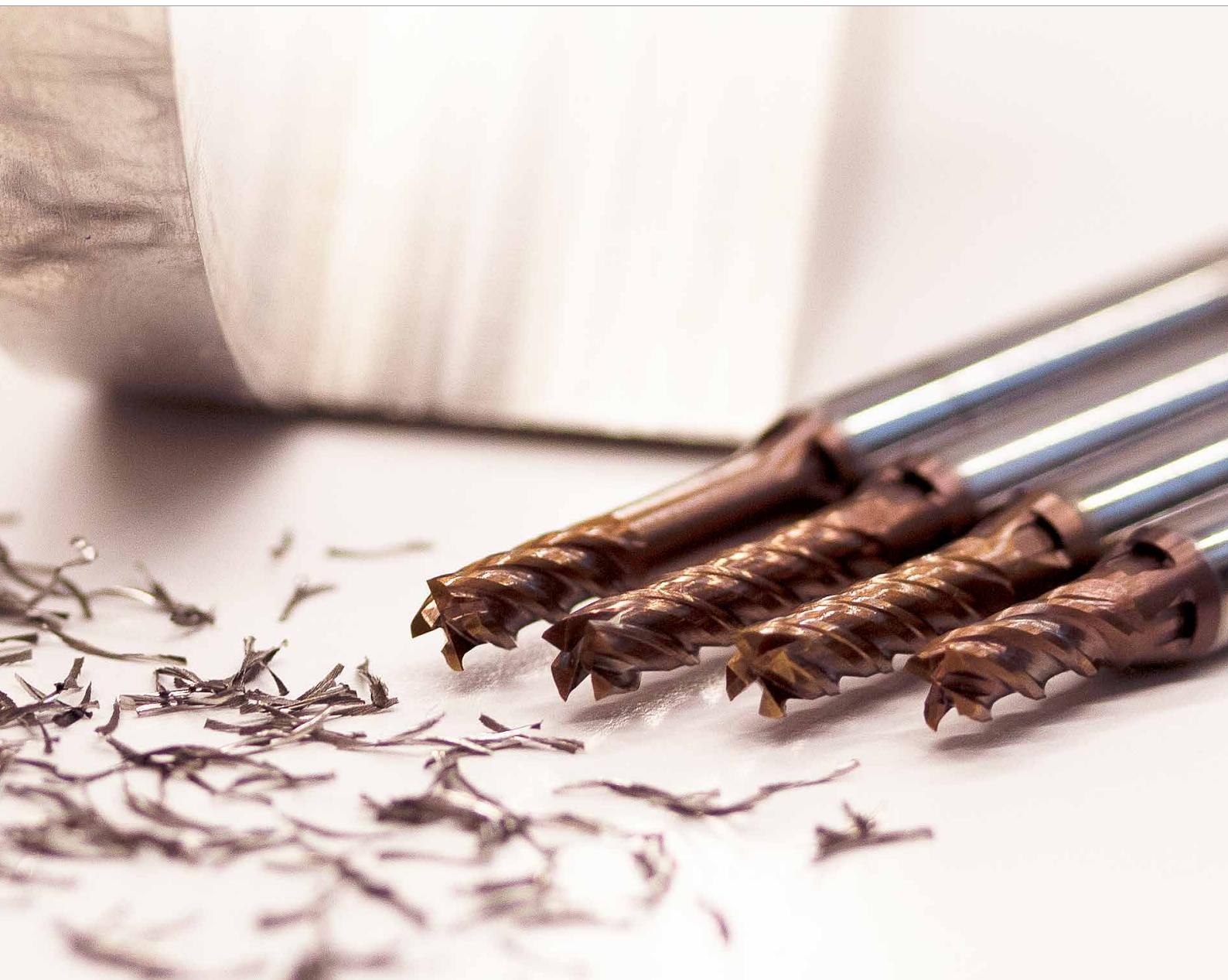
crazy about milling

CRAZYMILL COOL Z4

- SQUARE
- CORNER RADIUS

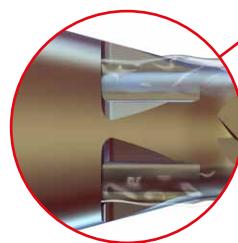
NEW

CrazyMill Cool Square / Corner radius - Z4

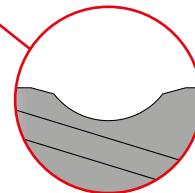


NEW**CRAZYMILL™**
by Mikron Tool
Cool**MILLING TOOL FOR PRE-MACHINING AND FINISHING DIFFICULT MATERIALS**

CrazyMill Cool Square / Corner radius with four flutes is an innovative end mill, developed by Mikron Tool, for machining stainless steels, titanium alloys, CrCo and super alloys. It is available in the diameter range from .039" to .315" (1 mm to 8 mm) and a maximal milling depth of 5 x d.

**Integrated cooling**

Constant and massive cooling
of the cutting edges

**New chip-splitting concept**

Optimized to guarantee short
chips and a perfect evacuation

Performance features

- Highest speed and feed
- Integrated cooling
- Pre-machining and finishing
with one tool
- New chip-splitting concept

Your advantages

- Time and cost saving
- Excellent surface quality
- Reliable process
- Perfect chip control

NEW

Maximum performance and surface quality

SQUARE / CORNER RADIUS ENDMILL WITH INTEGRATED COOLING

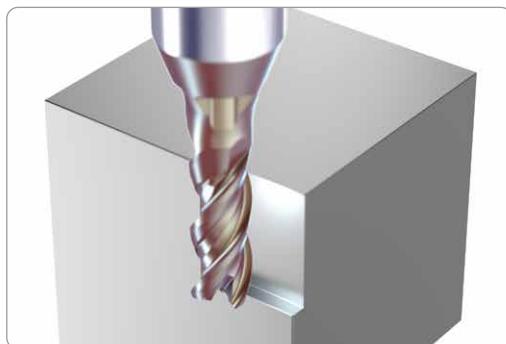
With CrazyMill Cool Square / Corner radius – Z4, Mikron Tool expands the range of milling cutters for difficult-to-machine materials. Four versions of square respectively corner radius endmills with four teeth and shank integrated cooling are available in the diameter range from .039" to .315" (1 mm to 8 mm) and a maximal milling depth of 5 x d.

- CrazyMill Cool Square, Type A – milling depth 2 x d, cutting length 2 x d, through shank coolant, Z = 4
 - CrazyMill Cool Square, Type C – milling depth 5 x d, cutting length 2 x d, through shank coolant, Z = 4
 - CrazyMill Cool Square, Type M – milling depth 3 x d, cutting length 3 x d, through shank coolant, Z = 4
 - CrazyMill Cool Square, Type N – milling depth 4 x d, cutting length 4 x d, through shank coolant, Z = 4
-
- CrazyMill Cool Corner radius, Type A – milling depth 2 x d, cutting length 2 x d, through shank coolant, Z = 4
 - CrazyMill Cool Corner radius, Type C – milling depth 5 x d, cutting length 2 x d, through shank coolant, Z = 4
 - CrazyMill Cool Corner radius, Type M – milling depth 3 x d, cutting length 3 x d, through shank coolant, Z = 4
 - CrazyMill Cool Corner radius, Type N – milling depth 4 x d, cutting length 4 x d, through shank coolant, Z = 4

One tool for many applications

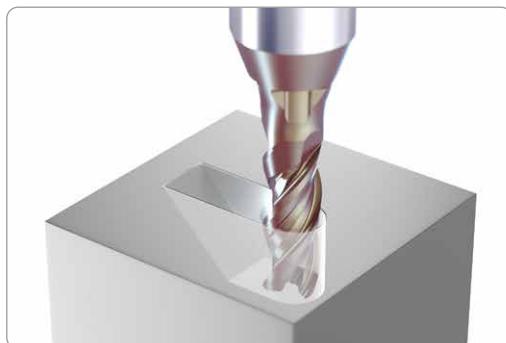
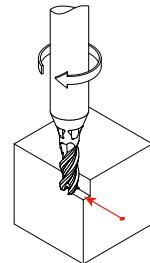
FOR DIFFICULT TO MACHINE MATERIALS

■ CrazyMill Cool Square / Corner radius - Z4 for:



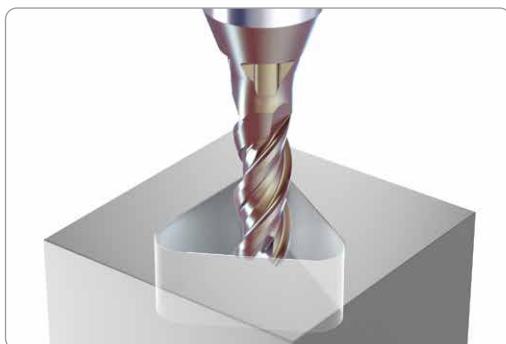
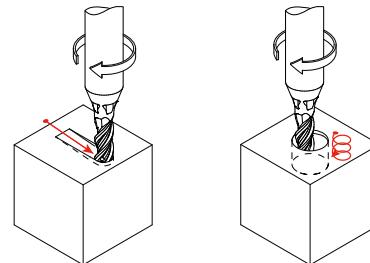
1. Side milling: Pre-machining and Finishing

$$a_p = 2 \times d / 3 \times d / 4 \times d$$

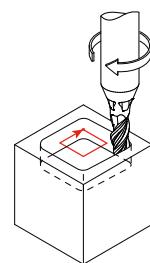


2. Linear ramp or helical interpolation milling

Angle depending on material



3. Pocket milling



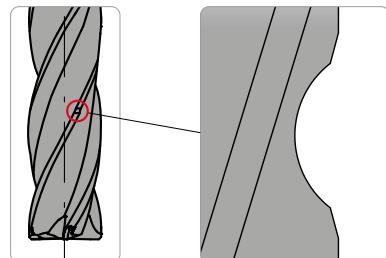
NEW

Important features

FOR BEST PERFORMANCE ON SURFACE QUALITY

■ Optimized chip-splitting for short chips and perfect surface quality

Chip-splitting design



Optimized chip-splitting geometry for short chips and a perfect chip evacuation. The result is a perfect surface quality.

Short chips



Due to the chip-splitting the chips are short and easily evacuated. The result is long tool life.

Surface quality

CrazyMill Cool

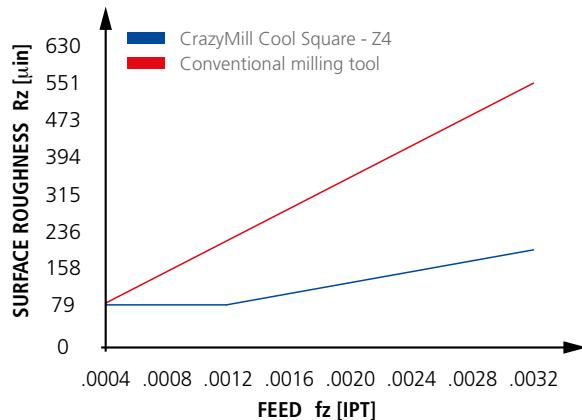


Conventional endmill



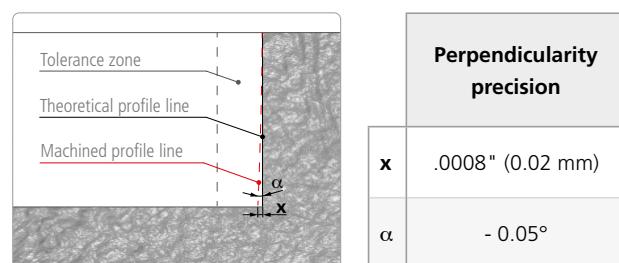
Due to the new design of chip-splitting there is no visible mark as happens when using a conventional milling tool. The result is an excellent surface quality.

■ Surface roughness Rz



Material: X2CrNiMo17-12-2 / 1.4404 / AISI 316L
Diameter: .315" (8 mm); Milling depth: .630" (16 mm);
Coolant: cutting oil; Cutting data: $v_c = 853$ SFM (260 m/min);
 $a_p = .630"$ (16 mm); $a_e = .006"$ (0.16 mm)

■ Perpendicularity



Material: X2CrNiMo17-12-2 / 1.4404 / AISI 316L
Diameter: .236" (6 mm); Milling depth: .945" (24 mm);
Coolant: cutting oil; Cutting data: $v_c = 723$ SFM (220 m/min);
 $f_z = .0012$ IPT (0.03 mm); $a_p = .945"$ (24 mm);
 $a_e = .0047"$ (0.12 mm)

Thanks to the profile of the flute and the size of the core,
greater stability is achieved. The result is high perpendicularity
precision, in particular for long tool versions.

PATENTED**2 x d****5 x d****3 x d****4 x d****Type A****Type C****Type M****Type N**

l_1 = Effective length
 l_2 = Cutting length

- Coated
- Integ. cooling
- $l_1: 2xd, l_2: 2xd$

- Coated
- Integ. cooling
- $l_1: 5xd, l_2: 2xd$

- Coated
- Integ. cooling
- $l_1: 3xd, l_2: 3xd$

- Coated
- Integ. cooling
- $l_1: 4xd, l_2: 4xd$



page 14

page 20

page 26

page 32

Regrinding: This product is not suitable for regrinding.

NEW

1 | SHANK

The robust solid carbide shank guarantees stable and vibration-free milling. High precision and extraordinary surface quality are reached.

2 | INTEGRATED COOLING - PATENTED

The integrated cooling channels guarantee constant and maximal cooling of the cutting edges and optimal chip removal. The result is higher cutting speed and depth a_p as well as an excellent surface quality.

3 | CARBIDE

The specially developed micro-grain carbide meets all requirements in terms of mechanical properties.

4 | COATING

The high-performance eXedur SNP coating is heat and wear resistant, prevents buildup edges and guarantees optimum chip flushing. The result is a long tool life.

5 | CUTTING GEOMETRY OF END FACE - LINEAR RAMP AND HELICAL INTERPOLATION MILLING

The frontal cutting geometry with the specially designed expanded chip collection has been optimized for linear ramp and helical interpolation milling by high ramp angles.

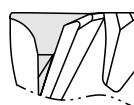
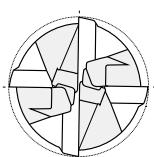
6 | LATERAL CUTTING GEOMETRY

The long and robust lateral cutting edge of versions M and N allows to obtain high tool rigidity. The result is higher machining force resistance that leads to high perpendicularity precision and high surface quality.

7 | CHIP-SPLITTING

An optimized chip-splitting guarantees short chips and highest surface quality. The chip-splitting is implemented in version M for $\varnothing d_1 \geq 4$ mm and N for $\varnothing d_1 \geq 3$ mm.

Mill tip

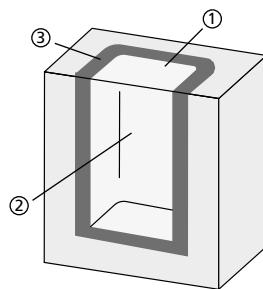


4 - Flute

NEW

Benefits and applications

PRE-MACHINING AND FINISHING CUTTER WITH INTEGRATED COOLING

**COMPONENT**

Pocket milling

MATERIAL

X2CrNiMo17-12-2 / 1.4404 / AISI 316L

MACHINING

- ① Helical ramp
- ② Pre-machining
- ③ Finishing
- Diameter endmill = .315" (8 mm)
- Pocket depth = .630" (16 mm)

MILLING TOOL

Mikron Tool - CrazyMill Cool Square - Z4
Type A

DATA	MIKRON TOOL
Tool type	CrazyMill Cool Square - Z4 - Carbide - Coated - Integrated cooling
Item number	2.CMC42.A1Z4.800.1
Cutting data	<p>① Helical ramp</p> <p>$v_c = 160 \text{ m/min} 525 \text{ SFM}$ $f_z = 0.03 \text{ mm} .00012 \text{ IPT}$ $a_{p,\max} = 1 \times d$ $a_e = 7.5 \text{ mm} .295"$ $\alpha = 20^\circ$ $Q = 22.9 \text{ cm}^3/\text{min} .006 \text{ gpm}$ $\Delta t = 4 \text{ s}$</p> <p>② Pre-machining</p> <p>$v_c = 180 \text{ m/min} 591 \text{ SFM}$ $f_z = 0.048 \text{ mm} .0019 \text{ IPT}$ $a_{p,\max} = 2 \times d$ $a_e = 1.6 \text{ mm} .063"$ $Q = 35.2 \text{ cm}^3/\text{min} .009 \text{ gpm}$ $\Delta t = 1 \text{ min } 40 \text{ s}$</p> <p>③ Finishing</p> <p>$v_c = 260 \text{ m/min} 853 \text{ SFM}$ $f_z = 0.04 \text{ mm} .0016 \text{ IPT}$ $a_{p,\max} = 2 \times d$ $a_e = 0.16 \text{ mm} .0063"$ $Q = 4.2 \text{ cm}^3/\text{min} .001 \text{ gpm}$ $\Delta t = 9 \text{ s}$</p>



APPLICATION DOMAINS		COMPONENTS EXAMPLES		MATERIALS GROUPS		EXAMPLES		
				Mat. no.	DIN	AISI / ASTM / UNS		
Dental	Tooth crown			Group P Unalloyed and alloyed steel	1.0401	C15	1015	
					1.3505	100Cr6	52100	
					1.2436	X210CrW12	D4 / D6	
Medical technology	Component for endoscope			Group M Stainless steel	1.4105	X6CrMoS17	430F	
					1.4112	X90CrMoV18	440B	
					1.4301	X5CrNi 18-10	304	
Automotive industry	Components for injection system			Group K Cast iron	0.7040	GGG40	60-40-18	
					3.2315	AlMgSi1	6351	
					3.2163	GD-AlSi9Cu3	A380	
Mechanical engineering	Machine components			Group N Non ferrous metals	2.004	Cu-OF / CW008A	C10100	
					2.0321	CuZn37 CW508L	C27400	
					2.102	CuSn6	C51900	
Watches	Watch housing			Group S1 Super alloys	2.096	CuAl9Mn2	C63200	
					2.4856		INCONEL 625	
					2.4665	NiCr22Fe18Mo	HASTELLOY X	
Aerospace industry	Engine parts			Group S2 Titanium (pure and alloyed)	3.7035	Gr.2	B348 / F67	
					3.7165	TiAl6V4	B348 / F136	
Power industry	Blade			Group S3 CrCo alloys	2.4964	CoCr20W15Ni	HAYNES 25	

NEW

CrazyMill Cool Square / Corner radius - Z4

MILLING WITH INTEGRATED COOLING



Square

2 x d
page 145 x d
page 203 x d
page 264 x d
page 32

Corner radius

2 x d
page 155 x d
page 213 x d
page 274 x d
page 33

CrazyMill Cool is setting new standards for the milling of pockets and walls with regard to cutting speeds, feed, performance, tool life, and surface quality. The new features of this pre-machining and finishing cutter include not only the solid carbide, coating, and geometry, but especially the unique cooling system with cooling channels integrated in the shaft, which achieve constant and extensive cooling of the cutting edges, thus enabling the highest cutting speeds and maximum feed.

The milling tools have three to five integrated cooling channels depending on the shaft diameter.

Mikron Tool developed two different variants:

- **Variant square** - sharp-edged with small, defined protection phase of 45°, for a maximum machining depth of $5 \times d$.
- **Variant corner radius** - sharp-edged with a corner radius for a maximum machining depth of $5 \times d$.

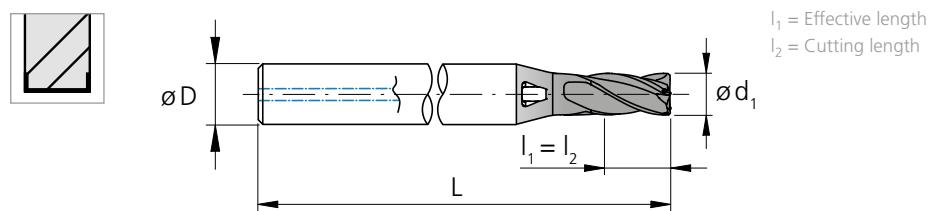
Coolant type, pressure and filtration

Detailed recommendations for coolant type, pressure and filtration are on page "milling process".

Please note

You couldn't find your suitable version of the CrazyMill Cool Square / Corner radius - Z4 (diameter, length, cutting direction...)? Ask us about our customized versions!

Regrinding: This product is not suitable for regrounding.

NEW**Type A - 2 x d - Square / Corner radius - Z4****MILLING WITH INTEGRATED COOLING****Square**

d₁ [inch]	d₁ [inch]	d₁ [mm]	l₁ [inch]	l₁ [mm]	l₂ [mm]	D (h6) [mm]	L [inch]	L [mm]	Item number	Availability
.039	1.0	.079	2.0	2.0	4	1.57	40	2.CMC42.A1Z4.100.1	■	
.047	1.2	.094	2.4	2.4	4	1.57	40	2.CMC42.A1Z4.120.1	■	
.059	1.5	.118	3.0	3.0	4	1.57	40	2.CMC42.A1Z4.150.1	■	
1/16	.0625	1.587	.122	3.1	3.1	4	1.57	40	2.CMC.SAZ4.F116	■
									2.CMC42.A1Z4.180.1	■
									2.CMC42.A1Z4.200.1	■
3/32	.0937	2.381	.185	4.7	4.7	4	1.57	40	2.CMC.SAZ4.F332	■
									2.CMC42.A1Z4.250.1	■
									2.CMC42.A1Z4.300.1	■
1/8	.1250	3.175	.252	6.4	6.4	6	1.97	50	2.CMC.SAZ4.F18	■
									2.CMC42.A1Z4.350.1	■
5/32	.1562	3.968	.312	7.9	7.9	6	1.97	50	2.CMC.SAZ4.F532	■
									2.CMC42.A1Z4.400.1	■
									2.CMC42.A1Z4.450.1	■
3/16	.1875	4.762	.375	9.5	9.5	8	2.36	60	2.CMC.SAZ4.F316	■
									2.CMC42.A1Z4.500.1	■
7/32	.2189	5.560	.438	11.1	11.1	10	2.36	60	2.CMC.SAZ4.F732	■
									2.CMC42.A1Z4.600.1	■
1/4	.2500	6.350	.500	12.7	12.7	10	2.36	60	2.CMC.SAZ4.F14	■
									2.CMC42.A1Z4.800.1	■

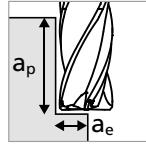
■ Stock item

NEW

Type A - Pre-machining

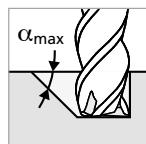
MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

Pre-machining

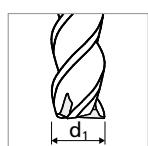
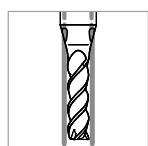


- (1)
 ■ $a_p = 1.5 \times d$,
 ■ $a_e = 0.3 \times d$,

- (2)
 ■ $a_p = 2 \times d$,
 ■ $a_e = 0.2 \times d$,



Note:
 In case of linear ramp or helical interpolation milling reduce f_z by 35%



Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	1/16"			
					1.0 mm .039"		1.5 mm .059"	
					v _c	f _z	v _c	f _z
P	Unalloyed carbon steel Rm < 800 N/mm ²	1.0301	C10	AISI 1010	140		200	
		1.0401	C15	AISI 1015	459	0.011	656	0.024
		1.1191	C45E/CK45	AISI 1045		.00043		.00067
		1.0044	S275JR	AISI 1020		.00051		
		1.0715	11SMn30	AISI 1215				
	Low alloyed steel Rm > 900 N/mm ²	1.5752	15NiCr13	ASTM 3415 / AISI 3310				
		1.7131	16MnCr5	AISI 5115	140		200	
		1.3505	100Cr6	AISI 52100	459	0.010	656	0.022
		1.7225	42CrMo4	AISI 4140		.00047		.00059
	High alloyed tool steel Rm < 1200 N/mm ²	1.2842	90MnCrV8	AISI O2				
		1.2379	X153CrMoV12	AISI D2	140		200	
		1.2436	X210CrW12	AISI D4/D6	459	0.008	656	0.019
M	Stainless steel ferritic	1.3343	HS6-5-2C	AISI M2 / UNS T11302	140		200	
		1.3355	HS18-0-1	AISI T1 / UNS T12001	459	.00032	.00035	.00075
		1.4016	X6Cr17	AISI 430 / UNS S43000	140	0.012	180	0.021
		1.4105	X6CrMoS17	AISI 430F	459	.00047	.00055	.00083
	Stainless steel martensitic	1.4034	X46Cr13	AISI 420C	140	0.011	180	0.021
		1.4112	X90CrMoV18	AISI 440B	459	.00043	.00051	.00083
	Stainless steel martensitic – PH	1.4542	X5CrNiCuNb16-4	AISI 630 / ASTM 17-4 PH	140	0.011	180	0.021
		1.4545	X5CrNiCuNb15-5	ASTM 15-5 PH	459	.00043	.00051	.00083
K	Stainless steel austenitic	1.4301	X5CrNi18-10	AISI 304	140		180	
		1.4435	X2CrNiMo18-14-3	AISI 316L	459	0.009	180	0.018
		1.4441	X2CrNiMo18-15-3	AISI 316LM		.00043		.00055
		1.4539	X1NiCrMoCu25-20-5	AISI 904L				
	0.6020	GG20	ASTM 30		120		160	
N	Cast iron	0.6030	GG30	ASTM 40B	394	.00032	.00039	.00075
		0.7040	GGG40	ASTM 60-40-18			525	.00063
		0.7060	GGG60	ASTM 80-60-03				
S ₁ S ₂ S ₃	Aluminium alloy wrought	3.2315	AlMgSi1	ASTM 6351	160	0.013	200	0.026
		3.4365	AlZnMgCu1.5	ASTM 7075	525	.00051	.00059	.00102
		3.2163	GD-AlSi9Cu3	ASTM A380	160	0.013	220	0.026
		3.2381	GD-AlSi10Mg	UNS A03590	525	.00051	.00059	.00102
	Copper	2.0040	Cu-OF / CW008A	UNS C10100	160	0.013	220	0.026
		2.0065	Cu-ETP / CW004A	UNS C11000	525	.00051	.00059	.00102
	Brass lead free	2.0321	CuZn37 CW508L	UNS C27400	160	0.013	220	0.026
		2.0360	CuZn40 CW509L	UNS C28000	525	.00051	.00059	.00102
		2.0401	CuZn39Pb3 / CW614N	UNS C38500	160	0.013	220	0.026
	Brass, Bronze Rm < 400 N/mm ²	2.1020	CuSn6	UNS C51900	525	.00051	.00059	.00102
		2.0966	CuAl10Ni5Fe4	UNS C63000	160	0.013	220	0.026
		2.0960	CuAl9Mn2	UNS C63200	525	.00051	.00059	.00102
	Super alloys	2.4856		Inconel 625	80		100	
		2.4668		Inconel 718	262	-	328	
		2.4617	NiMo28	Hastelloy B-2		.00024		
		2.4665	NiCr22Fe18Mo	Hastelloy X				
H ₁ H ₂	Titanium pure	3.7035	Gr.2	ASTM B348 / F67	100	0.010	100	0.017
		3.7065	Gr.4	ASTM B348 / F68	328	.00039	.00047	.00067
	Titanium alloys	3.7165	TiAl6V4	ASTM B348 / F136	100	0.010	100	0.017
		9.9367	TiAl6Nb7	ASTM F1295	328	.00039	.00047	.00067
	CrCo alloys	2.4964	CoCr20W15Ni	Haynes 25	80		100	
			CrCoMo28	ASTM F1537	262	-	328	-
						.00024		.00030

v_c [m/min] | [SFM]
f_z [mm] | [IPT]

RECOMMENDATION FOR USE

● Excellent | ○ Good | ○ Acceptable | □ Not recommended

P	N	S ₃	
M	S ₁	H ₁	□
K	S ₂	H ₂	□

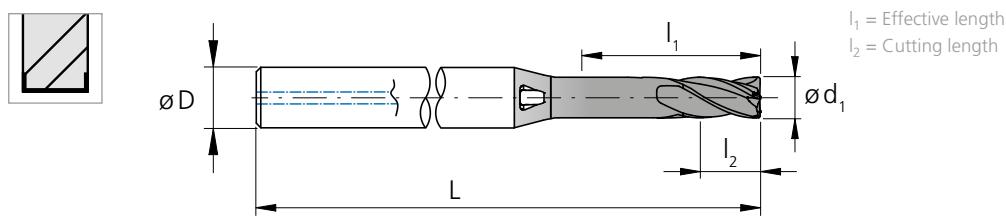
3/32"		1/8"		Ød ₁ 5/32"		3/16" - 7/32"		1/4"		8.0 mm .315"		
v _c	f _z	v _c	f _z	v _c	f _z	v _c	f _z	v _c	f _z	v _c	f _z	
200	0.017	0.020	210	0.023	0.026	220	0.025	0.029	0.032	220	0.038	0.044
656	.00067	.00079	689	.0091	.00103	722	.00098	.00114	.00126	722	.00150	.00173
200	0.016	0.018	210	0.022	0.025	220	0.024	0.028	0.030	220	0.034	0.040
656	.00063	.00071	689	.00087	.00098	722	.00094	.00110	.00118	722	.00130	.00157
200	0.015	0.017	210	0.020	0.023	220	0.021	0.024	0.026	220	0.030	0.035
656	.00059	.00067	689	.00079	.0091	722	.00083	.00094	.00102	722	.00118	.00138
200	0.017	0.020	210	0.022	0.025	220	0.024	0.028	0.030	220	0.029	0.033
656	.00067	.00079	689	.00087	.00098	722	.00094	.00110	.00118	722	.00114	.00134
200	0.016	0.018	210	0.022	0.025	220	0.023	0.027	0.025	220	0.028	0.032
656	.00063	.00071	689	.00087	.00098	722	.00091	.00106	.00098	722	.00110	.00126
200	0.016	0.018	210	0.022	0.025	220	0.023	0.027	0.025	220	0.028	0.032
656	.00063	.00071	689	.00087	.00098	722	.00091	.00106	.00098	722	.00110	.00126
200	0.015	0.017	210	0.020	0.023	220	0.022	0.025	0.026	220	0.032	0.037
656	.00059	.00067	689	.00079	.0091	722	.00087	.00098	.00110	722	.00126	.00146
150	0.014	0.016	160	0.022	0.025	170	0.025	0.029	0.033	170	0.031	0.042
492	.00055	.00063	525	.00087	.00098	558	.00098	.00114	.00130	558	.00122	.00142
200	0.018	0.021	210	0.029	0.033	220	0.030	0.035	0.038	220	0.036	0.041
656	.00071	.00083	689	.00114	.00130	722	.00118	.00138	.00130	722	.00142	.00161
200	0.018	0.021	210	0.029	0.033	220	0.030	0.035	0.038	220	0.036	0.041
656	.00071	.00083	689	.00114	.00130	722	.00118	.00138	.00130	722	.00142	.00161
200	0.018	0.021	210	0.029	0.033	220	0.030	0.035	0.038	220	0.036	0.041
656	.00071	.00083	689	.00114	.00130	722	.00118	.00138	.00130	722	.00142	.00161
200	0.018	0.021	210	0.029	0.033	220	0.030	0.035	0.038	220	0.036	0.041
656	.00071	.00083	689	.00114	.00130	722	.00118	.00138	.00130	722	.00142	.00161
200	0.018	0.021	210	0.029	0.033	220	0.030	0.035	0.038	220	0.036	0.041
656	.00071	.00083	689	.00114	.00130	722	.00118	.00138	.00130	722	.00142	.00161
130	0.005	0.006	130	0.008	0.009	140	0.010	0.012	0.013	150	0.012	0.014
427	.00020	.00024	427	.00032	.00035	459	.00039	.00047	.00051	492	.00047	.00055
130	0.014	0.016	130	0.020	0.023	140	0.022	0.025	0.028	150	0.026	0.030
427	.00055	.00063	427	.00079	.00091	459	.00087	.00098	.00094	492	.00102	.00118
130	0.014	0.016	130	0.020	0.023	140	0.022	0.025	0.028	150	0.026	0.030
427	.00055	.00063	427	.00079	.00091	459	.00087	.00098	.00094	492	.00102	.00118
130	0.005	0.006	130	0.008	0.009	140	0.010	0.012	0.013	150	0.012	0.014
427	.00020	.00024	427	.00032	.00035	459	.00039	.00047	.00051	492	.00047	.00055

NEW

Type C - 5 x d - Square / Corner radius - Z4

MILLING WITH INTEGRATED COOLING

Square



d_1 [inch]	d_1 [inch]	d_1 [mm]	l_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [inch]	L [mm]	Item number	Availability
.039	1.0	.197	5.00	2.00	4	1.57	40		2.CMC42.C1Z4.100.1	■
.047	1.2	.236	6.00	2.40	4	1.57	40		2.CMC42.C1Z4.120.1	■
.059	1.5	.295	7.50	3.00	4	1.57	40		2.CMC42.C1Z4.150.1	■
1/16	.0625	1.587	.312	7.94	3.10	4	1.77	45	2.CMC.SCZ4.F116	■
.071	1.8	.354	9.00	3.60	4	1.77	45		2.CMC42.C1Z4.180.1	■
.079	2.0	.394	10.00	4.00	4	1.73	44		2.CMC42.C1Z4.200.1	■
3/32	.0937	2.381	.469	11.91	4.70	4	1.73	44	2.CMC.SCZ4.F332	■
.098	2.5	.492	12.50	5.00	6	2.17	55		2.CMC42.C1Z4.250.1	■
.118	3.0	.591	15.00	6.00	6	2.17	55		2.CMC42.C1Z4.300.1	■
1/8	.1250	3.175	.625	15.88	6.40	6	2.36	60	2.CMC.SCZ4.F18	■
.138	3.5	.689	17.50	7.00	6	2.36	60		2.CMC42.C1Z4.350.1	■
5/32	.1562	3.968	.781	19.84	7.94	6	2.36	60	2.CMC.SCZ4.F532	■
.157	4.0	.787	20.00	8.00	6	2.36	60		2.CMC42.C1Z4.400.1	■
.177	4.5	.886	22.50	9.00	8	2.76	70		2.CMC42.C1Z4.450.1	■
3/16	.1875	4.762	.937	23.81	9.52	8	2.76	70	2.CMC.SCZ4.F316	■
.197	5.0	.984	25.00	10.00	8	2.76	70		2.CMC42.C1Z4.500.1	■
7/32	.2189	5.560	1.09	27.80	11.12	10	2.76	70	2.CMC.SCZ4.F732	■
.236	6.0	1.18	30.00	12.00	10	2.76	70		2.CMC42.C1Z4.600.1	■
1/4	.2500	6.350	1.25	31.70	12.70	10	2.76	70	2.CMC.SCZ4.F14	■
.315	8.0	1.57	40.00	16.00	12	3.54	90		2.CMC42.C1Z4.800.1	■

■ Stock item

NEW

Type C - Finishing

MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

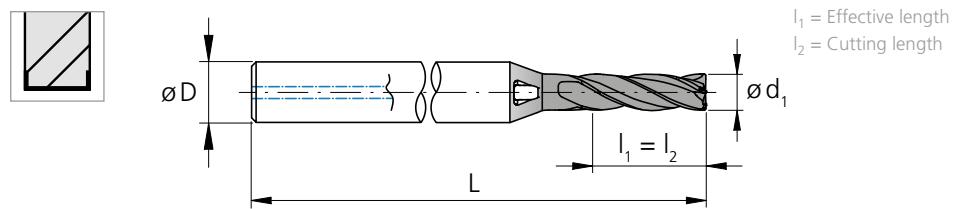
Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	1.0 mm .039"		
					v_c	f_z	
Finishing	P	Unalloyed carbon steel $R_m < 800 \text{ N/mm}^2$	1.0301 1.0401 1.1191 1.0044 1.0715	C10 C15 C45E/CK45 S275JR 11SMn30	AISI 1010 AISI 1015 AISI 1045 AISI 1020 AISI 1215	130 425	0.008 .00032
		Low alloyed steel $R_m > 900 \text{ N/mm}^2$	1.5752 1.7131 1.3505 1.7225 1.2842	15NiCr13 16MnCr5 100Cr6 42CrMo4 90MnCrV8	ASTM 3415 / AISI 3310 AISI 5115 AISI 52100 AISI 4140 AISI O2	130 425	0.007 .00028
			1.2379 1.2436 1.3343 1.3355	X153CrMoV12 X210CrW12 HS6-5-2C HS18-0-1	AISI D2 AISI D4/D6 AISI M2 / UNS T11302 AISI T1 / UNS T12001	130 425	0.006 .00024
	M	Stainless steel ferritic	1.4016 1.4105	X6Cr17 X6CrMoS17	AISI 430 / UNS S43000 AISI 430F	130 425	0.008 .00032
			1.4034 1.4112	X46Cr13 X90CrMoV18	AISI 420C AISI 440B	130 425	0.008 .00032
		Stainless steel martensitic – PH	1.4542 1.4545	X5CrNiCuNb16-4 X5CrNiCuNb15-5	AISI 630 / ASTM 17-4 PH ASTM 15-5 PH	130 425	0.008 .00032
			1.4301 1.4435 1.4441 1.4539	X5CrNi18-10 X2CrNiMo18-14-3 X2CrNiMo18-15-3 X1NiCrMoCu25-20-5	AISI 304 AISI 316L AISI 316LM AISI 904L	130 425	0.006 .00024
		Stainless steel austenitic	0.6020 0.6030 0.7040 0.7060	GG20 GG30 GGG40 GGG60	ASTM 30 ASTM 40B ASTM 60-40-18 ASTM 80-60-03	110 361	0.006 .00024
			0.6020 0.6030 0.7040 0.7060	GG20 GG30 GGG40 GGG60	ASTM 30 ASTM 40B ASTM 60-40-18 ASTM 80-60-03	110 361	0.006 .00024
			0.6020 0.6030 0.7040 0.7060	GG20 GG30 GGG40 GGG60	ASTM 30 ASTM 40B ASTM 60-40-18 ASTM 80-60-03	110 361	0.006 .00024
			0.6020 0.6030 0.7040 0.7060	GG20 GG30 GGG40 GGG60	ASTM 30 ASTM 40B ASTM 60-40-18 ASTM 80-60-03	110 361	0.006 .00024
	K	Cast iron	0.6020 0.6030 0.7040 0.7060	GG20 GG30 GGG40 GGG60	ASTM 30 ASTM 40B ASTM 60-40-18 ASTM 80-60-03	110 361	0.006 .00024
			0.6020 0.6030 0.7040 0.7060	GG20 GG30 GGG40 GGG60	ASTM 30 ASTM 40B ASTM 60-40-18 ASTM 80-60-03	110 361	0.006 .00024
			0.6020 0.6030 0.7040 0.7060	GG20 GG30 GGG40 GGG60	ASTM 30 ASTM 40B ASTM 60-40-18 ASTM 80-60-03	110 361	0.006 .00024
			0.6020 0.6030 0.7040 0.7060	GG20 GG30 GGG40 GGG60	ASTM 30 ASTM 40B ASTM 60-40-18 ASTM 80-60-03	110 361	0.006 .00024
		N	3.2315 3.4365	AlMgSi1 AlZnMgCu1.5	ASTM 6351 ASTM 7075	130 425	0.009 .00035
			3.2163 3.2381	GD-AlSi9Cu3 GD-AlSi10Mg	ASTM A380 UNS A03590	130 425	0.009 .00035
			2.0040 2.0065	Cu-OF / CW008A Cu-ETP / CW004A	UNS C10100 UNS C11000	130 425	0.010 .00039
			2.0321 2.0360	CuZn37 CW508L CuZn40 CW509L	UNS C27400 UNS C28000	130 425	0.010 .00039
			2.0401 2.1020	CuZn39Pb3 / CW614N CuSn6	UNS C38500 UNS C51900	130 425	0.010 .00039
			2.0966 2.0960	CuAl10Ni5Fe4 CuAl9Mn2	UNS C63000 UNS C63200	130 425	0.009 .00035
	S₁	Super alloys	2.4856 2.4668 2.4617 2.4665		Inconel 625 Inconel 718 NiMo28 NiCr22Fe18Mo	110 361	0.004 .00016
			3.7035 3.7065	Gr.2 Gr.4	ASTM B348 / F67 ASTM B348 / F68	110 361	0.008 .00032
			3.7165 9.9367	TiAl6V4 TiAl6Nb7	ASTM B348 / F136 ASTM F1295	110 361	0.008 .00032
			2.4964 2.0960	CoCr20W15Ni CrCoMo28	Haynes 25 ASTM F1537	110 361	0.004 .00016
		S ₂	1.2510	100MnCrMoW4	AISI O1		
			1.2379	X153CrMoV12	AISI D2		
	H ₁	Hardened steel < 55 HRC	1.2510	100MnCrMoW4	AISI O1		
		Hardened steel ≥ 55 HRC	1.2379	X153CrMoV12	AISI D2		

NEW

Type M - 3 x d - Square / Corner radius - Z4

MILLING WITH INTEGRATED COOLING

Square

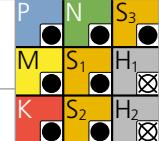


d ₁ [inch]	d ₁ [inch]	d ₁ [mm]	l ₁ [inch]	l ₁ [mm]	l ₂ [mm]	D (h6) [mm]	L [inch]	L [mm]	Item number	Availability
.039	1.0	.118	3.0	3.0	4	1.57	40	2.CMC42.M1Z4.100.1	■	
.047	1.2	.142	3.6	3.6	4	1.57	40	2.CMC42.M1Z4.120.1	■	
.059	1.5	.177	4.5	4.5	4	1.57	40	2.CMC42.M1Z4.150.1	■	
1/16	.0625	1.587	.185	4.7	4.7	4	1.57	40	2.CMC.SMZ4.F116	■
	.071	1.8	.213	5.4	5.4	4	1.57	40	2.CMC42.M1Z4.180.1	■
	.079	2.0	.236	6.0	6.0	4	1.57	40	2.CMC42.M1Z4.200.1	■
3/32	.0937	2.381	.281	7.1	7.1	4	1.57	40	2.CMC.SMZ4.F332	■
	.098	2.5	.295	7.5	7.5	6	1.97	50	2.CMC42.M1Z4.250.1	■
	.118	3.0	.354	9.0	9.0	6	1.97	50	2.CMC42.M1Z4.300.1	■
1/8	.1250	3.175	.375	9.5	9.5	6	2.17	55	2.CMC.SMZ4.F18	■
	.138	3.5	.413	10.5	10.5	6	2.17	55	2.CMC42.M1Z4.350.1	■
5/32	.1562	3.968	.469	11.9	11.9	6	2.17	55	2.CMC.SMZ4.F532	■
	.157	4.0	.472	12.0	12.0	6	2.17	55	2.CMC42.M1Z4.400.1	■
	.177	4.5	.531	13.5	13.5	8	2.56	65	2.CMC42.M1Z4.450.1	■
3/16	.1875	4.762	.562	14.3	14.3	8	2.56	65	2.CMC.SMZ4.F316	■
	.197	5.0	.591	15.0	15.0	8	2.56	65	2.CMC42.M1Z4.500.1	■
7/32	.2189	5.560	.657	16.7	16.7	10	2.56	65	2.CMC.SMZ4.F732	■
	.236	6.0	.709	18.0	18.0	10	2.56	65	2.CMC42.M1Z4.600.1	■
1/4	.2500	6.350	.748	19.0	19.0	10	2.56	65	2.CMC.SMZ4.F14	■
	.315	8.0	.945	24.0	24.0	12	3.15	80	2.CMC42.M1Z4.800.1	■

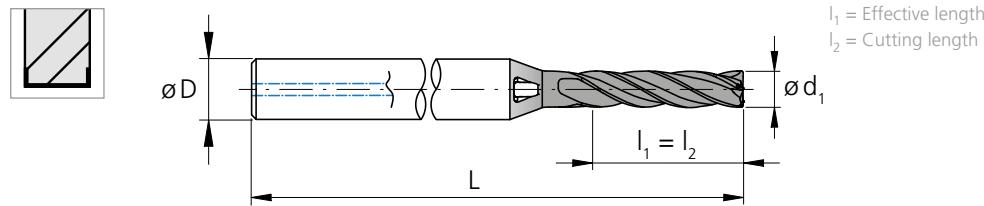
■ Stock item

v_c [m/min] | [SFM]
f_z [mm] | [IPT]

RECOMMENDATION FOR USE
 ● Excellent | ○ Good | □ Acceptable | ✗ Not recommended



1/16" 1.5 mm .059"		3/32" 2.0 mm .079"		1/8" 3.0 mm .118"		Ød ₁ 5/32"		3/16" - 7/32" 5.0 mm .197"		1/4" 6.0 mm .236"		8.0 mm .315"	
v _c	f _z	v _c	f _z	v _c	f _z	v _c	f _z	v _c	f _z	v _c	f _z	v _c	f _z
180 591	0.014 .00055	200 656	0.020 .00079	210 688	0.026 .00102	220 722	0.029 .00114	220 722	0.032 .00126	220 722	0.038 .00150	220 722	0.044 .00173
180 591	0.013 .00051	200 656	0.018 .00071	210 688	0.025 .00098	220 722	0.028 .00110	220 722	0.030 .00118	220 722	0.033 .00130	220 722	0.040 .00157
180 591	0.012 .00047	200 656	0.017 .00067	210 688	0.023 .00091	220 722	0.024 .00094	220 722	0.026 .00102	220 722	0.029 .00114	220 722	0.035 .00138
180 591	0.014 .00055	200 656	0.020 .00079	210 688	0.025 .00098	220 722	0.028 .00110	220 722	0.030 .00118	220 722	0.033 .00130	260 853	0.040 .00157
180 591	0.013 .00051	200 656	0.018 .00071	210 688	0.025 .00098	220 722	0.027 .00106	220 722	0.029 .00114	220 722	0.032 .00126	260 853	0.038 .00150
180 591	0.013 .00051	200 656	0.018 .00071	210 688	0.025 .00098	220 722	0.027 .00106	220 722	0.029 .00114	220 722	0.032 .00126	260 853	0.038 .00150
180 591	0.009 .00035	200 656	0.017 .00067	210 688	0.023 .00091	220 722	0.025 .00098	220 722	0.028 .00110	220 722	0.030 .00118	260 853	0.037 .00146
130 427	0.014 .00055	150 492	0.016 .00063	160 525	0.025 .00098	170 558	0.029 .00114	170 558	0.033 .00130	170 558	0.036 .00142	200 656	0.042 .00165
180 591	0.015 .00059	200 656	0.021 .00083	210 688	0.033 .00130	220 722	0.035 .00138	220 722	0.038 .00150	220 722	0.041 .00161	270 886	0.047 .00185
180 591	0.015 .00059	200 656	0.021 .00083	210 688	0.033 .00130	220 722	0.035 .00138	220 722	0.038 .00150	220 722	0.041 .00161	270 886	0.047 .00185
180 591	0.015 .00059	200 656	0.021 .00083	210 688	0.033 .00130	220 722	0.035 .00138	220 722	0.038 .00150	220 722	0.041 .00161	270 886	0.047 .00185
180 591	0.015 .00059	200 656	0.021 .00083	210 688	0.033 .00130	220 722	0.035 .00138	220 722	0.038 .00150	220 722	0.041 .00161	270 886	0.047 .00185
180 591	0.015 .00059	200 656	0.021 .00083	210 688	0.033 .00130	220 722	0.035 .00138	220 722	0.038 .00150	220 722	0.041 .00161	270 886	0.047 .00185
180 591	0.015 .00059	200 656	0.021 .00083	210 688	0.033 .00130	220 722	0.035 .00138	220 722	0.038 .00150	220 722	0.041 .00161	270 886	0.047 .00185
120 394	0.006 .00024	130 427	0.006 .00024	130 427	0.009 .00035	140 459	0.012 .00047	140 459	0.013 .00051	150 492	0.014 .00055	160 525	0.020 .00079
120 394	0.012 .00047	130 427	0.016 .00063	130 427	0.023 .00091	140 459	0.025 .00098	140 459	0.028 .00110	150 492	0.030 .00118	160 525	0.036 .00142
120 394	0.012 .00047	130 427	0.016 .00063	130 427	0.023 .00091	140 459	0.025 .00098	140 459	0.028 .00110	150 492	0.030 .00118	160 525	0.036 .00142
120 394	0.006 .00024	130 427	0.006 .00024	130 427	0.009 .00035	140 459	0.012 .00047	140 459	0.013 .00051	150 492	0.014 .00055	160 525	0.020 .00079

NEW**Type N - 4 x d - Square / Corner radius - Z4****MILLING WITH INTEGRATED COOLING****Square**

d₁ [inch]	d₁ [inch]	d₁ [mm]	l₁ [inch]	l₁ [mm]	l₂ [mm]	D (h6) [mm]	L [inch]	L [mm]	Item number	Availability
.039	1.0	.157	4.0	4.0	4	1.57	40		2.CMC42.N1Z4.100.1	■
.047	1.2	.189	4.8	4.8	4	1.57	40		2.CMC42.N1Z4.120.1	■
.059	1.5	.236	6.0	6.0	4	1.57	40		2.CMC42.N1Z4.150.1	■
1/16	.0625	1.587	.250	6.3	6.3	4	1.77	45	2.CMC.SNZ4.F116	■
.071	1.8	.283	7.2	7.2	4	1.77	45		2.CMC42.N1Z4.180.1	■
.079	2.0	.315	8.0	8.0	4	1.73	44		2.CMC42.N1Z4.200.1	■
3/32	.0937	2.381	.375	9.5	9.5	4	1.73	44	2.CMC.SNZ4.F332	■
.098	2.5	.394	10.0	10.0	6	2.17	55		2.CMC42.N1Z4.250.1	■
.118	3.0	.472	12.0	12.0	6	2.17	55		2.CMC42.N1Z4.300.1	■
1/8	.1250	3.175	.500	12.7	12.7	6	2.36	60	2.CMC.SNZ4.F18	■
.138	3.5	.551	14.0	14.0	6	2.36	60		2.CMC42.N1Z4.350.1	■
5/32	.1562	3.968	.625	15.9	15.9	6	2.36	60	2.CMC.SNZ4.F532	■
.157	4.0	.630	16.0	16.0	6	2.36	60		2.CMC42.N1Z4.400.1	■
.177	4.5	.709	18.0	18.0	8	2.76	70		2.CMC42.N1Z4.450.1	■
3/16	.1875	4.762	.750	19.0	19.0	8	2.76	70	2.CMC.SNZ4.F316	■
.197	5.0	.787	20.0	20.0	8	2.76	70		2.CMC42.N1Z4.500.1	■
7/32	.2189	5.560	.876	22.2	22.2	10	2.76	70	2.CMC.SNZ4.F732	■
.236	6.0	.945	24.0	24.0	10	2.76	70		2.CMC42.N1Z4.600.1	■
1/4	.2500	6.350	1.00	25.4	25.4	10	2.76	70	2.CMC.SNZ4.F14	■
.315	8.0	1.26	32.0	32.0	12	3.54	90		2.CMC42.N1Z4.800.1	■

■ Stock item

NEW**Type N - Finishing****MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW**

Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	1.0 mm	.039"	v_c	f_z
					1.0 mm	.039"		
Finishing	P	1.0301	C10	AISI 1010				
		1.0401	C15	AISI 1015				
		1.1191	C45E/CK45	AISI 1045				
		1.0044	S275JR	AISI 1020				
		1.0715	11SMn30	AISI 1215				
	Low alloyed steel Rm > 900 N/mm ²	1.5752	15NiCr13	ASTM 3415 / AISI 3310				
		1.7131	16MnCr5	AISI 5115				
		1.3505	100Cr6	AISI 52100				
		1.7225	42CrMo4	AISI 4140				
	High alloyed tool steel Rm < 1200 N/mm ²	1.2842	90MnCrV8	AISI O2				
		1.2379	X153CrMoV12	AISI D2				
		1.2436	X210CrW12	AISI D4/D6				
		1.3343	HS6-5-2C	AISI M2 / UNS T11302				
		1.3355	HS18-0-1	AISI T1 / UNS T12001				
M	Stainless steel ferritic	1.4016	X6Cr17	AISI 430 / UNS S43000	130	0.009		
		1.4105	X6CrMoS17	AISI 430F	425	.00035		
		1.4034	X46Cr13	AISI 420C	130	0.009		
		1.4112	X90CrMoV18	AISI 440B	425	.00035		
	Stainless steel martensitic – PH	1.4542	X5CrNiCuNb16-4	AISI 630 / ASTM 17-4 PH	130	0.009		
		1.4545	X5CrNiCuNb15-5	ASTM 15-5 PH	425	.00035		
		1.4301	X5CrNi18-10	AISI 304				
		1.4435	X2CrNiMo18-14-3	AISI 316L				
	Stainless steel austenitic	1.4441	X2CrNiMo18-15-3	AISI 316LM	130	0.007		
		1.4539	X1NiCrMoCu25-20-5	AISI 904L	425	.00028		
K	Cast iron	0.6020	GG20	ASTM 30				
		0.6030	GG30	ASTM 40B				
		0.7040	GGG40	ASTM 60-40-18	110	0.007		
		0.7060	GGG60	ASTM 80-60-03	361	.00028		
N	Aluminium alloy wrought	3.2315	AlMgSi1	ASTM 6351	130	0.010		
		3.4365	AlZnMgCu1.5	ASTM 7075	425	.00039		
	Aluminium alloy cast	3.2163	GD-AlSi9Cu3	ASTM A380	130	0.010		
		3.2381	GD-AlSi10Mg	UNS A03590	425	.00039		
	Copper	2.0040	Cu-OF / CW008A	UNS C10100	130	0.012		
		2.0065	Cu-ETP / CW004A	UNS C11000	425	.00047		
	Brass lead free	2.0321	CuZn37 CW508L	UNS C27400	130	0.012		
		2.0360	CuZn40 CW509L	UNS C28000	425	.00047		
	Brass, Bronze Rm < 400 N/mm ²	2.0401	CuZn39Pb3 / CW614N	UNS C38500	130	0.012		
		2.1020	CuSn6	UNS C51900	425	.00047		
		2.0966	CuAl10Ni5Fe4	UNS C63000	130	0.010		
		2.0960	CuAl9Mn2	UNS C63200	425	.00039		
S₁	Super alloys	2.4856		Inconel 625				
		2.4668		Inconel 718				
		2.4617	NiMo28	Hastelloy B-2	110	0.005		
		2.4665	NiCr22Fe18Mo	Hastelloy X	361	.00020		
S₂	Titanium pure	3.7035	Gr.2	ASTM B348 / F67	110	0.009		
		3.7065	Gr.4	ASTM B348 / F68	361	.00035		
	Titanium alloys	3.7165	TiAl6V4	ASTM B348 / F136	110	0.009		
		9.9367	TiAl6Nb7	ASTM F1295	361	.00035		
S₃	CrCo alloys	2.4964	CoCr20W15Ni	Haynes 25	110	0.005		
		2.0960	CrCoMo28	ASTM F1537	361	.00020		
H₁	Hardened steel < 55 HRC	1.2510	100MnCrMoW4	AISI O1				
H₂	Hardened steel ≥ 55 HRC	1.2379	X153CrMoV12	AISI D2				

NEW

Process CrazyMill Cool Square / Corner radius - Z4

ACCURATE AND EFFICIENT MILLING

Coolant type, pressure and filtration

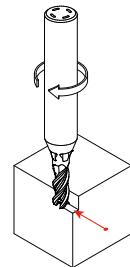
Coolant: for best results, Mikron Tool recommends the use of cutting oil as coolant. Alternatively, water base coolant with EP-Additives (Extreme-Pressure-Additives) can be used as well.

Filter: the large cooling channels permit the use of a standard filter with filter quality of $\leq .002"$ (0.05 mm).

Coolant pressure: at least 15 bar (218 psi) coolant pressure is required to achieve reliable milling. High pressure is generally better for the cooling and flushing effect.

Revolution	[rpm]	$\leq 10'000$	$> 10'000$
Minimal pressure	[bar]	15	30
	[psi]	218	435

Climb milling and conventional milling

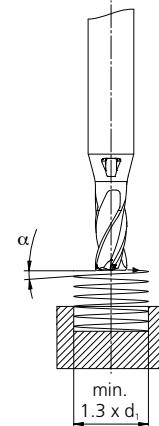


Mikron tool recommends climb milling for the machining of side and pocket milling. The chip thickness here is greater at the beginning and decreases continuously; the cutting forces remain low. With conventional milling, however, high cutting forces would push the milling tool away from the part. Thus surface quality decreases.

MILLING PROCESS

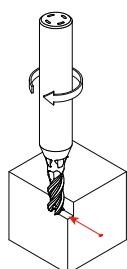
Maximum ramp angles in linear ramping or helical interpolation

	Material	α - Linear ramp	α - Helical interpolation
P	Unalloyed carbon steel	45°	47°
	Low alloyed steel	45°	47°
	High alloyed tool steel	27°	28°
M	Stainless steel ferritic	45°	47°
	Stainless steel martensitic	27°	28°
	Stainless steel martensitic - PH	27°	28°
K	Stainless steel austenitic	45°	47°
	Cast iron	45°	47°
	Aluminium alloy wrought	45°	47°
N	Aluminium alloy cast	45°	47°
	Copper	45°	47°
	Brass lead free	45°	47°
S₁	Brass, Bronze Rm < 400 N/mm ²	45°	47°
	Bronze Rm < 600 N/mm ²	45°	47°
	Super alloys	14°	15°
S₂	Titanium pure and titanium alloys	14°	15°
	CrCo alloys	27°	28°



Note: In case of linear ramping or helical interpolation refer to cutting data for pre-machining with a reduction by 35% of f_z

Pre-machining

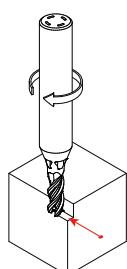


Recommended cutting parameters

v_c and f_z = as specified in the cutting data table

Strategy	Type A	Type C	Type M	Type N
①	$a_p = 1.5 \times d$ $a_e = 0.3 \times d$	$a_p = 2 \times d$ $a_e = 0.1 \times d$	$a_p = 1.5 \times d$ $a_e = 0.2 \times d$	$a_p = 2 \times d$ $a_e = 0.1 \times d$
②	$a_p = 2 \times d$ $a_e = 0.2 \times d$	-	$a_p = 3 \times d$ $a_e = 0.1 \times d$	$a_p = 4 \times d$ $a_e = 0.05 \times d$
③	-	-	$a_p = 3 \times d$ $a_e = 0.05 \times d$	-

Finishing



Recommended cutting parameters

v_c and f_z = as specified in the cutting data table

Strategy	Type A	Type C	Type M	Type N
①	$a_p = 2 \times d$ $a_e = 0.04 \times d$	$a_p = 2 \times d$ $a_e = 0.02 \times d$	$a_p = 3 \times d$ $a_e = 0.02 \times d$	$a_p = 4 \times d$ $a_e = 0.02 \times d$
②	$a_p = 2 \times d$ $a_e = 0.02 \times d$	-	-	-



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