

PATENTED

CrazyMill Cool P&S

CRAZYMILL
Cool



PLUNGE MILL FOR SLOTS AND POCKETS IN MINIMAL SPACES



With CrazyMill Cool P&S, Mikron Tool introduces a new 3-flutes milling cutter for the rough and finish milling of many materials, with emphasis on stainless steels, titanium, super alloys and CrCo alloys. This square micro-cutter is available in diameters from 1 mm to 8 mm and with milling depth up to 5 x d.

Due to its special features such as cutting geometry and integrated cooling, CrazyMill Cool P&S is capable of plunging perpendicularly into the material and impresses with its speed, output, performance as well as the high tool life and surface quality. This tool is well adapted for the milling of slots, pockets and sides in minimal spaces. An example of these applications is the keyway that can be found in transmission shafts.

NEW

NEW

Highest performance in smallest dimensions

2.5 x d

5 x d

PLUNGE AND SLOT END MILL WITH INTEGRATED COOLING

With the CrazyMill Cool P&S Mikron Tool expands its range of milling cutters for difficult to machine materials. The three flute milling cutter allows perpendicular plunging with subsequent milling into solid material. Available with integrated cooling, in the diameter range from 1 to 8 mm and for maximal milling depth of 5 x d.

■ CrazyMill Cool P&S, type A – milling depth 2.5 x d, cutting length 2.5 x d, through shaft cooling, Z = 3

■ CrazyMill Cool P&S, type C – milling depth 5 x d, cutting length 2 x d, through shaft cooling, Z = 3



- Coated
- Through-tool cooling

Type A

- Coated
- Through-tool cooling



Type C

PATENTED

1 | SHANK
The robust carbide shank guarantees stable and vibration-free milling. A high degree of precision and excellent surface quality is achieved.

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 as well as improved 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 material build-up on cutting edges and guarantees optimum chip flushing. The result is long tool life.

5 | FLUTE GEOMETRY
The specially designed flutes provide high stability and sufficient space for perfect chip evacuation.

6 | GEOMETRY OF THE END FACE
The specially designed expanded chip collection section in the end face guarantees good chip evacuation when plunging. A correction in the web prevents edge breakout, reduces the penetration force and increases tool life.

End face geometry - 3 Flute



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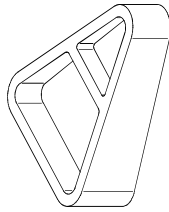
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NEW

Benefits and applications

ROUGHING AND FINISHING CUTTER WITH INTEGRATED COOLING, FROM 1 MM

- **SHORT MACHINING TIME** | up to 5 times faster
- **LONG TOOL LIFE** | due to efficient cooling
- **HIGH DEGREE OF PROCESS RELIABILITY** | due to through shank coolant
- **HIGH SURFACE QUALITY** | due to anti-vibration geometry



COMPONENT
Steering component

MATERIAL
X2CrNiMo18-14-3 / 1.4435 / AISI 316L

- MACHINING**
- ① Plunging
 - ② Slotting
 - ③ Finishing
 - d = 6 mm
 - Milling depth = 14.4 mm

MILLING TOOL
Mikron Tool - CrazyMill Cool P&S

| DATA | MIKRON TOOL |
|--------------|--|
| Tool type | CrazyMill Cool P&S - Carbide - Coated - Integrated cooling |
| Item number | 2,CMC42,A8Z3,600,1 |
| Cutting data | ① Plunging $V_c = 160$ m/min $f_{sp} = 0.005$ mm $a_p = 1 \times d$ |
| | ② Slotting $V_c = 160$ m/min $f_{cs} = 0.025$ mm $a_p = 1 \times d$ |
| | ③ Finishing $V_c = 220$ m/min $f_c = 0.026$ mm $a_p = 2.5 \times d$ $a_e = 0.3$ mm |



| APPLICATION DOMAINS | COMPONENTS EXAMPLES |
|------------------------|---------------------------------|
| Dental | Tooth crown |
| Medical technology | Component for endoscope system |
| Automotive industry | Components for injection system |
| Mechanical engineering | Machine components |
| Watches | Watch housing |
| Food industry | Nozzle |
| Aerospace industry | Engine parts |
| Power industry | Blade |

| MATERIALS GROUPS | Mat. no. | EXAMPLES DIN | EXAMPLES ANSI / ASTM / UNS |
|--|----------|-----------------|----------------------------|
| Group P Unalloyed and alloyed steel | 1,0401 | C15 | 1015 |
| | 1,3505 | 100Cr6 | 52100 |
| | 1,2436 | X210CrWMn | D4 / D6 |
| Group M Stainless steel | 1,4105 | X6CrMoS17 | 430F |
| | 1,4112 | X9CrMoV18 | 4408 |
| | 1,4301 | X5CrNi 18-10 | 304 |
| Group K Cast iron | 0,7040 | GGG40 | 60-40-18 |
| Group N Non ferrous metals | 3,2315 | AlMgSi1 | 6351 |
| | 3,2163 | GD-AL59Cu3 | A380 |
| | 2,004 | Cu-OF / CuM008A | C10100 |
| | 2,0321 | CuZn37 CW508L | C27400 |
| | 2,102 | Cu5Ni6 | C51900 |
| Group S1 Super alloys | 2,096 | CuAlBMn2 | C63200 |
| | 2,4856 | | INCONEL 625 |
| Group S2 Titanium (pure and alloyed) | 2,4665 | NiCr22Fe18Mo | HASTELLOY X |
| | 3,7035 | Gz2 | B348 / F167 |
| Group S3 CrCo alloys | 3,7165 | TiAl6V4 | B348 / F136 |
| | 2,4964 | Co-C20W15Ni | HAYNES 25 |

NEW

One tool for many applications

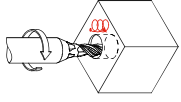
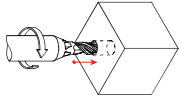
FOR DIFFICULT TO MACHINE MATERIALS

CrazyMill Cool P&S for:



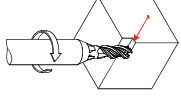
1. Plunge milling

Direct or with helical interpolation



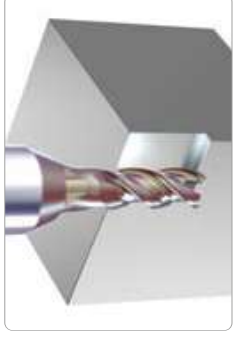
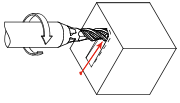
4. Side milling - Semi-finishing

$a_p = \max. 1 \times d$



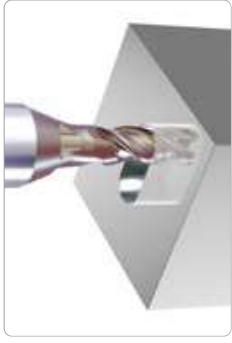
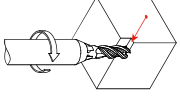
2. Linear ramp milling

Angle depending on material



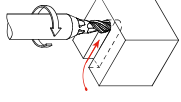
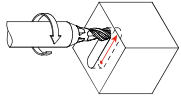
5. Side milling - Finishing

$a_p = 2.5 \times d$



3. Slot milling

Pockets or through slots



NEW

CrazyMill Cool P&S

MILLING WITH INTEGRATED COOLING

CrazyMill Cool P&S end-mill is especially developed with 3 flutes for the rough and finish milling of stainless steels, titanium, super alloys and CrCo alloys. Its strengths include high cutting speeds, high removal rate, a long tool life and excellent surface quality.

The special edge geometry provides a stable and vibration-free "Drilling" (perpendicular plunging) up to 1 x D. A correction in the center stabilizes the web (no breakout), reduces penetration force and helps increase tool life. Due to the specially designed chip space in the head of the tool, chips are evacuated into the flutes when plunging. The design of the flutes creates enough space for perfect chip evacuation and simultaneously guarantees robust stability for the lateral milling process up to 5 x D.

In the shank, integrated ducts provide a constant and massive coolant flow instrumental for an efficient chip evacuation from the milling area. This concept is ideally suited to machine grooves, slots and pockets since chips are flushed out even from tight and angled spaces. The surface quality improves significantly and reaches finishing quality when milling into solid material. Moreover, the cooling prevents an overheating of the cutting edges and thus guarantees long tool life and significantly higher chip removal compared to conventional milling.

Coolant type, pressure and filtration

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

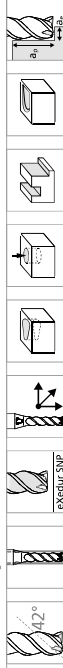
Please note

You couldn't find your suitable version of the CrazyMill Cool P&S (diameter, length, cutting direction...)? Ask us about our customized versions!

Regrinding: This product is not suitable for regrinding.

Type A - 2.5 x d - Square - Z3

Carbide Z3

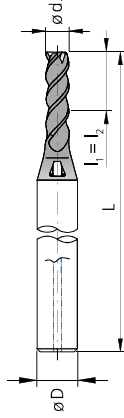


Ø d. 1,0 - 8,0 mm

Tolerance 0 - 0,02 mm

l₁ = Effective length
l₂ = Cutting length

P&S - Square



| d ₁ | d ₁ | l ₁ | l ₂ | l ₁ | l ₂ | D | L | Item number | Availability |
|----------------|----------------|----------------|----------------|----------------|----------------|------|------|--------------------|--------------|
| [mm] | [inch] | [mm] | [mm] | [mm] | [mm] | (H6) | [mm] | | |
| 1,0 | | 2,50 | 2,50 | 4 | 40 | | 40 | Z.CMC42.AB23.100.1 | ■ |
| 1,1 | | 2,75 | 2,75 | 4 | 40 | | 40 | Z.CMC42.AB23.110.1 | ■ |
| 1,2 | | 3,00 | 3,00 | 4 | 40 | | 40 | Z.CMC42.AB23.120.1 | ■ |
| 1,3 | | 3,25 | 3,25 | 4 | 40 | | 40 | Z.CMC42.AB23.130.1 | ■ |
| 1,4 | | 3,50 | 3,50 | 4 | 40 | | 40 | Z.CMC42.AB23.140.1 | ■ |
| 1,5 | | 3,75 | 3,75 | 4 | 40 | | 40 | Z.CMC42.AB23.150.1 | ■ |
| 1,587 | 1/16 | 3,97 | 3,97 | 4 | 40 | | 40 | Z.CMC.PSS.AZ3.F116 | ■ |
| 1,6 | | 4,00 | 4,00 | 4 | 40 | | 40 | Z.CMC42.AB23.160.1 | ■ |
| 1,7 | | 4,25 | 4,25 | 4 | 40 | | 40 | Z.CMC42.AB23.170.1 | ■ |
| 1,8 | | 4,50 | 4,50 | 4 | 40 | | 40 | Z.CMC42.AB23.180.1 | ■ |
| 1,9 | | 4,75 | 4,75 | 4 | 40 | | 40 | Z.CMC42.AB23.190.1 | ■ |
| 2,0 | | 5,00 | 5,00 | 4 | 40 | | 40 | Z.CMC42.AB23.200.1 | ■ |
| 2,1 | | 5,25 | 5,25 | 4 | 40 | | 40 | Z.CMC42.AB23.210.1 | ■ |
| 2,2 | | 5,50 | 5,50 | 4 | 40 | | 40 | Z.CMC42.AB23.220.1 | ■ |
| 2,3 | | 5,75 | 5,75 | 4 | 40 | | 40 | Z.CMC42.AB23.230.1 | ■ |
| 2,381 | 3/32 | 5,95 | 5,95 | 4 | 40 | | 40 | Z.CMC.PSS.AZ3.F332 | ■ |
| 2,4 | | 6,00 | 6,00 | 4 | 40 | | 40 | Z.CMC42.AB23.240.1 | ■ |
| 2,5 | | 6,25 | 6,25 | 6 | 50 | | 50 | Z.CMC42.AB23.250.1 | ■ |
| 2,6 | | 6,50 | 6,50 | 6 | 50 | | 50 | Z.CMC42.AB23.260.1 | ■ |
| 2,7 | | 6,75 | 6,75 | 6 | 50 | | 50 | Z.CMC42.AB23.270.1 | ■ |
| 2,8 | | 7,00 | 7,00 | 6 | 50 | | 50 | Z.CMC42.AB23.280.1 | ■ |
| 2,9 | | 7,25 | 7,25 | 6 | 50 | | 50 | Z.CMC42.AB23.290.1 | ■ |
| 3,0 | | 7,50 | 7,50 | 6 | 50 | | 50 | Z.CMC42.AB23.300.1 | ■ |
| 3,1 | | 7,75 | 7,75 | 6 | 50 | | 50 | Z.CMC42.AB23.310.1 | ■ |
| 3,175 | 1/8 | 7,94 | 7,94 | 6 | 50 | | 50 | Z.CMC.PSS.AZ3.F18 | ■ |
| 3,3 | | 8,25 | 8,25 | 6 | 50 | | 50 | Z.CMC42.AB23.330.1 | ■ |
| 3,7 | | 9,25 | 9,25 | 6 | 50 | | 50 | Z.CMC42.AB23.370.1 | ■ |
| 3,968 | 5/32 | 9,92 | 9,92 | 6 | 50 | | 50 | Z.CMC.PSS.AZ3.F532 | ■ |
| 4,0 | | 10,00 | 10,00 | 6 | 50 | | 50 | Z.CMC42.AB23.400.1 | ■ |
| 4,3 | | 10,75 | 10,75 | 8 | 60 | | 60 | Z.CMC42.AB23.430.1 | ■ |
| 4,7 | | 11,75 | 11,75 | 8 | 60 | | 60 | Z.CMC42.AB23.470.1 | ■ |
| 4,762 | 3/16 | 11,91 | 11,91 | 8 | 60 | | 60 | Z.CMC.PSS.AZ3.F316 | ■ |
| 4,8 | | 12,00 | 12,00 | 8 | 60 | | 60 | Z.CMC42.AB23.480.1 | ■ |
| 5,0 | | 12,50 | 12,50 | 8 | 60 | | 60 | Z.CMC42.AB23.500.1 | ■ |
| 5,3 | | 13,25 | 13,25 | 10 | 65 | | 65 | Z.CMC42.AB23.530.1 | ■ |
| 5,560 | 7/32 | 13,90 | 13,90 | 10 | 65 | | 65 | Z.CMC.PSS.AZ3.F732 | ■ |
| 5,7 | | 14,25 | 14,25 | 10 | 65 | | 65 | Z.CMC42.AB23.570.1 | ■ |
| 6,0 | | 15,00 | 15,00 | 10 | 65 | | 65 | Z.CMC42.AB23.600.1 | ■ |
| 6,350 | 1/4 | 15,88 | 15,88 | 10 | 65 | | 65 | Z.CMC.PSS.AZ3.F14 | ■ |
| 8,0 | | 20,00 | 20,00 | 12 | 80 | | 80 | Z.CMC42.AB23.800.1 | ■ |

■ Stock item

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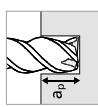
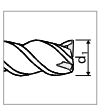
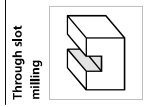
Type A - Milling of through slots

MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

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



| Materials group | Material | Mat. no. | DIN | 1.0 mm | | | 1.5 mm | | | 2.0 mm | | | 3.0 mm | | | 4.0 mm | | | 5.0 mm | | | 6.0 mm - 8.0 mm | | | | | | |
|-----------------|--|----------|---------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|-----------------|----------------|----------------|--------|-----|-------|------|
| | | | | V _c | f _r | a _p | V _c | f _r | a _p | V _c | f _r | a _p | V _c | f _r | a _p | V _c | f _r | a _p | V _c | f _r | a _p | V _c | f _r | a _p | | | | |
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 1.0401 | C15 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 1.1191 | C45E/CK45 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Low alloyed steel Rm > 900 N/mm² | 1.0044 | S275JR | | 140 | 0.009 | 1xd1 | 180 | 0.015 | 1xd1 | 200 | 0.020 | 1xd1 | 220 | 0.029 | 1xd1 | 230 | 0.031 | 1xd1 | 240 | 0.031 | 1xd1 | 240 | 0.031 | 1xd1 | 260 | 0.032 | 1xd1 |
| | | 1.0715 | S15Mn30 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 1.5752 | S15NCr13 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 1.7131 | S16MnCr5 | | 140 | 0.008 | 1xd1 | 180 | 0.013 | 1xd1 | 200 | 0.019 | 1xd1 | 220 | 0.028 | 1xd1 | 230 | 0.029 | 1xd1 | 240 | 0.030 | 1xd1 | 260 | 0.031 | 1xd1 | | | |
| | | 1.3505 | 100Cr6 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 1.7225 | 42CrMn4 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 1.2842 | 90MnCrV8 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 1.2379 | X155CrMoV12 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 1.2436 | X210CrW12 | | 140 | 0.006 | 0.5xd1 | 180 | 0.012 | 0.5xd1 | 200 | 0.017 | 0.5xd1 | 220 | 0.025 | 0.5xd1 | 230 | 0.026 | 0.5xd1 | 240 | 0.026 | 0.5xd1 | 260 | 0.027 | 0.5xd1 | | | |
| | | 1.3343 | H66-5-2C | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1.2355 | HS18-0-1 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | | 140 | 0.009 | 1xd1 | 180 | 0.015 | 1xd1 | 200 | 0.020 | 1xd1 | 220 | 0.028 | 1xd1 | 230 | 0.029 | 1xd1 | 240 | 0.030 | 1xd1 | 260 | 0.031 | 1xd1 | | | |
| | | 1.4105 | X6CrMoS17 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 1.4105 | X6CrMoS17 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Stainless steel austenitic | 1.4034 | X4CrCr13 | | 140 | 0.009 | 1xd1 | 180 | 0.013 | 1xd1 | 200 | 0.019 | 1xd1 | 220 | 0.027 | 1xd1 | 230 | 0.028 | 1xd1 | 240 | 0.029 | 1xd1 | 260 | 0.029 | 1xd1 | | | |
| | | 1.4112 | X9CrMoV18 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Stainless steel martensitic - PH | 1.4542 | X5CrNiCuNb16-4 | | 140 | 0.009 | 1xd1 | 180 | 0.013 | 1xd1 | 200 | 0.019 | 1xd1 | 220 | 0.027 | 1xd1 | 230 | 0.028 | 1xd1 | 240 | 0.029 | 1xd1 | 260 | 0.029 | 1xd1 | | | |
| | | 1.4545 | X5CrNiCuNb15-5 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 1.4301 | X5CrNi18-10 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 1.4435 | X2CrNiMo18-14-3 | | 140 | 0.007 | 1xd1 | 180 | 0.011 | 1xd1 | 200 | 0.017 | 1xd1 | 220 | 0.025 | 1xd1 | 230 | 0.027 | 1xd1 | 240 | 0.027 | 1xd1 | 260 | 0.028 | 1xd1 | | | |
| | | 1.4441 | X2CrNiMo18-15-3 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 1.4435 | X1NiCrMoCu25-20-5 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 0.6020 | G620 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 0.6030 | G630 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0.7040 | G640 | | 120 | 0.007 | 1xd1 | 140 | 0.015 | 1xd1 | 160 | 0.017 | 1xd1 | 180 | 0.025 | 1xd1 | 200 | 0.031 | 1xd1 | 200 | 0.031 | 1xd1 | 200 | 0.032 | 1xd1 | | | | | |
| 0.7060 | G660 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| N | Aluminum alloy wrought | 3.2315 | AlMgSi1 | | 140 | 0.010 | 1xd1 | 180 | 0.016 | 1xd1 | 200 | 0.021 | 1xd1 | 220 | 0.034 | 1xd1 | 260 | 0.035 | 1xd1 | 300 | 0.036 | 1xd1 | 340 | 0.037 | 1xd1 | | | |
| | | 3.4365 | AlZnMgCu1.5 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 3.2163 | GD-ALSi9Cu3 | | 140 | 0.010 | 1xd1 | 180 | 0.016 | 1xd1 | 200 | 0.021 | 1xd1 | 220 | 0.032 | 1xd1 | 260 | 0.034 | 1xd1 | 300 | 0.034 | 1xd1 | 340 | 0.036 | 1xd1 | | | |
| | Aluminum alloy cast | 3.2381 | GD-ALSi10Mg | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 2.0040 | CU-OF / CW008A | | 140 | 0.012 | 1xd1 | 180 | 0.016 | 1xd1 | 200 | 0.021 | 1xd1 | 220 | 0.034 | 1xd1 | 260 | 0.035 | 1xd1 | 300 | 0.036 | 1xd1 | 340 | 0.037 | 1xd1 | | | |
| | | 2.0065 | CU-ETP / CW004A | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 2.0321 | CUZn37 / CW008L | | 140 | 0.012 | 1xd1 | 180 | 0.016 | 1xd1 | 200 | 0.021 | 1xd1 | 220 | 0.034 | 1xd1 | 260 | 0.035 | 1xd1 | 300 | 0.036 | 1xd1 | 340 | 0.037 | 1xd1 | | | |
| | | 2.0360 | CUZn40 / CW009L | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 2.0401 | CUZn39PB3 / CW0614N | | 140 | 0.012 | 1xd1 | 180 | 0.016 | 1xd1 | 200 | 0.021 | 1xd1 | 220 | 0.034 | 1xd1 | 260 | 0.035 | 1xd1 | 300 | 0.036 | 1xd1 | 340 | 0.037 | 1xd1 | | | |
| | | 2.0956 | CUAl10Ni5Fe4 | | 140 | 0.011 | 1xd1 | 180 | 0.016 | 1xd1 | 200 | 0.021 | 1xd1 | 220 | 0.034 | 1xd1 | 260 | 0.035 | 1xd1 | 300 | 0.036 | 1xd1 | 340 | 0.037 | 1xd1 | | | |
| | | 2.0960 | CUAl9Ni2 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 2.4856 | Inconel 625 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 2.4668 | NiMe28 | | 80 | 0.005 | 0.5xd1 | 100 | 0.006 | 0.5xd1 | 100 | 0.007 | 0.5xd1 | 120 | 0.010 | 0.5xd1 | 120 | 0.013 | 0.5xd1 | 120 | 0.013 | 0.5xd1 | 120 | 0.013 | 0.5xd1 | | | |
| 2.4617 | Hastelloy B-2 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2.4665 | NC122Fe18Mo | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| S1 | Titanium pure | 3.7035 | Gr2 | | 100 | 0.009 | 0.5xd1 | 100 | 0.012 | 0.5xd1 | 120 | 0.017 | 0.5xd1 | 120 | 0.027 | 0.5xd1 | 140 | 0.027 | 0.5xd1 | 140 | 0.027 | 0.5xd1 | 140 | 0.028 | 0.5xd1 | | | |
| | | 3.7065 | Gr4 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 3.7165 | TiAl6V4 | | 100 | 0.009 | 0.5xd1 | 100 | 0.012 | 0.5xd1 | 120 | 0.017 | 0.5xd1 | 120 | 0.027 | 0.5xd1 | 140 | 0.027 | 0.5xd1 | 140 | 0.028 | 0.5xd1 | | | | | | |
| | | 9.9367 | TiAl6Nb7 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 2.4954 | CoCr20W15Ni | | 80 | 0.005 | 0.5xd1 | 80 | 0.006 | 0.5xd1 | 100 | 0.007 | 0.5xd1 | 100 | 0.010 | 0.5xd1 | 120 | 0.013 | 0.5xd1 | 120 | 0.013 | 0.5xd1 | | | | | | |
| S2 | Titanium alloys | 3.7065 | Gr4 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 9.9367 | TiAl6Nb7 | | | | | | | | | | | | | | | | | | | | | | | | | |
| S3 | CrCo alloys | 3.7065 | Gr4 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 9.9367 | TiAl6Nb7 | | | | | | | | | | | | | | | | | | | | | | | | | |
| H1 | Hardened steel < 35 HRC | 1.2510 | 100MnCrMoW4 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 1.2379 | X153CrMoV12 | | | | | | | | | | | | | | | | | | | | | | | | | |
| H2 | Hardened steel ≥ 35 HRC | 1.2510 | 100MnCrMoW4 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 1.2379 | X153CrMoV12 | | | | | | | | | | | | | | | | | | | | | | | | | |



NEW

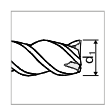
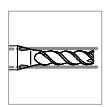
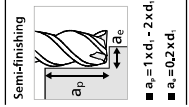
Type A - Side milling - Semi-finishing

MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

RECOMMENDATION FOR USE
 ● Excellent | ○ Good | ◯ Acceptable | ⊗ Not recommended



| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | 1,0 mm | | | 1,5 mm | | | 2,0 mm | | | 3,0 mm | | | 4,0 mm | | | 5,0 mm | | | 6,0 mm | | | 8,0 mm | | | |
|-----------------|--|----------|-----------------------------|-------------------------|----------------|-----------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|--|
| | | | | | V _c | f _a | f _i | V _c | f _a | f _i | V _c | f _a | f _i | V _c | f _a | f _i | V _c | f _a | f _i | V _c | f _a | f _i | V _c | f _a | f _i | V _c | f _a | f _i | |
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 1.0401 | C15 | AISI 1015 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 1.1191 | C45E/Ck45 | AISI 1045 | 140 | 0.013 | | | | | | | | | | | | | | | | | | | | | | | |
| | | 1.0044 | S275JR | AISI 1020 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 1.0715 | S15Mn30 | AISI 1215 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 1.5752 | S15NCr13 | ASTM A315 / AISI 3310 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 1.7131 | S16MnCr5 | AISI 5115 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 1.3505 | 100Cr6 | AISI 52100 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 1.7225 | 42CrMn4 | AISI 4140 | 140 | 0.012 | | | | | | | | | | | | | | | | | | | | | | | |
| | | 1.2842 | 90MnCrV8 | AISI 02 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 1.2379 | X153CrMoV12 | AISI D2 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 1.3343 | H56-5-Z | AISI M2 / UNS T1302 | 140 | 0.009 | | | | | | | | | | | | | | | | | | | | | | | |
| | | 1.3355 | H51B-0-1 | AISI T1 / UNS T1201 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | 140 | 0.014 | | | | | | | | | | | | | | | | | | | | | |
| 1.4105 | X6CrMnSi17 | | | AISI 430F | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1.4034 | X4CrCr13 | | | AISI 420C | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1.4112 | X9CrCoMoV18 | | | AISI 440B | 140 | 0.013 | | | | | | | | | | | | | | | | | | | | | | | |
| 1.4542 | X5CrNiCuNb16-4 | | | AISI 630 / ASTM 17-4 PH | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1.4545 | X5CrNiCuNb15-5 | | | ASTM 15-5 PH | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1.4301 | X5CrNi18-10 | | | AISI 304 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1.4435 | X2CrNiMo18-14-3 | | | AISI 316L | 140 | 0.010 | | | | | | | | | | | | | | | | | | | | | | | |
| 1.4441 | X2CrNiMo18-15-3 | | | AISI 316LM | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1.4539 | X1NiCrMoCu25-20-5 | | | AISI 904L | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0.6020 | G620 | | | ASTM 30 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0.6030 | G630 | | | ASTM 40B | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0.7040 | G640 | | | ASTM 60-40-18 | 120 | 0.009 | | | | | | | | | | | | | | | | | | | | | | | |
| 0.7060 | G660 | | | ASTM 60-60-03 | | | | | | | | | | | | | | | | | | | | | | | | | |
| N | Aluminum alloy wrought | | | 3.2315 | AlMgSi1 | ASTM 6351 | 140 | 0.015 | | | | | | | | | | | | | | | | | | | | | |
| | | 3.4365 | AlZnMgCu15 | ASTM 7075 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 3.2163 | GD-AlSi9Cu3 | ASTM A380 | 140 | 0.015 | | | | | | | | | | | | | | | | | | | | | | | |
| | | 3.2381 | GD-AlSi10Mg | UNS A93590 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 2.0040 | Cu-Pb / CW008A | UNS C10100 | 140 | 0.017 | | | | | | | | | | | | | | | | | | | | | | | |
| | | 2.0065 | Cu-Pb / CW004A | UNS C11000 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 2.0321 | CuZn37 / CW508L | UNS C27400 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 2.0360 | CuZn40 / CW509L | UNS C28000 | 140 | 0.017 | | | | | | | | | | | | | | | | | | | | | | | |
| | | 2.0401 | CuZn39Pb3 / CW614N | UNS C38500 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 2.1020 | CuSn6 | UNS C51900 | 140 | 0.017 | | | | | | | | | | | | | | | | | | | | | | | |
| | | 2.0956 | CuAl10Ni5Fe4 | UNS C63000 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 2.0960 | CuAl9Ni2 | UNS C63200 | 140 | 0.015 | | | | | | | | | | | | | | | | | | | | | | | |
| | | S1 | Super alloys | 2.4856 | Inconel 625 | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | 2.4668 | NiMo28 | Inconel 718 | 80 | 0.006 | | | | | | | | | | | | | | | | | | | | | |
| | | | | 2.4618 | NiCr22Fe18Mo | Hastelloy B-2 | | | | | | | | | | | | | | | | | | | | | | | |
| 2.4655 | NC122Fe18Mo | | | Hastelloy X | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3.7035 | Ti2 | | | ASTM B348 / F167 | 120 | 0.014 | | | | | | | | | | | | | | | | | | | | | | | |
| S2 | Titanium pure | 3.7065 | Ti4 | ASTM B348 / F168 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 3.7165 | TiAl6V4 | ASTM B348 / F136 | 120 | 0.014 | | | | | | | | | | | | | | | | | | | | | | | |
| S3 | Titanium alloys | 9.9367 | TiAl6Nb7 | ASTM F1295 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 2.4954 | CoCr20W15Ni | Haynes 25 | 80 | 0.006 | | | | | | | | | | | | | | | | | | | | | | | |
| H1 | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 1.2379 | X153CrMoV12 | AISI D2 | | | | | | | | | | | | | | | | | | | | | | | | | |
| H2 | Hardened steel ≥ 55 HRC | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |



NEW

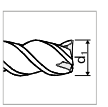
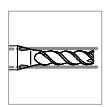
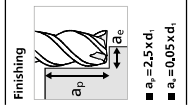
Type A - Side milling - Finishing

MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

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



| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | 1.0 mm | | | 1.5 mm 1/16" | | | 2.0 mm 3/32" | | | 3.0 mm 1/8" | | | 4.0 mm 5/32" | | | 5.0 mm 3/16" - 7/32" | | | 6.0 mm 1/4" | | | 8.0 mm | | |
|-----------------|--|---------------------|--------------------|-------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| | | | | | V _c | f _s | f _i | V _c | f _s | f _i | V _c | f _s | f _i | V _c | f _s | f _i | V _c | f _s | f _i | V _c | f _s | f _i | V _c | f _s | f _i | V _c | f _s | f _i |
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 1.0401 | C15 | AISI 1015 | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 1.1191 | C45E/CK45 | AISI 1045 | | | | | | | | | | | | | | | | | | | | | | | | |
| | Low alloyed steel Rm > 900 N/mm² | 1.0044 | S275JR | AISI 1020 | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 1.0715 | 11SMn30 | AISI 1215 | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 1.5752 | 15NiCr13 | ASTM A315 / AISI 3310 | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 1.7131 | 16MnCr5 | AISI 5115 | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 1.3505 | 100Cr6 | AISI 52100 | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 1.7225 | 42CrMn4 | AISI 4140 | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 1.2842 | 90MnCrV8 | AISI 02 | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 1.2379 | X153CrMoV12 | AISI D2 | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 1.3343 | H56-5-Z | AISI M2 / UNS T1302 | | | | | | | | | | | | | | | | | | | | | | | | |
| 1.3355 | H51B-0-1 | AISI T1 / UNS T1201 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| M | Stainless steel ferritic | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 1.4105 | X6CrMoS17 | AISI 430F | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 1.4034 | X4Cr13 | AISI 420C | | | | | | | | | | | | | | | | | | | | | | | | |
| | Stainless steel martensitic | 1.4112 | X9CrMoV18 | AISI 440B | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 1.4542 | X5CrNiCuNb16-4 | AISI 630 / ASTM 17-4 PH | | | | | | | | | | | | | | | | | | | | | | | | |
| | Stainless steel austenitic | 1.4545 | X5CrNiCuNb15-5 | ASTM 15-5 PH | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 1.4301 | X5CrNi18-10 | AISI 304 | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 1.4435 | X2CrNiMo18-14-3 | AISI 316L | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 1.4441 | X2CrNiMo18-15-3 | AISI 316LM | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 1.4539 | X1NiCrMoCu25-20-5 | AISI 904L | | | | | | | | | | | | | | | | | | | | | | | | |
| K | Cast iron | 0.6020 | GG20 | ASTM 30 | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 0.6030 | GG30 | ASTM 40B | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 0.7040 | GG40 | ASTM 60-40-18 | | | | | | | | | | | | | | | | | | | | | | | | |
| N | Aluminum alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 3.4365 | AlZnMgCu15 | ASTM 7075 | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 3.2163 | GD-ALSi9Cu3 | ASTM A380 | | | | | | | | | | | | | | | | | | | | | | | | |
| | Aluminum alloy cast | 3.2381 | GD-ALSi10Mg | UNS A93590 | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 2.0040 | CU-OF / CW008A | UNS C10100 | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 2.0065 | CU-ETP / CW004A | UNS C11000 | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 2.0321 | CUZn37 / CW008L | UNS C27400 | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 2.0360 | CUZn40 / CW009L | UNS C28000 | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 2.0401 | CUZn39PB3 / CW014N | UNS C38500 | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 2.1020 | CU56 | UNS C51900 | | | | | | | | | | | | | | | | | | | | | | | | |
| S1 | Super alloys | 2.0956 | CUAlTiNi5Fe4 | UNS C63000 | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 2.0960 | CUAl9Ni2 | UNS C63200 | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 2.4856 | Inconel 625 | Inconel 625 | | | | | | | | | | | | | | | | | | | | | | | | |
| S2 | Titanium pure | 2.4668 | NiMo28 | Inconel 718 | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 2.4678 | NiMo28 | Hastelloy B-2 | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 2.4655 | NI22Fe18Mo | Hastelloy X | | | | | | | | | | | | | | | | | | | | | | | | |
| S3 | Titanium alloys | 3.7035 | Ti2 | ASTM B348 / F157 | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 3.7065 | Ti4 | ASTM B348 / F156 | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 3.7165 | TiAl6V4 | ASTM B348 / F136 | | | | | | | | | | | | | | | | | | | | | | | | |
| H1 | Hardened steel < 55 HRC | 9.9367 | TiAl6Nb7 | ASTM F1295 | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 2.4954 | CoCr20W15Ni | Haynes 25 | | | | | | | | | | | | | | | | | | | | | | | | |
| H2 | Hardened steel > 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 1.2379 | X153CrMoV12 | AISI D2 | | | | | | | | | | | | | | | | | | | | | | | | |



NEW

Type C - 5 x d - Square - Z3

Z3

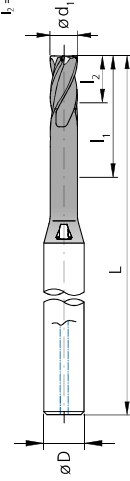
Carbide



P&S - Square



l_1 = Effective length
 l_2 = Cutting length



| d ₁ [mm] | d ₁ [inch] | l ₁ [mm] | l ₂ [mm] | D (h6) [mm] | L [mm] | Item number | Availability |
|------------------------|--------------------------|------------------------|------------------------|-------------------|-----------|--------------------|--------------|
| 1.0 | | 5.00 | 2.00 | 4 | 40 | 2.CMC42.C1Z3.100.1 | ■ |
| 1.1 | | 5.50 | 2.20 | 4 | 40 | 2.CMC42.C1Z3.110.1 | ■ |
| 1.2 | | 6.00 | 2.40 | 4 | 40 | 2.CMC42.C1Z3.120.1 | ■ |
| 1.3 | | 6.50 | 2.60 | 4 | 40 | 2.CMC42.C1Z3.130.1 | ■ |
| 1.4 | | 7.00 | 2.80 | 4 | 40 | 2.CMC42.C1Z3.140.1 | ■ |
| 1.5 | | 7.50 | 3.00 | 4 | 40 | 2.CMC42.C1Z3.150.1 | ■ |
| 1.587 | 1/16 | 7.94 | 3.17 | 4 | 45 | 2.CMC.PSSCZ3.F116 | ■ |
| 1.6 | | 8.00 | 3.20 | 4 | 45 | 2.CMC42.C1Z3.160.1 | ■ |
| 1.7 | | 8.50 | 3.40 | 4 | 45 | 2.CMC42.C1Z3.170.1 | ■ |
| 1.8 | | 9.00 | 3.60 | 4 | 45 | 2.CMC42.C1Z3.180.1 | ■ |
| 1.9 | | 9.50 | 3.80 | 4 | 44 | 2.CMC42.C1Z3.190.1 | ■ |
| 2.0 | | 10.00 | 4.00 | 4 | 44 | 2.CMC42.C1Z3.200.1 | ■ |
| 2.1 | | 10.50 | 4.20 | 4 | 44 | 2.CMC42.C1Z3.210.1 | ■ |
| 2.2 | | 11.00 | 4.40 | 4 | 44 | 2.CMC42.C1Z3.220.1 | ■ |
| 2.3 | | 11.50 | 4.60 | 4 | 44 | 2.CMC42.C1Z3.230.1 | ■ |
| 2.381 | 3/32 | 11.91 | 4.76 | 4 | 44 | 2.CMC.PSSCZ3.F332 | ■ |
| 2.4 | | 12.00 | 4.80 | 4 | 44 | 2.CMC42.C1Z3.240.1 | ■ |
| 2.5 | | 12.50 | 5.00 | 6 | 55 | 2.CMC42.C1Z3.250.1 | ■ |
| 2.6 | | 13.00 | 5.20 | 6 | 55 | 2.CMC42.C1Z3.260.1 | ■ |
| 2.7 | | 13.50 | 5.40 | 6 | 55 | 2.CMC42.C1Z3.270.1 | ■ |

■ Stock item

| d ₁ [mm] | d ₁ [inch] | l ₁ [mm] | l ₂ [mm] | D (h6) [mm] | L [mm] | Item number | Availability |
|------------------------|--------------------------|------------------------|------------------------|-------------------|-----------|--------------------|--------------|
| 2.8 | | 14.00 | 5.60 | 6 | 55 | 2.CMC42.C1Z3.280.1 | ■ |
| 2.9 | | 14.50 | 5.80 | 6 | 55 | 2.CMC42.C1Z3.290.1 | ■ |
| 3.0 | | 15.00 | 6.00 | 6 | 55 | 2.CMC42.C1Z3.300.1 | ■ |
| 3.1 | | 15.50 | 6.20 | 6 | 60 | 2.CMC42.C1Z3.310.1 | ■ |
| 3.175 | 1/8 | 15.88 | 6.35 | 6 | 60 | 2.CMC.PSSCZ3.F18 | ■ |
| 3.3 | | 16.50 | 6.60 | 6 | 60 | 2.CMC42.C1Z3.330.1 | ■ |
| 3.7 | | 18.50 | 7.40 | 6 | 60 | 2.CMC42.C1Z3.370.1 | ■ |
| 3.968 | 5/32 | 19.84 | 7.94 | 6 | 60 | 2.CMC.PSSCZ3.F52 | ■ |
| 4.0 | | 20.00 | 8.00 | 6 | 60 | 2.CMC42.C1Z3.400.1 | ■ |
| 4.3 | | 21.50 | 8.60 | 8 | 70 | 2.CMC42.C1Z3.430.1 | ■ |
| 4.7 | | 23.50 | 9.40 | 8 | 70 | 2.CMC42.C1Z3.470.1 | ■ |
| 4.762 | 3/16 | 23.81 | 9.52 | 8 | 70 | 2.CMC.PSSCZ3.F16 | ■ |
| 4.8 | | 24.00 | 9.60 | 8 | 70 | 2.CMC42.C1Z3.480.1 | ■ |
| 5.0 | | 25.00 | 10.00 | 8 | 70 | 2.CMC42.C1Z3.500.1 | ■ |
| 5.3 | | 26.50 | 10.60 | 10 | 70 | 2.CMC42.C1Z3.530.1 | ■ |
| 5.560 | 7/32 | 27.80 | 11.12 | 10 | 70 | 2.CMC.PSSCZ3.F72 | ■ |
| 5.7 | | 28.50 | 11.40 | 10 | 70 | 2.CMC42.C1Z3.570.1 | ■ |
| 6.0 | | 30.00 | 12.00 | 10 | 70 | 2.CMC42.C1Z3.600.1 | ■ |
| 6.350 | 1/4 | 31.75 | 12.70 | 10 | 70 | 2.CMC.PSSCZ3.F14 | ■ |
| 8.0 | | 40.00 | 16.00 | 12 | 90 | 2.CMC42.C1Z3.800.1 | ■ |

■ Stock item

NEW

Type C - Milling of through slots

MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

RECOMMENDATION FOR USE
 ● Excellent ● Good ○ Acceptable ☒ Not recommended

V_c [m/min]
 f_z [mm]
 a_p [mm]



| Materials group | Material | Mat. no. | DIN | 1.0 mm | | | 1.5 mm | | | 2.0 mm | | | 3.0 mm | | | 4.0 mm | | | 5.0 mm | | | 6.0 mm - 8.0 mm | | | | |
|-----------------|--|---------------|---------------------|-------------------------|-------|---------|---------|-------|---------|---------|-------|---------|---------|-------|---------|---------|-------|---------|---------|-------|---------|-----------------|-------|---------|---------|--|
| | | | | V_c | f_z | a_p | V_c | f_z | a_p | V_c | f_z | a_p | V_c | f_z | a_p | V_c | f_z | a_p | V_c | f_z | a_p | V_c | f_z | a_p | | |
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | | | | | | | | | | | | | | | | | | | | | | | |
| | | 1.0401 | C15 | 120 | 0.009 | 0.5wd1 | 160 | 0.020 | 0.5wd1 | 180 | 0.029 | 0.5wd1 | 200 | 0.031 | 0.5wd1 | 200 | 0.032 | 0.5wd1 | 220 | 0.032 | 0.5wd1 | 220 | 0.032 | 0.5wd1 | | |
| | | 1.1191 | C45E/Ck45 | | | | | | | | | | | | | | | | | | | | | | | |
| | | 1.0044 | S275JR | | | | | | | | | | | | | | | | | | | | | | | |
| | | 1.0715 | S235JR | | | | | | | | | | | | | | | | | | | | | | | |
| | Low alloyed steel Rm > 900 N/mm² | 1.5752 | 15NiCr13 | | | | | | | | | | | | | | | | | | | | | | | |
| | | 1.7131 | 16MnCr13 | | | | | | | | | | | | | | | | | | | | | | | |
| | | 1.3505 | 100Cr6 | 120 | 0.008 | 0.5wd1 | 160 | 0.019 | 0.5wd1 | 180 | 0.028 | 0.5wd1 | 200 | 0.029 | 0.5wd1 | 200 | 0.031 | 0.5wd1 | 220 | 0.031 | 0.5wd1 | 220 | 0.031 | 0.5wd1 | | |
| | | 1.7225 | 42CrMo4 | | | | | | | | | | | | | | | | | | | | | | | |
| | | 1.2842 | 90MnCrV8 | | | | | | | | | | | | | | | | | | | | | | | |
| | High alloyed tool steel Rm < 1200 N/mm² | 1.2379 | X153CrMoV12 | | | | | | | | | | | | | | | | | | | | | | | |
| | | 1.2436 | X210CrW12 | 120 | 0.006 | 0.25wd1 | 160 | 0.017 | 0.25wd1 | 180 | 0.025 | 0.25wd1 | 200 | 0.026 | 0.25wd1 | 200 | 0.027 | 0.25wd1 | 220 | 0.027 | 0.25wd1 | 220 | 0.027 | 0.25wd1 | | |
| | | 1.3343 | H56-5-2C | | | | | | | | | | | | | | | | | | | | | | | |
| | | 1.3355 | H518-0-1 | | | | | | | | | | | | | | | | | | | | | | | |
| | | 1.4016 | X6Cr17 | | | | | | | | | | | | | | | | | | | | | | | |
| M | Stainless steel ferritic | 1.4105 | X6CrMoS17 | 120 | 0.009 | 0.5wd1 | 160 | 0.020 | 0.5wd1 | 180 | 0.028 | 0.5wd1 | 200 | 0.029 | 0.5wd1 | 200 | 0.029 | 0.5wd1 | 220 | 0.031 | 0.5wd1 | 220 | 0.031 | 0.5wd1 | | |
| | | 1.4034 | X4Cr13 | | | | | | | | | | | | | | | | | | | | | | | |
| | | 1.4112 | X9CrMoV18 | 120 | 0.009 | 0.5wd1 | 160 | 0.019 | 0.5wd1 | 180 | 0.027 | 0.5wd1 | 200 | 0.028 | 0.5wd1 | 200 | 0.028 | 0.5wd1 | 220 | 0.029 | 0.5wd1 | 220 | 0.029 | 0.5wd1 | | |
| | | 1.4542 | X5CrNiCuNb16-4 | 120 | 0.009 | 0.5wd1 | 160 | 0.019 | 0.5wd1 | 180 | 0.027 | 0.5wd1 | 200 | 0.028 | 0.5wd1 | 200 | 0.028 | 0.5wd1 | 220 | 0.029 | 0.5wd1 | 220 | 0.029 | 0.5wd1 | | |
| | | 1.4545 | X5CrNiCuNb15-5 | | | | | | | | | | | | | | | | | | | | | | | |
| | Stainless steel austenitic | 1.4301 | X5CrNi18-10 | | | | | | | | | | | | | | | | | | | | | | | |
| | | 1.4435 | X2CrNiMo18-14-3 | 120 | 0.007 | 0.5wd1 | 160 | 0.017 | 0.5wd1 | 180 | 0.025 | 0.5wd1 | 200 | 0.027 | 0.5wd1 | 200 | 0.027 | 0.5wd1 | 220 | 0.028 | 0.5wd1 | 220 | 0.028 | 0.5wd1 | | |
| | | 1.4441 | X2CrNiMo18-15-3 | | | | | | | | | | | | | | | | | | | | | | | |
| | | 1.4439 | X1NiCrMoCu25-20-5 | | | | | | | | | | | | | | | | | | | | | | | |
| | | 0.6020 | G620 | | | | | | | | | | | | | | | | | | | | | | | |
| | K | Cast iron | 0.6030 | G630 | 100 | 0.007 | 0.5wd1 | 140 | 0.017 | 0.5wd1 | 160 | 0.025 | 0.5wd1 | 180 | 0.031 | 0.5wd1 | 200 | 0.032 | 0.5wd1 | 200 | 0.032 | 0.5wd1 | 200 | 0.032 | 0.5wd1 | |
| | | | 0.7040 | G640 | | | | | | | | | | | | | | | | | | | | | | |
| | | | 0.7060 | G660 | | | | | | | | | | | | | | | | | | | | | | |
| | | | 3.2315 | AlMgSi1 | | | | | | | | | | | | | | | | | | | | | | |
| | | | 3.4365 | AlZnMgCu15 | | | | | | | | | | | | | | | | | | | | | | |
| N | Aluminum alloy wrought | 3.2163 | GD-ALSi9Cu3 | 170 | 0.010 | 0.5wd1 | 210 | 0.021 | 0.5wd1 | 230 | 0.034 | 0.5wd1 | 250 | 0.036 | 0.5wd1 | 270 | 0.037 | 0.5wd1 | 270 | 0.037 | 0.5wd1 | 270 | 0.037 | 0.5wd1 | | |
| | | 3.2381 | GD-ALSi10Mg | | | | | | | | | | | | | | | | | | | | | | | |
| | | 2.0040 | Cu-OF / CW008A | | | | | | | | | | | | | | | | | | | | | | | |
| | | 2.0065 | Cu-ETP / CW004A | | | | | | | | | | | | | | | | | | | | | | | |
| | | 2.0321 | CuZn37 / CW008L | | | | | | | | | | | | | | | | | | | | | | | |
| | Aluminum alloy cast | 2.0360 | CuZn40 / CW009L | 170 | 0.012 | 0.5wd1 | 210 | 0.021 | 0.5wd1 | 230 | 0.034 | 0.5wd1 | 250 | 0.036 | 0.5wd1 | 270 | 0.037 | 0.5wd1 | 270 | 0.037 | 0.5wd1 | 270 | 0.037 | 0.5wd1 | | |
| | | 2.0401 | CuZn39PB3 / CW0614N | | | | | | | | | | | | | | | | | | | | | | | |
| | | 2.1020 | CuSn6 | | | | | | | | | | | | | | | | | | | | | | | |
| | | 2.0956 | CuAl10Ni5Fe4 | | | | | | | | | | | | | | | | | | | | | | | |
| | | 2.0960 | CuAl9Mn2 | | | | | | | | | | | | | | | | | | | | | | | |
| | S1 | Super alloys | 2.4856 | Inconel 625 | 80 | 0.006 | 0.25wd1 | 100 | 0.007 | 0.25wd1 | 100 | 0.010 | 0.25wd1 | 120 | 0.013 | 0.25wd1 | 120 | 0.013 | 0.25wd1 | 120 | 0.013 | 0.25wd1 | 120 | 0.013 | 0.25wd1 | |
| | | | 2.4668 | NiMe28 | | | | | | | | | | | | | | | | | | | | | | |
| | | | 2.4617 | Hastelloy B-2 | | | | | | | | | | | | | | | | | | | | | | |
| | | | 2.4655 | NC122Fe18Mo | | | | | | | | | | | | | | | | | | | | | | |
| | | | 3.7035 | Gr4 | 80 | 0.009 | 0.25wd1 | 100 | 0.017 | 0.25wd1 | 100 | 0.027 | 0.25wd1 | 120 | 0.027 | 0.25wd1 | 120 | 0.027 | 0.25wd1 | 140 | 0.028 | 0.25wd1 | 140 | 0.028 | 0.25wd1 | |
| S2 | | Titanium pure | 3.7165 | TiAl6V4 | 80 | 0.009 | 0.25wd1 | 100 | 0.017 | 0.25wd1 | 100 | 0.027 | 0.25wd1 | 120 | 0.027 | 0.25wd1 | 120 | 0.027 | 0.25wd1 | 140 | 0.028 | 0.25wd1 | 140 | 0.028 | 0.25wd1 | |
| | | | 9.9367 | TiAl6Nb7 | | | | | | | | | | | | | | | | | | | | | | |
| | | | 2.4954 | CoCr20W15Ni | | | | | | | | | | | | | | | | | | | | | | |
| | | | | Hytrons 25 | | | | | | | | | | | | | | | | | | | | | | |
| | | | | CoCrMo28 | | | | | | | | | | | | | | | | | | | | | | |
| S3 | | CrCo alloys | 1.2510 | 100MnCrMoW4 | 80 | 0.006 | 0.25wd1 | 100 | 0.007 | 0.25wd1 | 100 | 0.010 | 0.25wd1 | 120 | 0.013 | 0.25wd1 | 120 | 0.013 | 0.25wd1 | 120 | 0.013 | 0.25wd1 | 120 | 0.013 | 0.25wd1 | |
| | | | 1.2379 | X153CrMoV12 | | | | | | | | | | | | | | | | | | | | | | |
| | | | | Hardened steel < 35 HRC | | | | | | | | | | | | | | | | | | | | | | |
| | | | | Hardened steel ≥ 35 HRC | | | | | | | | | | | | | | | | | | | | | | |
| | | | | AlSi12 | | | | | | | | | | | | | | | | | | | | | | |

NEW

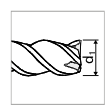
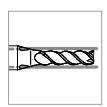
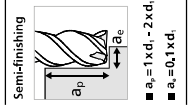
Type C - Side milling - Semi-finishing

MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

RECOMMENDATION FOR USE
 ● Excellent | ○ Good | ◯ Acceptable | ⊗ Not recommended



| Materials group | Material | Mat. no. | DIN | AISI/ASTM/UNS | 1,0 mm | | 1,5 mm 1/16" | | 2,0 mm 3/32" | | 3,0 mm 1/8" | | 4,0 mm 5/32" | | 5,0 mm 3/16" - 7/32" | | 6,0 mm 1/4" | | 8,0 mm | | | |
|-----------------|--|-------------------------|--------------------|-----------------------|----------------|----------------|-----------------|----------------|-----------------|----------------|----------------|----------------|-----------------|----------------|-------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| | | | | | V _c | f _s | V _c | f _s | V _c | f _s | V _c | f _s | V _c | f _s | V _c | f _s | V _c | f _s | V _c | f _s | V _c | f _s |
| P | Unalloyed carbon steel Rm < 800 N/mm² | 1.0301 | C10 | AISI 1010 | | | | | | | | | | | | | | | | | | |
| | | 1.0401 | C15 | AISI 1015 | | | | | | | | | | | | | | | | | | |
| | | 1.1191 | C45E/Ck45 | AISI 1045 | | 120 | 0.017 | 140 | 0.026 | 160 | 0.038 | 180 | 0.048 | 200 | 0.050 | 200 | 0.052 | 220 | 0.056 | 220 | 0.058 | |
| | | 1.0044 | S275JR | AISI 1020 | | | | | | | | | | | | | | | | | | |
| | | 1.0715 | S15Mn30 | AISI 1215 | | | | | | | | | | | | | | | | | | |
| | | 1.5752 | S15NCr13 | ASTM A315 / AISI 3310 | | | | | | | | | | | | | | | | | | |
| | | 1.7131 | S16MnCr5 | AISI 5115 | | | | | | | | | | | | | | | | | | |
| | | 1.3505 | 100Cr6 | AISI 52100 | | | | | | | | | | | | | | | | | | |
| | | 1.7225 | 42CrMn4 | AISI 4140 | | 120 | 0.016 | 140 | 0.025 | 160 | 0.036 | 180 | 0.044 | 200 | 0.048 | 200 | 0.050 | 220 | 0.054 | 220 | 0.056 | |
| | | 1.2842 | 90MnCrV8 | AISI 02 | | | | | | | | | | | | | | | | | | |
| | | 1.2379 | X153CrMoV12 | AISI D2 | | | | | | | | | | | | | | | | | | |
| | | 1.2436 | X210CrW12 | AISI D4/D6 | | | | | | | | | | | | | | | | | | |
| | | 1.3343 | H56-5-Z | AISI M2 / UNS T1302 | | 120 | 0.012 | 140 | 0.022 | 160 | 0.035 | 180 | 0.042 | 200 | 0.043 | 200 | 0.045 | 220 | 0.048 | 220 | 0.058 | |
| | | 1.3355 | H51B-0-1 | AISI T1 / UNS T12001 | | | | | | | | | | | | | | | | | | |
| | | 1.4016 | X6Cr17 | AISI 430 / UNS S43000 | | | | | | | | | | | | | | | | | | |
| 1.4105 | X6CrMoS17 | AISI 430F | | 120 | 0.018 | 140 | 0.026 | 160 | 0.038 | 180 | 0.046 | 200 | 0.048 | 200 | 0.050 | 220 | 0.055 | 220 | 0.062 | | | |
| 1.4034 | X4CrCr13 | AISI 420C | | | | | | | | | | | | | | | | | | | | |
| 1.4112 | X90CrMoV18 | AISI 4408 | | 120 | 0.017 | 140 | 0.025 | 160 | 0.036 | 180 | 0.044 | 200 | 0.046 | 200 | 0.048 | 220 | 0.052 | 220 | 0.060 | | | |
| 1.4542 | X5CrNiCuNb16-4 | AISI 630 / ASTM 17-4 PH | | 120 | 0.017 | 140 | 0.025 | 160 | 0.036 | 180 | 0.044 | 200 | 0.046 | 200 | 0.048 | 220 | 0.052 | 220 | 0.060 | | | |
| 1.4545 | X5CrNiCuNb15-5 | ASTM 15-5 PH | | | | | | | | | | | | | | | | | | | | |
| 1.4301 | X5CrNi18-10 | AISI 304 | | | | | | | | | | | | | | | | | | | | |
| 1.4435 | X2CrNiMo18-14-3 | AISI 316L | | 120 | 0.013 | 140 | 0.016 | 160 | 0.034 | 180 | 0.042 | 200 | 0.044 | 200 | 0.046 | 220 | 0.049 | 220 | 0.058 | | | |
| 1.4441 | X2CrNiMo18-15-3 | AISI 316LM | | | | | | | | | | | | | | | | | | | | |
| 1.4539 | X1NiCrMoCu25-20-5 | AISI 904L | | | | | | | | | | | | | | | | | | | | |
| 0.6020 | G620 | ASTM 30 | | | | | | | | | | | | | | | | | | | | |
| 0.6030 | G630 | ASTM 408 | | | | | | | | | | | | | | | | | | | | |
| 0.7040 | G640 | ASTM 60-40-18 | | 100 | 0.012 | 120 | 0.026 | 140 | 0.032 | 160 | 0.043 | 180 | 0.054 | 180 | 0.056 | 200 | 0.058 | 200 | 0.070 | | | |
| 0.7060 | G660 | ASTM 60-60-03 | | | | | | | | | | | | | | | | | | | | |
| N | Aluminum alloy wrought | 3.2315 | AlMgSi1 | ASTM 6351 | | | | | | | | | | | | | | | | | | |
| | | 3.4365 | AlZnMgCu15 | ASTM 7075 | | 170 | 0.020 | 190 | 0.029 | 210 | 0.040 | 230 | 0.050 | 250 | 0.062 | 250 | 0.064 | 270 | 0.068 | 270 | 0.084 | |
| | | 3.2163 | GD-ALSi9Cu3 | ASTM A380 | | 170 | 0.020 | 190 | 0.029 | 210 | 0.040 | 230 | 0.050 | 250 | 0.062 | 250 | 0.064 | 270 | 0.068 | 270 | 0.084 | |
| | | 3.2381 | GD-ALSi10Mg | UNS A93590 | | | | | | | | | | | | | | | | | | |
| | | 2.0040 | Cu-Pb / CW008A | UNS C10100 | | 170 | 0.022 | 190 | 0.029 | 210 | 0.040 | 230 | 0.050 | 250 | 0.062 | 250 | 0.064 | 270 | 0.068 | 270 | 0.084 | |
| | | 2.0065 | Cu-Pb / CW004A | UNS C11000 | | | | | | | | | | | | | | | | | | |
| | | 2.0321 | CuZn79Zr / CW008A | UNS C27400 | | 170 | 0.022 | 190 | 0.029 | 210 | 0.040 | 230 | 0.050 | 250 | 0.062 | 250 | 0.064 | 270 | 0.068 | 270 | 0.084 | |
| | | 2.0360 | CuZn40 / CW509L | UNS C28000 | | | | | | | | | | | | | | | | | | |
| | | 2.0401 | CuZr39PB3 / CW614N | UNS C38500 | | 170 | 0.022 | 190 | 0.029 | 210 | 0.040 | 230 | 0.050 | 250 | 0.062 | 250 | 0.064 | 270 | 0.068 | 270 | 0.084 | |
| | | 2.0956 | CuSi6 | UNS C51900 | | | | | | | | | | | | | | | | | | |
| | | 2.0966 | CuAl10Ni5Fe4 | UNS C63000 | | 170 | 0.020 | 190 | 0.029 | 210 | 0.040 | 230 | 0.050 | 250 | 0.062 | 250 | 0.064 | 270 | 0.068 | 270 | 0.084 | |
| | | 2.0960 | CuAl9Ni2 | UNS C63200 | | | | | | | | | | | | | | | | | | |
| | | 2.4856 | Inconel 625 | | | | | | | | | | | | | | | | | | | |
| | | 2.4658 | Inconel 718 | | | | | | | | | | | | | | | | | | | |
| | | 2.4618 | NiMo28 | Hastelloy B-2 | | 100 | 0.008 | 100 | 0.010 | 120 | 0.012 | 120 | 0.016 | 140 | 0.018 | 140 | 0.020 | 160 | 0.022 | 160 | 0.024 | |
| 2.4655 | NIc22Fe18Mo | Hastelloy X | | | | | | | | | | | | | | | | | | | | |
| 3.7035 | Ti2 | ASTM B348 / F157 | | 100 | 0.018 | 100 | 0.022 | 120 | 0.032 | 120 | 0.042 | 140 | 0.044 | 140 | 0.046 | 160 | 0.048 | 160 | 0.054 | | | |
| 3.7165 | TiAl6V4 | ASTM B348 / F136 | | | | | | | | | | | | | | | | | | | | |
| 9.9367 | TiAl6Nb7 | ASTM F1295 | | 100 | 0.018 | 100 | 0.022 | 120 | 0.032 | 120 | 0.042 | 140 | 0.044 | 140 | 0.046 | 160 | 0.048 | 160 | 0.054 | | | |
| 2.4954 | CoCr20W15Ni | Haynes 25 | | | | | | | | | | | | | | | | | | | | |
| | CrCoMo28 | ASTM F1537 | | 100 | 0.008 | 100 | 0.010 | 120 | 0.012 | 120 | 0.016 | 140 | 0.018 | 140 | 0.020 | 160 | 0.022 | 160 | 0.024 | | | |
| H1 | Hardened steel < 55 HRC | 1.2510 | 100MnCrMoW4 | AISI O1 | | | | | | | | | | | | | | | | | | |
| | | 1.2379 | X153CrMoV12 | AISI D2 | | | | | | | | | | | | | | | | | | |
| H2 | Hardened steel > 55 HRC | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | |



ACCURATE AND EFFICIENT MILLING

Coolant type, pressure and filtration

Coolant: for best results, Mikron Tool recommends the use of cutting oil as coolant. Alternatively, emulsion of 8% or more 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 ≤ 0.05 mm.

Coolant pressure: at least 15 bar 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 |

Tool holders

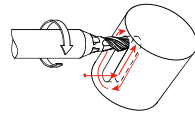
For optimal use of the tool, Mikron Tool recommends a shrink fit collet as per DIN 69871 or as an alternative a hydraulic tool holder. For additional information regarding tool holding refer to "Technical Information" in our main catalogue.

Milling process

A. Milling of keyways - only for Type A

Mikron Tool recommends a machining process in 3 steps to guarantee the tolerance of the slot:

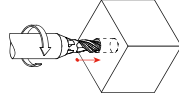
- 1. Plunge milling or plunging with a linear ramp
- 2. Slot milling
- 3. Side milling (finishing milling)



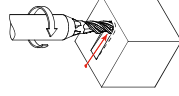
Mikron Tool generally recommends the time and space saving plunge milling (vertically). As an alternative, plunging with a linear ramp is also possible.

MILLING PROCESS

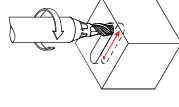
1. Plunge milling or Linear ramp



When plunge milling, an increase of the drilling diameter of approx. 0.05 mm respect to the tool diameter needs to be applied. The maximum milling depth is $2.5 \times d_1$ ($d_{p,max} = 1 \times d_1$). For data regarding feed $f_{z,p}$ refer to cutting data for plunge milling (page 550).

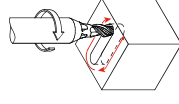


2. Slot milling



Attention: a finishing operation is provided after slot milling. For data regarding feed $f_{z,s}$ refer to cutting data for slot milling (page 550). For the corresponding selection of tool (diameter) refer to the table "Tool selection" (page 572).

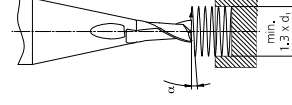
3. Side milling



A finishing operation is necessary to reach the required tolerance and highest squareness.

Maximum plunge angles in linear ramp or helical interpolation

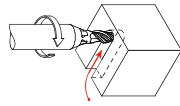
| Material | α - Linear ramp | α - Helical interpolation |
|--|------------------------|----------------------------------|
| P Unalloyed carbon steel | 45° | 47° |
| Low alloyed steel | 45° | 47° |
| High alloyed tool steel | 27° | 28° |
| Stainless steel ferritic | 45° | 47° |
| Stainless steel martensitic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



MILLING PROCESS

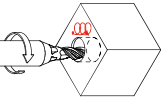
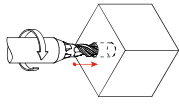
MILLING PROCESS

B. Milling of through slots



When milling through slots, the maximum cutting parameters can be applied. Refer to the cutting data page 552 / page 562.

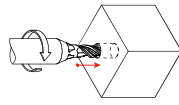
C. Plunge milling



With CrazyMill Cool P&S, plunge milling (drilling) can be executed in two versions:

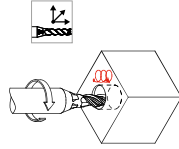
- 1. Direct plunge milling
- 2. Plunging with helical interpolation

1. Direct plunge milling



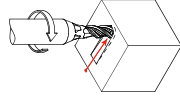
When plunge milling, an increase of the drilling diameter of approx. 0.05 mm respect to the tool diameter needs to be applied. The maximum milling depth is $2.5 \times d_1$ - type A / $2 \times d_1$ - type C ($a_{p,max} = 1 \times d_1$). For data regarding feed $f_{z,p}$ refer to cutting data for plunge milling (page 550 / page 560).

2. Plunging with helical interpolation



The maximum plunge angle α depends on the material and cannot be overcut (see table page 569). For data regarding feed $f_{z,s}$ refer to cutting data for keyway milling (page 550 / page 560). Attention: the minimum diameter of the hole is $d_{hole} = 1.3 \times d_{tool}$

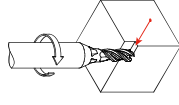
D. Linear ramp



The maximum plunge angle α depends on the material and cannot be overcut (see table page 569). For data regarding feed $f_{z,s}$ refer to cutting data for keyway milling (page 550 / page 560).

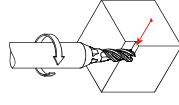
E. Side milling

Semi-finishing



Recommended cutting parameters:
 v_c and f_s = as specified in the cutting data table
 $a_p = \max. 1 \times d$
 $a_e = 0.2 \times d$

Finishing



Recommended cutting parameters:
 v_c and f_s = as specified in the cutting data table
 $a_p = 2.5 \times d$ - Type A
 $a_p = 2 \times d$ - Type C
 $a_e = 0.05 - 0.1 \times d$ depending on required surface quality

NEW

Process CrazyMill Cool P&S

THE RIGHT TOOL FOR KEYWAY SLOTTING - ONLY FOR TYPE A

Tool selection

| W slot [mm] | d ₁ Tool [mm] | l _{1max} [mm] | Item number |
|-------------|--------------------------|------------------------|--------------------|
| 1,1 | 1,0 | 2,50 | 2.CMC42.A823.100.1 |
| 1,2 | 1,0 | 2,50 | 2.CMC42.A823.100.1 |
| 1,3 | 1,1 | 2,75 | 2.CMC42.A823.110.1 |
| 1,3 | 1,1 | 2,75 | 2.CMC42.A823.110.1 |
| 1,4 | 1,2 | 3,00 | 2.CMC42.A823.120.1 |
| 1,4 | 1,2 | 3,00 | 2.CMC42.A823.120.1 |
| 1,5 | 1,3 | 3,25 | 2.CMC42.A823.130.1 |
| 1,5 | 1,3 | 3,25 | 2.CMC42.A823.130.1 |
| 1,4 | 1,3 | 3,25 | 2.CMC42.A823.130.1 |
| 1,3 | 1,3 | 3,25 | 2.CMC42.A823.130.1 |
| 1,4 | 1,4 | 3,50 | 2.CMC42.A823.140.1 |
| 1,4 | 1,4 | 3,50 | 2.CMC42.A823.140.1 |
| 1,5 | 1,4 | 3,50 | 2.CMC42.A823.140.1 |
| 1,5 | 1,5 | 3,75 | 2.CMC42.A823.150.1 |
| 1,5 | 1,5 | 3,75 | 2.CMC42.A823.150.1 |
| 1,6 | 1,6 | 4,00 | 2.CMC42.A823.160.1 |
| 1,6 | 1,6 | 4,00 | 2.CMC42.A823.160.1 |
| 1,7 | 1,7 | 4,25 | 2.CMC42.A823.170.1 |
| 1,8 | 1,8 | 4,50 | 2.CMC42.A823.180.1 |
| 1,9 | 1,9 | 4,75 | 2.CMC42.A823.190.1 |
| 2,0 | 2,0 | 5,00 | 2.CMC42.A823.200.1 |
| 2,0 | 2,0 | 5,00 | 2.CMC42.A823.200.1 |
| 2,1 | 2,1 | 5,25 | 2.CMC42.A823.210.1 |
| 2,1 | 2,1 | 5,25 | 2.CMC42.A823.210.1 |
| 2,2 | 2,2 | 5,50 | 2.CMC42.A823.220.1 |
| 2,2 | 2,2 | 5,50 | 2.CMC42.A823.220.1 |
| 2,3 | 2,3 | 5,75 | 2.CMC42.A823.230.1 |
| 2,3 | 2,3 | 5,75 | 2.CMC42.A823.230.1 |
| 2,4 | 2,4 | 6,00 | 2.CMC42.A823.240.1 |
| 2,4 | 2,4 | 6,00 | 2.CMC42.A823.240.1 |
| 2,5 | 2,5 | 6,25 | 2.CMC42.A823.250.1 |
| 2,5 | 2,5 | 6,25 | 2.CMC42.A823.250.1 |
| 2,6 | 2,6 | 6,50 | 2.CMC42.A823.260.1 |
| 2,6 | 2,6 | 6,50 | 2.CMC42.A823.260.1 |
| 2,7 | 2,7 | 6,75 | 2.CMC42.A823.270.1 |
| 2,7 | 2,7 | 6,75 | 2.CMC42.A823.270.1 |
| 2,8 | 2,8 | 7,00 | 2.CMC42.A823.280.1 |
| 2,8 | 2,8 | 7,00 | 2.CMC42.A823.280.1 |

| W slot [mm] | d ₁ Tool [mm] | l _{1max} [mm] | Item number |
|-------------|--------------------------|------------------------|--------------------|
| 3,1 | 2,6 | 6,50 | 2.CMC42.A823.260.1 |
| 3,1 | 2,7 | 6,75 | 2.CMC42.A823.270.1 |
| 3,1 | 2,8 | 7,00 | 2.CMC42.A823.280.1 |
| 3,1 | 2,9 | 7,25 | 2.CMC42.A823.290.1 |
| 3,175 | 2,7 | 6,75 | 2.CMC42.A823.270.1 |
| 3,175 | 2,8 | 7,00 | 2.CMC42.A823.280.1 |
| 3,175 | 2,9 | 7,25 | 2.CMC42.A823.290.1 |
| 3,2 | 2,7 | 6,75 | 2.CMC42.A823.270.1 |
| 3,2 | 2,8 | 7,00 | 2.CMC42.A823.280.1 |
| 3,2 | 2,9 | 7,25 | 2.CMC42.A823.290.1 |
| 3,3 | 3,0 | 7,50 | 2.CMC42.A823.300.1 |
| 3,3 | 3,0 | 7,50 | 2.CMC42.A823.300.1 |
| 3,3 | 3,1 | 7,75 | 2.CMC42.A823.310.1 |
| 3,3 | 3,1 | 7,75 | 2.CMC42.A823.310.1 |
| 3,4 | 3,1 | 7,75 | 2.CMC42.A823.310.1 |
| 3,4 | 3,2 | 8,00 | 2.CMC42.A823.320.1 |
| 3,4 | 3,3 | 8,25 | 2.CMC42.A823.330.1 |
| 3,5 | 3,2 | 7,75 | 2.CMC42.A823.320.1 |
| 3,5 | 3,3 | 8,00 | 2.CMC42.A823.330.1 |
| 3,5 | 3,4 | 8,25 | 2.CMC42.A823.340.1 |
| 3,6 | 3,3 | 8,25 | 2.CMC42.A823.330.1 |
| 3,6 | 3,4 | 8,50 | 2.CMC42.A823.340.1 |
| 3,7 | 3,4 | 8,75 | 2.CMC42.A823.350.1 |
| 3,7 | 3,5 | 9,00 | 2.CMC42.A823.360.1 |
| 3,8 | 3,5 | 9,25 | 2.CMC42.A823.370.1 |
| 3,9 | 3,6 | 9,50 | 2.CMC42.A823.380.1 |
| 3,968 | 3,7 | 9,75 | 2.CMC42.A823.390.1 |
| 4,0 | 3,7 | 9,25 | 2.CMC42.A823.370.1 |
| 4,0 | 3,8 | 9,50 | 2.CMC42.A823.380.1 |
| 4,1 | 3,8 | 9,75 | 2.CMC42.A823.390.1 |
| 4,2 | 3,9 | 10,00 | 2.CMC42.A823.400.1 |
| 4,3 | 4,0 | 10,25 | 2.CMC42.A823.410.1 |
| 4,3 | 4,1 | 10,50 | 2.CMC42.A823.420.1 |
| 4,4 | 4,2 | 10,75 | 2.CMC42.A823.430.1 |
| 4,4 | 4,3 | 11,00 | 2.CMC42.A823.440.1 |
| 4,5 | 4,4 | 11,25 | 2.CMC42.A823.450.1 |
| 4,5 | 4,5 | 11,50 | 2.CMC42.A823.460.1 |
| 4,6 | 4,6 | 11,75 | 2.CMC42.A823.470.1 |
| 4,7 | 4,7 | 12,00 | 2.CMC42.A823.480.1 |
| 4,7 | 4,8 | 12,25 | 2.CMC42.A823.490.1 |
| 4,762 | 4,8 | 12,50 | 2.CMC42.A823.500.1 |
| 4,8 | 4,9 | 12,75 | 2.CMC42.A823.510.1 |
| 4,8 | 5,0 | 13,00 | 2.CMC42.A823.520.1 |
| 4,8 | 5,1 | 13,25 | 2.CMC42.A823.530.1 |
| 4,8 | 5,2 | 13,50 | 2.CMC42.A823.540.1 |
| 4,8 | 5,3 | 13,75 | 2.CMC42.A823.550.1 |

| W slot [mm] | d ₁ Tool [mm] | l _{1max} [mm] | Item number |
|-------------|--------------------------|------------------------|--------------------|
| 4,9 | 4,3 | 10,75 | 2.CMC42.A823.430.1 |
| 4,9 | 4,4 | 11,00 | 2.CMC42.A823.440.1 |
| 5,0 | 4,4 | 11,25 | 2.CMC42.A823.450.1 |
| 5,0 | 4,5 | 11,50 | 2.CMC42.A823.460.1 |
| 5,1 | 4,5 | 11,75 | 2.CMC42.A823.470.1 |
| 5,1 | 4,6 | 12,00 | 2.CMC42.A823.480.1 |
| 5,2 | 4,7 | 12,25 | 2.CMC42.A823.490.1 |
| 5,2 | 4,8 | 12,50 | 2.CMC42.A823.500.1 |
| 5,3 | 4,8 | 12,75 | 2.CMC42.A823.510.1 |
| 5,3 | 4,9 | 13,00 | 2.CMC42.A823.520.1 |
| 5,4 | 5,0 | 13,25 | 2.CMC42.A823.530.1 |
| 5,4 | 5,1 | 13,50 | 2.CMC42.A823.540.1 |
| 5,5 | 5,2 | 13,75 | 2.CMC42.A823.550.1 |
| 5,5 | 5,3 | 14,00 | 2.CMC42.A823.560.1 |
| 5,5 | 5,4 | 14,25 | 2.CMC42.A823.570.1 |
| 5,6 | 5,5 | 14,50 | 2.CMC42.A823.580.1 |
| 5,6 | 5,6 | 14,75 | 2.CMC42.A823.590.1 |
| 5,7 | 5,7 | 15,00 | 2.CMC42.A823.600.1 |
| 5,7 | 5,8 | 15,25 | 2.CMC42.A823.610.1 |
| 5,8 | 5,9 | 15,50 | 2.CMC42.A823.620.1 |
| 5,8 | 6,0 | 15,75 | 2.CMC42.A823.630.1 |
| 5,9 | 6,1 | 16,00 | 2.CMC42.A823.640.1 |
| 5,9 | 6,2 | 16,25 | 2.CMC42.A823.650.1 |
| 5,9 | 6,3 | 16,50 | 2.CMC42.A823.660.1 |
| 5,9 | 6,4 | 16,75 | 2.CMC42.A823.670.1 |
| 5,9 | 6,5 | 17,00 | 2.CMC42.A823.680.1 |
| 5,9 | 6,6 | 17,25 | 2.CMC42.A823.690.1 |
| 5,9 | 6,7 | 17,50 | 2.CMC42.A823.700.1 |
| 5,9 | 6,8 | 17,75 | 2.CMC42.A823.710.1 |
| 5,9 | 6,9 | 18,00 | 2.CMC42.A823.720.1 |
| 5,9 | 7,0 | 18,25 | 2.CMC42.A823.730.1 |
| 5,9 | 7,1 | 18,50 | 2.CMC42.A823.740.1 |
| 5,9 | 7,2 | 18,75 | 2.CMC42.A823.750.1 |
| 5,9 | 7,3 | 19,00 | 2.CMC42.A823.760.1 |
| 5,9 | 7,4 | 19,25 | 2.CMC42.A823.770.1 |
| 5,9 | 7,5 | 19,50 | 2.CMC42.A823.780.1 |
| 5,9 | 7,6 | 19,75 | 2.CMC42.A823.790.1 |
| 5,9 | 7,7 | 20,00 | 2.CMC42.A823.800.1 |
| 5,9 | 7,8 | 20,25 | 2.CMC42.A823.810.1 |
| 5,9 | 7,9 | 20,50 | 2.CMC42.A823.820.1 |
| 5,9 | 8,0 | 20,75 | 2.CMC42.A823.830.1 |
| 5,9 | 8,1 | 21,00 | 2.CMC42.A823.840.1 |
| 5,9 | 8,2 | 21,25 | 2.CMC42.A823.850.1 |
| 5,9 | 8,3 | 21,50 | 2.CMC42.A823.860.1 |
| 5,9 | 8,4 | 21,75 | 2.CMC42.A823.870.1 |
| 5,9 | 8,5 | 22,00 | 2.CMC42.A823.880.1 |
| 5,9 | 8,6 | 22,25 | 2.CMC42.A823.890.1 |
| 5,9 | 8,7 | 22,50 | 2.CMC42.A823.900.1 |

Example:

Milling of keyway slot 3x1,8 mm DIN 6885

Width of keyway: **w** = 3 mm; Depth of keyway: **l₁** = 11,8 mm;

Mikron Tool recommends the following diameters: **d₁** = 2,6 mm or **d₁** = 2,8 mm

