

PATENTED

CrazyMill Cool P&S

NEW



**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.

07

**NEW**

## Highest performance in smallest dimensions

### 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

2.5 x d

Type A

- Coated
- Through-tool cooling



page 549

5 x d

Type C

- Coated
- Through-tool cooling



page 558

## 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.

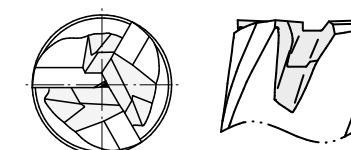
### 5 | FLUTE GEOMETRY

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



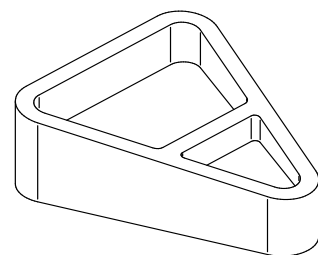
**NEW**

## 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

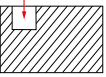
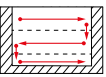
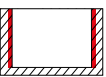


**COMPONENT**  
Steering component

**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<br>- Carbide<br>- Coated<br>- Integrated cooling   |
| Item number  | 2.CMC42.A8Z3.600.1  |
| Cutting data | <p>① Plunging<br/> <math>v_c = 160</math> m/min<br/> <math>f_{z,p} = 0.005</math> mm<br/> <math>a_p = 1 \times d</math></p>  <p>② Slotting<br/> <math>v_c = 160</math> m/min<br/> <math>f_{z,s} = 0.025</math> mm<br/> <math>a_p = 1 \times d</math></p>  <p>③ Finishing<br/> <math>v_c = 220</math> m/min<br/> <math>f_z = 0.026</math> mm<br/> <math>a_p = 2.5 \times d</math><br/> <math>a_e = 0.3</math> mm</p>  |

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

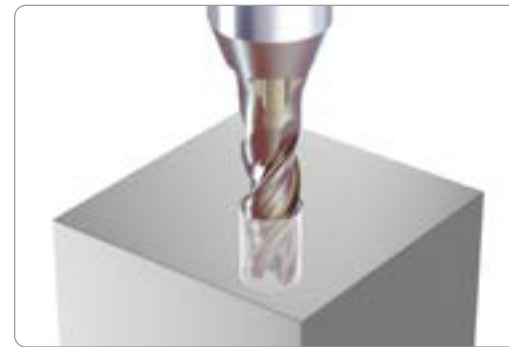
| MATERIALS GROUPS                               | EXAMPLES |                |                   |
|--|----------|----------------|-------------------|
|  | Mat. no. | DIN            | AISI / ASTM / UNS |
| <b>Group P</b><br>Unalloyed and alloyed steel  | 1.0401   | C15            | 1015              |
|  | 1.3505   | 100Cr6         | 52100             |
|  | 1.2436   | X210CrW12      | D4 / D6           |
| <b>Group M</b><br>Stainless steel              | 1.4105   | X6CrMoS17      | 430F              |
|  | 1.4112   | X90CrMoV18     | 440B              |
|  | 1.4301   | X5CrNi 18-10   | 304               |
| <b>Group K</b><br>Cast iron                    | 0.7040   | GGG40          | 60-40-18          |
| <b>Group N</b><br>Non ferrous metals           | 3.2315   | AlMgSi1        | 6351              |
|  | 3.2163   | GD-AlSi9Cu3    | A380              |
|  | 2.004    | Cu-OF / CW008A | C10100            |
|  | 2.0321   | CuZn37 CW508L  | C27400            |
|  | 2.102    | CuSn6          | C51900            |
| <b>Group S1</b><br>Super alloys                | 2.096    | CuAl9Mn2       | C63200            |
|  | 2.4856   |                | INCONEL 625       |
| <b>Group S2</b><br>Titanium (pure and alloyed) | 2.4665   | NiCr22Fe18Mo   | HASTELLOY X       |
|  | 3.7035   | Gr.2           | B348 / F67        |
| <b>Group S3</b><br>CrCo alloys                 | 3.7165   | TiAl6V4        | B348 / F136       |
|  | 2.4964   | CoCr20W15Ni    | HAYNES 25         |

**NEW**

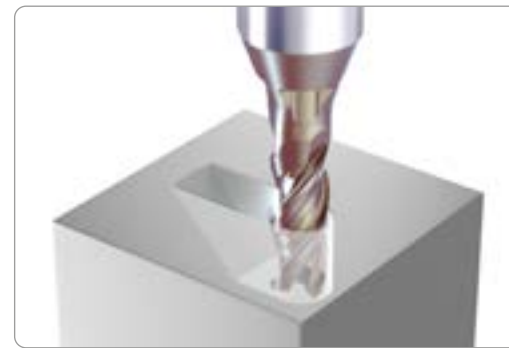
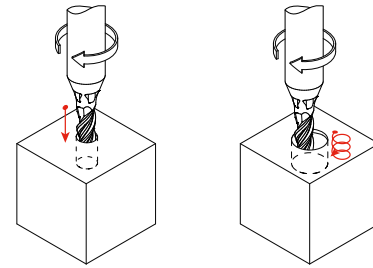
# One tool for many applications

FOR DIFFICULT TO MACHINE MATERIALS

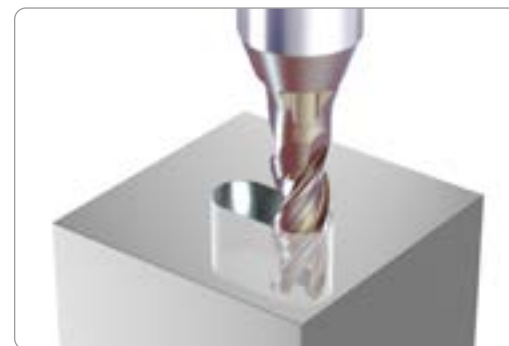
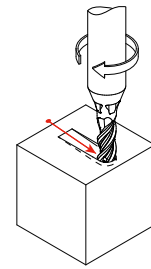
CrazyMill Cool P&S for:



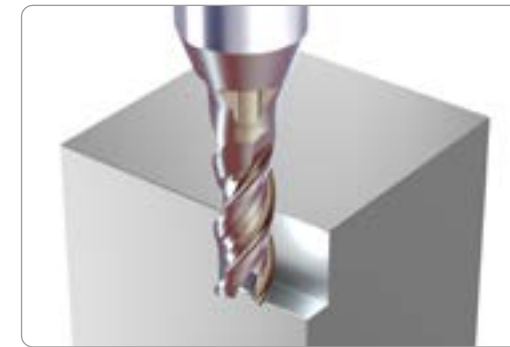
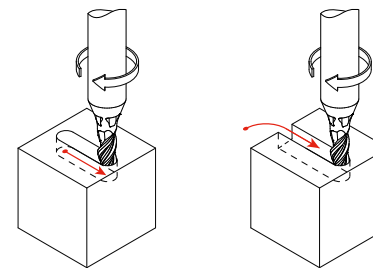
**1. Plunge milling**  
Direct or with helical interpolation



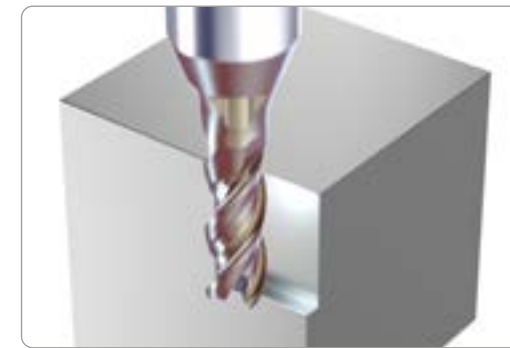
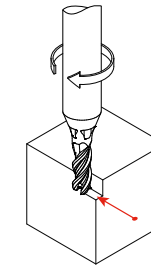
**2. Linear ramp milling**  
Angle depending on material



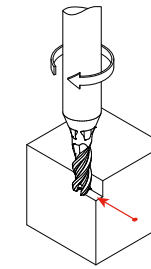
**3. Slot milling**  
Pockets or through slots



**4. Side milling - Semi-finishing**  
 $a_p = \max. 1 \times d$



**5. Side milling - Finishing**  
 $a_p = 2.5 \times d$



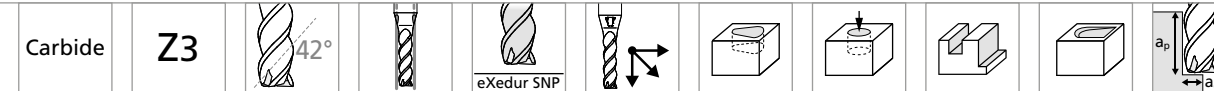


**NEW**

## CrazyMill Cool P&S

## Type A - 2.5 x d - Square - Z3

### 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!

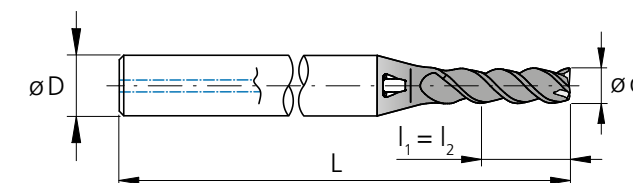
**Regrinding:** This product is not suitable for regrinding.

Ø d<sub>1</sub> 1.0 - 8.0 mm

Tolerance 0 - 0.02 mm

l<sub>1</sub> = Effective length  
l<sub>2</sub> = Cutting length

#### P&S - Square



| d <sub>1</sub><br>[mm] | d <sub>1</sub><br>[inch] | l <sub>1</sub><br>[mm] | l <sub>2</sub><br>[mm] | D<br>(h6)<br>[mm] | L<br>[mm] | Item<br>number     | Availability |
|------------------------|--------------------------|------------------------|------------------------|-------------------|-----------|--------------------|--------------|
| 1.0                    |                          | 2.50                   | 2.50                   | 4                 | 40        | 2.CMC42.A8Z3.100.1 | ■            |
| 1.1                    |                          | 2.75                   | 2.75                   | 4                 | 40        | 2.CMC42.A8Z3.110.1 | ■            |
| 1.2                    |                          | 3.00                   | 3.00                   | 4                 | 40        | 2.CMC42.A8Z3.120.1 | ■            |
| 1.3                    |                          | 3.25                   | 3.25                   | 4                 | 40        | 2.CMC42.A8Z3.130.1 | ■            |
| 1.4                    |                          | 3.50                   | 3.50                   | 4                 | 40        | 2.CMC42.A8Z3.140.1 | ■            |
| 1.5                    |                          | 3.75                   | 3.75                   | 4                 | 40        | 2.CMC42.A8Z3.150.1 | ■            |
| 1.587                  | 1/16                     | 3.97                   | 3.97                   | 4                 | 40        | 2.CMC.PSSAZ3.F116  | ■            |
| 1.6                    |                          | 4.00                   | 4.00                   | 4                 | 40        | 2.CMC42.A8Z3.160.1 | ■            |
| 1.7                    |                          | 4.25                   | 4.25                   | 4                 | 40        | 2.CMC42.A8Z3.170.1 | ■            |
| 1.8                    |                          | 4.50                   | 4.50                   | 4                 | 40        | 2.CMC42.A8Z3.180.1 | ■            |
| 1.9                    |                          | 4.75                   | 4.75                   | 4                 | 40        | 2.CMC42.A8Z3.190.1 | ■            |
| 2.0                    |                          | 5.00                   | 5.00                   | 4                 | 40        | 2.CMC42.A8Z3.200.1 | ■            |
| 2.1                    |                          | 5.25                   | 5.25                   | 4                 | 40        | 2.CMC42.A8Z3.210.1 | ■            |
| 2.2                    |                          | 5.50                   | 5.50                   | 4                 | 40        | 2.CMC42.A8Z3.220.1 | ■            |
| 2.3                    |                          | 5.75                   | 5.75                   | 4                 | 40        | 2.CMC42.A8Z3.230.1 | ■            |
| 2.381                  | 3/32                     | 5.95                   | 5.95                   | 4                 | 40        | 2.CMC.PSSAZ3.F332  | ■            |
| 2.4                    |                          | 6.00                   | 6.00                   | 4                 | 40        | 2.CMC42.A8Z3.240.1 | ■            |
| 2.5                    |                          | 6.25                   | 6.25                   | 6                 | 50        | 2.CMC42.A8Z3.250.1 | ■            |
| 2.6                    |                          | 6.50                   | 6.50                   | 6                 | 50        | 2.CMC42.A8Z3.260.1 | ■            |
| 2.7                    |                          | 6.75                   | 6.75                   | 6                 | 50        | 2.CMC42.A8Z3.270.1 | ■            |
| 2.8                    |                          | 7.00                   | 7.00                   | 6                 | 50        | 2.CMC42.A8Z3.280.1 | ■            |
| 2.9                    |                          | 7.25                   | 7.25                   | 6                 | 50        | 2.CMC42.A8Z3.290.1 | ■            |
| 3.0                    |                          | 7.50                   | 7.50                   | 6                 | 50        | 2.CMC42.A8Z3.300.1 | ■            |
| 3.1                    |                          | 7.75                   | 7.75                   | 6                 | 50        | 2.CMC42.A8Z3.310.1 | ■            |
| 3.175                  | 1/8                      | 7.94                   | 7.94                   | 6                 | 50        | 2.CMC.PSSAZ3.F18   | ■            |
| 3.3                    |                          | 8.25                   | 8.25                   | 6                 | 50        | 2.CMC42.A8Z3.330.1 | ■            |
| 3.7                    |                          | 9.25                   | 9.25                   | 6                 | 50        | 2.CMC42.A8Z3.370.1 | ■            |
| 3.968                  | 5/32                     | 9.92                   | 9.92                   | 6                 | 50        | 2.CMC.PSSAZ3.F532  | ■            |
| 4.0                    |                          | 10.00                  | 10.00                  | 6                 | 50        | 2.CMC42.A8Z3.400.1 | ■            |
| 4.3                    |                          | 10.75                  | 10.75                  | 8                 | 60        | 2.CMC42.A8Z3.430.1 | ■            |
| 4.7                    |                          | 11.75                  | 11.75                  | 8                 | 60        | 2.CMC42.A8Z3.470.1 | ■            |
| 4.762                  | 3/16                     | 11.91                  | 11.91                  | 8                 | 60        | 2.CMC.PSSAZ3.F316  | ■            |
| 4.8                    |                          | 12.00                  | 12.00                  | 8                 | 60        | 2.CMC42.A8Z3.480.1 | ■            |
| 5.0                    |                          | 12.50                  | 12.50                  | 8                 | 60        | 2.CMC42.A8Z3.500.1 | ■            |
| 5.3                    |                          | 13.25                  | 13.25                  | 10                | 65        | 2.CMC42.A8Z3.530.1 | ■            |
| 5.560                  | 7/32                     | 13.90                  | 13.90                  | 10                | 65        | 2.CMC.PSSAZ3.F732  | ■            |
| 5.7                    |                          | 14.25                  | 14.25                  | 10                | 65        | 2.CMC42.A8Z3.570.1 | ■            |
| 6.0                    |                          | 15.00                  | 15.00                  | 10                | 65        | 2.CMC42.A8Z3.600.1 | ■            |
| 6.350                  | 1/4                      | 15.88                  | 15.88                  | 10                | 65        | 2.CMC.PSSAZ3.F14   | ■            |
| 8.0                    |                          | 20.00                  | 20.00                  | 12                | 80        | 2.CMC42.A8Z3.800.1 | ■            |

■ Stock item

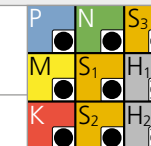


NEW

# Type A - Milling of through slots

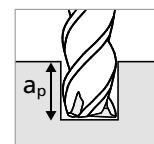
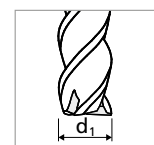
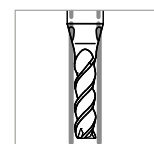
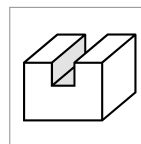
$v_c$  [m/min]  
 $f_z$  [mm]  
 $a_p$  [mm]

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



## MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

Through slot milling



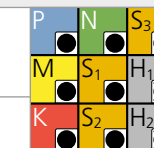
| Materials group  | Material   | Mat. no.                 | DIN                  | AISI/ASTM/UNS           | 1.0 mm |        |        | 1.5 mm 1/16" |        |        | 2.0 mm 3/32" |        |        | 3.0 mm 1/8" |        |        | 4.0 mm 5/32" |        |        | 5.0 mm 3/16" - 7/32" |        |        | 6.0 mm - 8.0 mm 1/4" |        |        |
|--|--|--------------------------|----------------------|-------------------------|--------|--------|--------|--------------|--------|--------|--------------|--------|--------|-------------|--------|--------|--------------|--------|--------|----------------------|--------|--------|----------------------|--------|--------|
|  |  |                          |                      |                         | $v_c$  | $f_z$  | $a_p$  | $v_c$        | $f_z$  | $a_p$  | $v_c$        | $f_z$  | $a_p$  | $v_c$       | $f_z$  | $a_p$  | $v_c$        | $f_z$  | $a_p$  | $v_c$                | $f_z$  | $a_p$  | $v_c$                | $f_z$  | $a_p$  |
| P  | Unalloyed carbon steel<br>Rm < 800 N/mm <sup>2</sup> | 1.0301                   | C10                  | AISI 1010               | 140    | 0.009  | 1xd1   | 180          | 0.015  | 1xd1   | 200          | 0.020  | 1xd1   | 220         | 0.029  | 1xd1   | 230          | 0.031  | 1xd1   | 240                  | 0.031  | 1xd1   | 260                  | 0.032  | 1xd1   |
|  |  | 1.0401                   | C15                  | AISI 1015               |        |        |        |              |        |        |              |        |        |             |        |        |              |        |        |                      |        |        |                      |        |        |
|  |  | 1.1191                   | C45E/CK45            | AISI 1045               |        |        |        |              |        |        |              |        |        |             |        |        |              |        |        |                      |        |        |                      |        |        |
|  |  | 1.0044                   | S275JR               | AISI 1020               |        |        |        |              |        |        |              |        |        |             |        |        |              |        |        |                      |        |        |                      |        |        |
|  |  | 1.0715                   | 11Mn30               | AISI 1215               |        |        |        |              |        |        |              |        |        |             |        |        |              |        |        |                      |        |        |                      |        |        |
|  | Low alloyed steel<br>Rm > 900 N/mm <sup>2</sup>      | 1.5752                   | 15NiCr13             | ASTM 3415 / AISI 3310   | 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   |
|  |  | 1.7131                   | 16MnCr5              | AISI 5115               |        |        |        |              |        |        |              |        |        |             |        |        |              |        |        |                      |        |        |                      |        |        |
|  |  | 1.3505                   | 100Cr6               | AISI 52100              |        |        |        |              |        |        |              |        |        |             |        |        |              |        |        |                      |        |        |                      |        |        |
|  |  | 1.7225                   | 42CrMo4              | AISI 4140               |        |        |        |              |        |        |              |        |        |             |        |        |              |        |        |                      |        |        |                      |        |        |
|  |  | 1.2842                   | 90MnCrV8             | AISI O2                 |        |        |        |              |        |        |              |        |        |             |        |        |              |        |        |                      |        |        |                      |        |        |
| High alloyed tool steel<br>Rm < 1200 N/mm <sup>2</sup> | 1.2379   | X153CrMoV12              | AISI D2              | 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 |        |
|  | 1.2436   | 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 |
| 1.4105   |  |                          | X6CrMoS17            | AISI 430F               |        |        |        |              |        |        |              |        |        |             |        |        |              |        |        |                      |        |        |                      |        |        |
| Stainless steel martensitic                            |  | 1.4034                   | X46Cr13              | AISI 420C               | 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                   | X90CrMoV18           | AISI 440B               |        |        |        |              |        |        |              |        |        |             |        |        |              |        |        |                      |        |        |                      |        |        |
| Stainless steel martensitic - PH                       |  | 1.4542                   | X5CrNiCuNb16-4       | AISI 630 / ASTM 17-4 PH | 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       | ASTM 15-5 PH            |        |        |        |              |        |        |              |        |        |             |        |        |              |        |        |                      |        |        |                      |        |        |
| Stainless steel austenitic                             |  | 1.4301                   | X5CrNi18-10          | AISI 304                | 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   |
|  |  | 1.4435                   | X2CrNiMo18-14-3      | AISI 316L               |        |        |        |              |        |        |              |        |        |             |        |        |              |        |        |                      |        |        |                      |        |        |
|  | 1.4441   | X2CrNiMo18-15-3          | AISI 316LM           |                         |        |        |        |              |        |        |              |        |        |             |        |        |              |        |        |                      |        |        |                      |        |        |
| K  | Cast iron  | 0.6020                   | GG20                 | ASTM 30                 | 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   |
|  |  | 0.6030                   | GG30                 | ASTM 40B                |        |        |        |              |        |        |              |        |        |             |        |        |              |        |        |                      |        |        |                      |        |        |
|  |  | 0.7040                   | GGG40                | ASTM 60-40-18           |        |        |        |              |        |        |              |        |        |             |        |        |              |        |        |                      |        |        |                      |        |        |
|  |  | 0.7060                   | GGG60                | ASTM 80-60-03           |        |        |        |              |        |        |              |        |        |             |        |        |              |        |        |                      |        |        |                      |        |        |
| N  | Aluminium alloy wrought                              | 3.2315                   | AlMgSi1              | ASTM 6351               | 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          | ASTM 7075               |        |        |        |              |        |        |              |        |        |             |        |        |              |        |        |                      |        |        |                      |        |        |
|  | Aluminium alloy cast                                 | 3.2163                   | GD-ALSi9Cu3          | ASTM A380               | 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   |
|  |  | 3.2381                   | GD-ALSi10Mg          | UNS A03590              |        |        |        |              |        |        |              |        |        |             |        |        |              |        |        |                      |        |        |                      |        |        |
|  | Copper   | 2.0040                   | Cu-OF / CW008A       | UNS C10100              | 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      | UNS C11000              |        |        |        |              |        |        |              |        |        |             |        |        |              |        |        |                      |        |        |                      |        |        |
|  | Brass lead free                                      | 2.0321                   | CuZn37 CW508L        | UNS C27400              | 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 CW509L        | UNS C28000              |        |        |        |              |        |        |              |        |        |             |        |        |              |        |        |                      |        |        |                      |        |        |
|  | Brass, Bronze<br>Rm < 400 N/mm <sup>2</sup>          | 2.0401                   | CuZn39Pb3 / CW614N   | UNS C38500              | 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   |
|  |  | 2.1020                   | CuSn6                | UNS C51900              |        |        |        |              |        |        |              |        |        |             |        |        |              |        |        |                      |        |        |                      |        |        |
| Bronze<br>Rm < 600 N/mm <sup>2</sup>                   | 2.0966   | CuAl10Ni5Fe4             | UNS C63000           | 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   | CuAl9Mn2                 | UNS C63200           |                         |        |        |        |              |        |        |              |        |        |             |        |        |              |        |        |                      |        |        |                      |        |        |
| S <sub>1</sub>   | Super alloys   | 2.4856                   |                      | Inconel 625             | 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 | 120                  | 0.013  | 0.5xd1 |
|  |  | 2.4668                   |                      | Inconel 718             |        |        |        |              |        |        |              |        |        |             |        |        |              |        |        |                      |        |        |                      |        |        |
|  |  | 2.4617                   | NiMo28               | Hastelloy B-2           |        |        |        |              |        |        |              |        |        |             |        |        |              |        |        |                      |        |        |                      |        |        |
|  |  | 2.4665                   | NiCr22Fe18Mo         | Hastelloy X             |        |        |        |              |        |        |              |        |        |             |        |        |              |        |        |                      |        |        |                      |        |        |
| S <sub>2</sub>   | Titanium pure  | 3.7035                   | Gr.2                 | ASTM B348 / F67         | 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                   | Gr.4                 | ASTM B348 / F68         |        |        |        |              |        |        |              |        |        |             |        |        |              |        |        |                      |        |        |                      |        |        |
| S <sub>3</sub>   | Titanium alloys                                      | 3.7165                   | TiAl6V4              | ASTM B348 / F136        | 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 |
|  |  | 9.9367                   | TiAl6Nb7             | ASTM F1295              |        |        |        |              |        |        |              |        |        |             |        |        |              |        |        |                      |        |        |                      |        |        |
| H <sub>1</sub>   | Hardened steel<br>< 55 HRC                           | 2.4964                   | CoCr20W15Ni          | Haynes 25               | 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 | 120                  | 0.013  | 0.5xd1 |
|  |  |                          | CrCoMo28             | ASTM F1537              |        |        |        |              |        |        |              |        |        |             |        |        |              |        |        |                      |        |        |                      |        |        |
| H <sub>2</sub>   | Hardened steel<br>≥ 55 HRC                           | 1.2510                   | 100MnCrMoW4          | AISI O1                 |        |        |        |              |        |        |              |        |        |             |        |        |              |        |        |                      |        |        |                      |        |        |
|  |  | 1.2379                   | X153CrMoV12          | AISI D2                 |        |        |        |              |        |        |              |        |        |             |        |        |              |        |        |                      |        |        |                      |        |        |

**NEW**

# Type A - Side milling - Semi-finishing

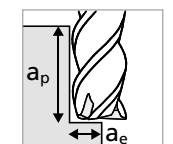
$v_c$  [m/min]  
 $f_z$  [mm]

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

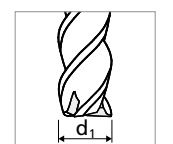
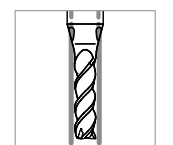


## MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

Semi-finishing



■  $a_p = 1 \times d_1 - 2 \times d_1$   
■  $a_e = 0.2 \times d_1$



| Materials group  | Material   | Mat. no.          | DIN                  | AISI/ASTM/UNS           | 1.0 mm |       | 1.5 mm<br>1/16" |       | 2.0 mm<br>3/32" |       | 3.0 mm<br>1/8" |       | Ød <sub>1</sub><br>4.0 mm<br>5/32" |       | 5.0 mm<br>3/16" - 7/32" |       | 6.0 mm<br>1/4" |       | 8.0 mm |       |
|--|--|-------------------|----------------------|-------------------------|--------|-------|-----------------|-------|-----------------|-------|----------------|-------|------------------------------------|-------|-------------------------|-------|----------------|-------|--------|-------|
|  |  |                   |                      |                         | $v_c$  | $f_z$ | $v_c$           | $f_z$ | $v_c$           | $f_z$ | $v_c$          | $f_z$ | $v_c$                              | $f_z$ | $v_c$                   | $f_z$ | $v_c$          | $f_z$ | $v_c$  | $f_z$ |
| P  | Unalloyed carbon steel<br>Rm < 800 N/mm <sup>2</sup> | 1.0301            | C10                  | AISI 1010               | 140    | 0.013 | 200             | 0.020 | 220             | 0.029 | 240            | 0.037 | 260                                | 0.040 | 260                     | 0.040 | 260            | 0.043 | 260    | 0.051 |
|  |  | 1.0401            | C15                  | AISI 1015               |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |       |
|  |  | 1.1191            | C45E/CK45            | AISI 1045               |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |       |
|  |  | 1.0044            | S275JR               | AISI 1020               |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |       |
|  |  | 1.0715            | 11SMn30              | AISI 1215               |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |       |
|  | Low alloyed steel<br>Rm > 900 N/mm <sup>2</sup>      | 1.5752            | 15NiCr13             | ASTM 3415 / AISI 3310   | 140    | 0.012 | 200             | 0.019 | 220             | 0.027 | 240            | 0.035 | 260                                | 0.038 | 260                     | 0.038 | 260            | 0.041 | 260    | 0.049 |
|  |  | 1.7131            | 16MnCr5              | AISI 5115               |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |       |
|  |  | 1.3505            | 100Cr6               | AISI 52100              |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |       |
|  |  | 1.7225            | 42CrMo4              | AISI 4140               |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |       |
|  |  | 1.2842            | 90MnCrV8             | AISI O2                 |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |       |
| High alloyed tool steel<br>Rm < 1200 N/mm <sup>2</sup> | 1.2379   | X153CrMoV12       | AISI D2              | 140                     | 0.009  | 200   | 0.017           | 220   | 0.026           | 240   | 0.032          | 260   | 0.034                              | 260   | 0.034                   | 260   | 0.036          | 260   | 0.043  |       |
|  | 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   | 140    | 0.014 | 200             | 0.020 | 220             | 0.029 | 240            | 0.035 | 260                                | 0.038 | 260                     | 0.038 | 260            | 0.041 | 260    | 0.046 |
|  |  | 1.4105            | X6CrMoS17            | AISI 430F               |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |       |
|  | Stainless steel martensitic                          | 1.4034            | X46Cr13              | AISI 420C               | 140    | 0.013 | 200             | 0.019 | 220             | 0.027 | 240            | 0.035 | 260                                | 0.037 | 260                     | 0.037 | 260            | 0.039 | 260    | 0.045 |
|  |  | 1.4112            | X90CrMoV18           | AISI 440B               |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |       |
|  | Stainless steel martensitic – PH                     | 1.4542            | X5CrNiCuNb16-4       | AISI 630 / ASTM 17-4 PH | 140    | 0.013 | 200             | 0.019 | 220             | 0.027 | 240            | 0.035 | 260                                | 0.037 | 260                     | 0.037 | 260            | 0.039 | 260    | 0.045 |
|  |  | 1.4545            | X5CrNiCuNb15-5       | ASTM 15-5 PH            |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |       |
|  | Stainless steel austenitic                           | 1.4301            | X5CrNi18-10          | AISI 304                | 140    | 0.010 | 200             | 0.014 | 220             | 0.026 | 240            | 0.032 | 260                                | 0.035 | 260                     | 0.035 | 260            | 0.037 | 260    | 0.043 |
|  |  | 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                 | 120    | 0.009 | 140             | 0.020 | 160             | 0.024 | 180            | 0.034 | 200                                | 0.040 | 200                     | 0.042 | 200            | 0.044 | 200    | 0.052 |
|  |  | 0.6030            | GG30                 | ASTM 40B                |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |       |
|  |  | 0.7040            | GGG40                | ASTM 60-40-18           |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |       |
|  |  | 0.7060            | GGG60                | ASTM 80-60-03           |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |       |
| N  | Aluminium alloy wrought                              | 3.2315            | AlMgSi1              | ASTM 6351               | 140    | 0.015 | 200             | 0.022 | 220             | 0.031 | 240            | 0.046 | 260                                | 0.048 | 260                     | 0.048 | 260            | 0.051 | 260    | 0.063 |
|  |  | 3.4365            | AlZnMgCu1.5          | ASTM 7075               |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |       |
|  | Aluminium alloy cast                                 | 3.2163            | GD-ALSi9Cu3          | ASTM A380               | 140    | 0.015 | 200             | 0.022 | 220             | 0.031 | 240            | 0.046 | 260                                | 0.048 | 260                     | 0.048 | 260            | 0.051 | 260    | 0.063 |
|  |  | 3.2381            | GD-ALSi10Mg          | UNS A03590              |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |       |
|  | Copper   | 2.0040            | Cu-OF / CW008A       | UNS C10100              | 140    | 0.017 | 200             | 0.022 | 220             | 0.031 | 240            | 0.046 | 260                                | 0.048 | 260                     | 0.048 | 260            | 0.051 | 260    | 0.063 |
|  |  | 2.0065            | Cu-ETP / CW004A      | UNS C11000              |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |       |
|  | Brass lead free                                      | 2.0321            | CuZn37 CW508L        | UNS C27400              | 140    | 0.017 | 200             | 0.022 | 220             | 0.031 | 240            | 0.046 | 260                                | 0.048 | 260                     | 0.048 | 260            | 0.051 | 260    | 0.063 |
|  |  | 2.0360            | CuZn40 CW509L        | UNS C28000              |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |       |
|  | Brass, Bronze<br>Rm < 400 N/mm <sup>2</sup>          | 2.0401            | CuZn39Pb3 / CW614N   | UNS C38500              | 140    | 0.017 | 200             | 0.022 | 220             | 0.031 | 240            | 0.046 | 260                                | 0.048 | 260                     | 0.048 | 260            | 0.051 | 260    | 0.063 |
|  |  | 2.1020            | CuSn6                | UNS C51900              |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |       |
| Bronze<br>Rm < 600 N/mm <sup>2</sup>                   | 2.0966   | CuAl10Ni5Fe4      | UNS C63000           | 140                     | 0.015  | 200   | 0.022           | 220   | 0.031           | 240   | 0.046          | 260   | 0.048                              | 260   | 0.048                   | 260   | 0.051          | 260   | 0.063  |       |
|  | 2.0960   | CuAl9Mn2          | UNS C63200           |                         |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |       |
| S <sub>1</sub>   | Super alloys   | 2.4856            |                      | Inconel 625             | 80     | 0.006 | 100             | 0.008 | 100             | 0.009 | 100            | 0.012 | 120                                | 0.016 | 120                     | 0.016 | 120            | 0.017 | 120    | 0.018 |
|  |  | 2.4668            |                      | Inconel 718             |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |       |
|  |  | 2.4617            | NiMo28               | Hastelloy B-2           |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |       |
|  |  | 2.4665            | NiCr22Fe18Mo         | Hastelloy X             |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |       |
| S <sub>2</sub>   | Titanium pure  | 3.7035            | Gr.2                 | ASTM B348 / F67         | 120    | 0.014 | 120             | 0.017 | 130             | 0.024 | 130            | 0.032 | 150                                | 0.035 | 150                     | 0.035 | 150            | 0.037 | 150    | 0.040 |
|  |  | 3.7065            | Gr.4                 | ASTM B348 / F68         |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |       |
| S <sub>3</sub>   | Titanium alloys                                      | 3.7165            | TiAl6V4              | ASTM B348 / F136        | 120    | 0.014 | 120             | 0.017 | 130             | 0.024 | 130            | 0.032 | 150                                | 0.035 | 150                     | 0.035 | 150            | 0.037 | 150    | 0.040 |
|  |  | 9.9367            | TiAl6Nb7             | ASTM F1295              |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |       |
| H <sub>1</sub>   | Hardened steel<br>< 55 HRC                           | 2.4964            | CoCr20W15Ni          | Haynes 25               | 80     | 0.006 | 100             | 0.008 | 100             | 0.009 | 100            | 0.012 | 120                                | 0.016 | 120                     | 0.016 | 120            | 0.017 | 120    | 0.018 |
|  |  |                   | CrCoMo28             | ASTM F1537              |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |       |
| H <sub>2</sub>   | Hardened steel<br>≥ 55 HRC                           | 1.2510            | 100MnCrMoW4          | AISI O1                 |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |       |
|  |  | 1.2379            | X153CrMoV12          | AISI D2                 |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |       |

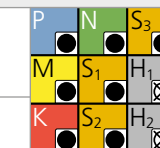


**NEW**

# Type A - Side milling - Finishing

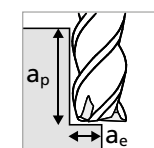
$v_c$  [m/min]  
 $f_z$  [mm]

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

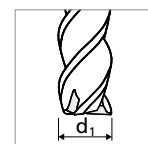
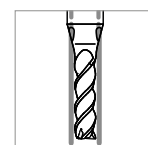


## MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

Finishing



■  $a_p = 2.5 \times d_1$   
■  $a_e = 0.05 \times d_1$



| Materials group  | Material   | Mat. no.                 | DIN                  | AISI/ASTM/UNS           | 1.0 mm |       | 1.5 mm<br>1/16" |       | 2.0 mm<br>3/32" |       | 3.0 mm<br>1/8" |       | Ød <sub>1</sub><br>4.0 mm<br>5/32" |       | 5.0 mm<br>3/16" - 7/32" |       | 6.0 mm<br>1/4" |       | 8.0 mm |        |
|--|--|--------------------------|----------------------|-------------------------|--------|-------|-----------------|-------|-----------------|-------|----------------|-------|------------------------------------|-------|-------------------------|-------|----------------|-------|--------|--------|
|  |  |                          |                      |                         | $v_c$  | $f_z$ | $v_c$           | $f_z$ | $v_c$           | $f_z$ | $v_c$          | $f_z$ | $v_c$                              | $f_z$ | $v_c$                   | $f_z$ | $v_c$          | $f_z$ | $v_c$  | $f_z$  |
| P  | Unalloyed carbon steel<br>Rm < 800 N/mm <sup>2</sup> | 1.0301                   | C10                  | AISI 1010               | 130    | 0.008 | 180             | 0.012 | 200             | 0.017 | 210            | 0.023 | 220                                | 0.025 | 220                     | 0.028 | 220            | 0.033 | 220    | 0.042  |
|  |  | 1.0401                   | C15                  | AISI 1015               |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |        |
|  |  | 1.1191                   | C45E/CK45            | AISI 1045               |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |        |
|  |  | 1.0044                   | S275JR               | AISI 1020               |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |        |
|  |  | 1.0715                   | 11Mn30               | AISI 1215               |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |        |
|  | Low alloyed steel<br>Rm > 900 N/mm <sup>2</sup>      | 1.5752                   | 15NiCr13             | ASTM 3415 / AISI 3310   | 130    | 0.007 | 180             | 0.011 | 200             | 0.016 | 210            | 0.022 | 220                                | 0.024 | 220                     | 0.026 | 220            | 0.029 | 220    | 0.038  |
|  |  | 1.7131                   | 16MnCr5              | AISI 5115               |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |        |
|  |  | 1.3505                   | 100Cr6               | AISI 52100              |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |        |
|  |  | 1.7225                   | 42CrMo4              | AISI 4140               |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |        |
|  |  | 1.2842                   | 90MnCrV8             | AISI O2                 |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |        |
| High alloyed tool steel<br>Rm < 1200 N/mm <sup>2</sup> | 1.2379   | X153CrMoV12              | AISI D2              | 130                     | 0.006  | 180   | 0.010           | 200   | 0.015           | 210   | 0.020          | 220   | 0.021                              | 220   | 0.023                   | 220   | 0.025          | 220   | 0.034  |        |
|  | 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 |
| 1.4105   |  |                          | X6CrMoS17            | AISI 430F               |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |        |
| Stainless steel martensitic                            |  | 1.4034                   | X46Cr13              | AISI 420C               | 130    | 0.008 | 180             | 0.011 | 200             | 0.016 | 210            | 0.022 | 220                                | 0.023 | 220                     | 0.025 | 220            | 0.028 | 220    | 0.037  |
|  |  | 1.4112                   | X90CrMoV18           | AISI 440B               |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |        |
| Stainless steel martensitic – PH                       |  | 1.4542                   | X5CrNiCuNb16-4       | AISI 630 / ASTM 17-4 PH | 130    | 0.008 | 180             | 0.011 | 200             | 0.016 | 210            | 0.022 | 220                                | 0.023 | 220                     | 0.025 | 220            | 0.028 | 220    | 0.037  |
|  |  | 1.4545                   | X5CrNiCuNb15-5       | ASTM 15-5 PH            |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |        |
| Stainless steel austenitic                             |  | 1.4301                   | X5CrNi18-10          | AISI 304                | 130    | 0.006 | 180             | 0.008 | 200             | 0.015 | 210            | 0.020 | 220                                | 0.022 | 220                     | 0.024 | 220            | 0.026 | 220    | 0.035  |
|  |  | 1.4435                   | X2CrNiMo18-14-3      | AISI 316L               |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |        |
|  | 1.4441   | X2CrNiMo18-15-3          | AISI 316LM           |                         |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |        |
| K  | Cast iron  | 0.6020                   | GG20                 | ASTM 30                 | 110    | 0.006 | 130             | 0.012 | 150             | 0.014 | 160            | 0.022 | 170                                | 0.025 | 170                     | 0.029 | 170            | 0.031 | 200    | 0.040  |
|  |  | 0.6030                   | GG30                 | ASTM 40B                |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |        |
|  |  | 0.7040                   | GGG40                | ASTM 60-40-18           |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |        |
|  |  | 0.7060                   | GGG60                | ASTM 80-60-03           |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |        |
| N  | Aluminium alloy wrought                              | 3.2315                   | AlMgSi1              | ASTM 6351               | 130    | 0.009 | 180             | 0.013 | 200             | 0.018 | 210            | 0.029 | 220                                | 0.030 | 220                     | 0.033 | 220            | 0.036 | 270    | 0.045  |
|  |  | 3.4365                   | AlZnMgCu1.5          | ASTM 7075               |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |        |
|  | Aluminium alloy cast                                 | 3.2163                   | GD-AlSi9Cu3          | ASTM A380               | 130    | 0.009 | 180             | 0.013 | 200             | 0.018 | 210            | 0.029 | 220                                | 0.030 | 220                     | 0.033 | 220            | 0.036 | 270    | 0.045  |
|  |  | 3.2381                   | GD-AlSi10Mg          | UNS A03590              |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |        |
|  | Copper   | 2.0040                   | Cu-OF / CW008A       | UNS C10100              | 130    | 0.010 | 180             | 0.013 | 200             | 0.018 | 210            | 0.029 | 220                                | 0.030 | 220                     | 0.033 | 220            | 0.036 | 270    | 0.045  |
|  |  | 2.0065                   | Cu-ETP / CW004A      | UNS C11000              |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |        |
|  | Brass lead free                                      | 2.0321                   | CuZn37 CW508L        | UNS C27400              | 130    | 0.010 | 180             | 0.013 | 200             | 0.018 | 210            | 0.029 | 220                                | 0.030 | 220                     | 0.033 | 220            | 0.036 | 270    | 0.045  |
|  |  | 2.0360                   | CuZn40 CW509L        | UNS C28000              |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |        |
|  | Brass, Bronze<br>Rm < 400 N/mm <sup>2</sup>          | 2.0401                   | CuZn39Pb3 / CW614N   | UNS C38500              | 130    | 0.010 | 180             | 0.013 | 200             | 0.018 | 210            | 0.029 | 220                                | 0.030 | 220                     | 0.033 | 220            | 0.036 | 270    | 0.045  |
|  |  | 2.1020                   | CuSn6                | UNS C51900              |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |        |
| Bronze<br>Rm < 600 N/mm <sup>2</sup>                   | 2.0966   | CuAl10Ni5Fe4             | UNS C63000           | 130                     | 0.009  | 180   | 0.013           | 200   | 0.018           | 210   | 0.029          | 220   | 0.030                              | 220   | 0.033                   | 220   | 0.036          | 270   | 0.045  |        |
|  | 2.0960   | CuAl9Mn2                 | UNS C63200           |                         |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |        |
| S <sub>1</sub>   | Super alloys   | 2.4856                   |                      | Inconel 625             | 110    | 0.004 | 120             | 0.005 | 130             | 0.005 | 130            | 0.008 | 140                                | 0.010 | 140                     | 0.011 | 150            | 0.012 | 160    | 0.021  |
|  |  | 2.4668                   |                      | Inconel 718             |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |        |
|  |  | 2.4617                   | NiMo28               | Hastelloy B-2           |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |        |
|  |  | 2.4665                   | NiCr22Fe18Mo         | Hastelloy X             |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |        |
| S <sub>2</sub>   | Titanium pure  | 3.7035                   | Gr.2                 | ASTM B348 / F67         | 110    | 0.008 | 120             | 0.010 | 130             | 0.014 | 130            | 0.020 | 140                                | 0.022 | 140                     | 0.024 | 150            | 0.026 | 160    | 0.035  |
|  |  | 3.7065                   | Gr.4                 | ASTM B348 / F68         |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |        |
| S <sub>3</sub>   | Titanium alloys                                      | 3.7165                   | TiAl6V4              | ASTM B348 / F136        | 110    | 0.008 | 120             | 0.010 | 130             | 0.014 | 130            | 0.020 | 140                                | 0.022 | 140                     | 0.024 | 150            | 0.026 | 160    | 0.035  |
|  |  | 9.9367                   | TiAl6Nb7             | ASTM F1295              |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |        |
| H <sub>1</sub>   | Hardened steel<br>< 55 HRC                           | 2.4964                   | CoCr20W15Ni          | Haynes 25               | 110    | 0.004 | 120             | 0.005 | 130             | 0.005 | 130            | 0.008 | 140                                | 0.010 | 140                     | 0.011 | 150            | 0.012 | 160    | 0.021  |
|  |  |                          | CrCoMo28             | ASTM F1537              |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |        |
| H <sub>2</sub>   | Hardened steel<br>≥ 55 HRC                           | 1.2510                   | 100MnCrMoW4          | AISI O1                 |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |        |
|  |  | 1.2379                   | X153CrMoV12          | AISI D2                 |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |        |

**NEW** Type C - 5 x d - Square - Z3

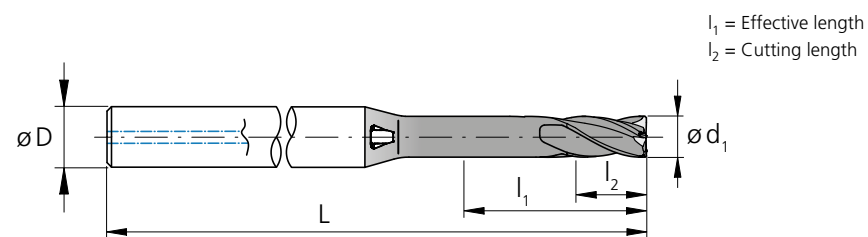
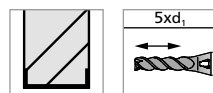
Carbide

Z3



|                  |                |
|------------------|----------------|
| Ø d <sub>1</sub> | 1.0 - 8.0 mm   |
| Tolerance        | 0<br>- 0.02 mm |

P&S - Square



l<sub>1</sub> = Effective length  
l<sub>2</sub> = Cutting length

| d <sub>1</sub><br>[mm] | d <sub>1</sub><br>[inch] | l <sub>1</sub><br>[mm] | l <sub>2</sub><br>[mm] | D<br>(h6)<br>[mm] | L<br>[mm] | Item<br>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                  | <b>1/16</b>              | 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                  | <b>3/32</b>              | 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 <sub>1</sub><br>[mm] | d <sub>1</sub><br>[inch] | l <sub>1</sub><br>[mm] | l <sub>2</sub><br>[mm] | D<br>(h6)<br>[mm] | L<br>[mm] | Item<br>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                  | <b>1/8</b>               | 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                  | <b>5/32</b>              | 19.84                  | 7.94                   | 6                 | 60        | 2.CMC.PSSCZ3.F532  | ■            |
| 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                  | <b>3/16</b>              | 23.81                  | 9.52                   | 8                 | 70        | 2.CMC.PSSCZ3.F316  | ■            |
| 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                  | <b>7/32</b>              | 27.80                  | 11.12                  | 10                | 70        | 2.CMC.PSSCZ3.F732  | ■            |
| 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                  | <b>1/4</b>               | 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

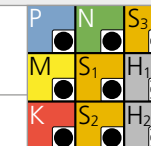


NEW

# Type C - Milling of through slots

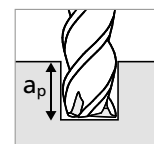
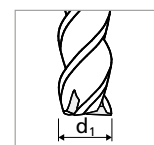
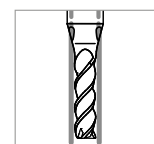
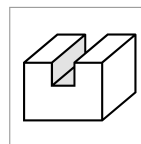
$v_c$  [m/min]  
 $f_z$  [mm]  
 $a_p$  [mm]

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



## MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

Through slot milling



| 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 - 8.0 mm 1/4" |         |            |                       |           |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |
|--|--|-----------------------------|-------------------------|-------------------------|--------|---------|---------|--------------|---------|---------|--------------|---------|---------|-------------|---------|---------|--------------|---------|---------|----------------------|---------|---------|----------------------|---------|------------|-----------------------|-----------|-------|--------|--------|-------|--------|--------|-------|--------|--------|-------|--------|--------|-------|--------|--------|-------|--------|--------|-------|--------|
|  |  |                             |                         |                         | $v_c$  | $f_z$   | $a_p$   | $v_c$        | $f_z$   | $a_p$   | $v_c$        | $f_z$   | $a_p$   | $v_c$       | $f_z$   | $a_p$   | $v_c$        | $f_z$   | $a_p$   | $v_c$                | $f_z$   | $a_p$   | $v_c$                | $f_z$   | $a_p$      |                       |           |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |
| P  | Unalloyed carbon steel<br>Rm < 800 N/mm <sup>2</sup> | 1.0301                      | C10                     | AISI 1010               | 120    | 0.009   | 0.5xd1  | 140          | 0.015   | 0.5xd1  | 160          | 0.020   | 0.5xd1  | 180         | 0.029   | 0.5xd1  | 200          | 0.031   | 0.5xd1  | 200                  | 0.031   | 0.5xd1  | 220                  | 0.032   | 0.5xd1     |                       |           |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |
|  |  | 1.0401                      | C15                     | AISI 1015               |        |         |         |              |         |         |              |         |         |             |         |         |              |         |         |                      |         |         |                      |         |            |                       |           |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |
|  |  | 1.1191                      | C45E/CK45               | AISI 1045               |        |         |         |              |         |         |              |         |         |             |         |         |              |         |         |                      |         |         |                      |         |            |                       |           |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |
|  |  | 1.0044                      | S275JR                  | AISI 1020               |        |         |         |              |         |         |              |         |         |             |         |         |              |         |         |                      |         |         |                      |         |            |                       |           |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |
|  |  | 1.0715                      | 11SMn30                 | AISI 1215               |        |         |         |              |         |         |              |         |         |             |         |         |              |         |         |                      |         |         |                      |         |            |                       |           |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |
|  | Low alloyed steel<br>Rm > 900 N/mm <sup>2</sup>      | 1.5752                      | 15NiCr13                | ASTM 3415 / AISI 3310   | 120    | 0.008   | 0.5xd1  | 140          | 0.013   | 0.5xd1  | 160          | 0.019   | 0.5xd1  | 180         | 0.028   | 0.5xd1  | 200          | 0.029   | 0.5xd1  | 200                  | 0.030   | 0.5xd1  | 220                  | 0.031   | 0.5xd1     |                       |           |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |
|  |  | 1.7131                      | 16MnCr5                 | AISI 5115               |        |         |         |              |         |         |              |         |         |             |         |         |              |         |         |                      |         |         |                      |         |            |                       |           |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |
|  |  | 1.3505                      | 100Cr6                  | AISI 52100              |        |         |         |              |         |         |              |         |         |             |         |         |              |         |         |                      |         |         |                      |         |            |                       |           |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |
|  |  | 1.7225                      | 42CrMo4                 | AISI 4140               |        |         |         |              |         |         |              |         |         |             |         |         |              |         |         |                      |         |         |                      |         |            |                       |           |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |
|  |  | 1.2842                      | 90MnCrV8                | AISI O2                 |        |         |         |              |         |         |              |         |         |             |         |         |              |         |         |                      |         |         |                      |         |            |                       |           |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |
| 1.2379   |  | X153CrMoV12                 | AISI D2                 |                         |        |         |         |              |         |         |              |         |         |             |         |         |              |         |         |                      |         |         |                      |         |            |                       |           |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |
| High alloyed tool steel<br>Rm < 1200 N/mm <sup>2</sup> | 1.2436   | X210CrW12                   | AISI D4/D6              | 120                     | 0.006  | 0.25xd1 | 140     | 0.012        | 0.25xd1 | 160     | 0.017        | 0.25xd1 | 180     | 0.025       | 0.25xd1 | 200     | 0.026        | 0.25xd1 | 200     | 0.026                | 0.25xd1 | 220     | 0.027                | 0.25xd1 |            |                       |           |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |
|  | 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 | 120       | 0.009 | 0.5xd1 | 140    | 0.015 | 0.5xd1 | 160    | 0.020 | 0.5xd1 | 180    | 0.028 | 0.5xd1 | 200    | 0.029 | 0.5xd1 | 200    | 0.030 | 0.5xd1 | 220    | 0.031 | 0.5xd1 |
|  |  |                             | 1.4105                  |                         |        |         |         |              |         |         |              |         |         |             |         |         |              |         |         |                      |         |         |                      |         | X6CrMoS17  | AISI 430F             |           |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |
|  |  |                             | 1.4034                  |                         |        |         |         |              |         |         |              |         |         |             |         |         |              |         |         |                      |         |         |                      |         | X46Cr13    | AISI 420C             |           |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |
|  |  | Stainless steel martensitic | 1.4112                  |                         |        |         |         |              |         |         |              |         |         |             |         |         |              |         |         |                      |         |         |                      |         | X90CrMoV18 | AISI 440B             | 120       | 0.009 | 0.5xd1 | 140    | 0.013 | 0.5xd1 | 160    | 0.019 | 0.5xd1 | 180    | 0.027 | 0.5xd1 | 200    | 0.028 | 0.5xd1 | 200    | 0.029 | 0.5xd1 | 220    | 0.029 | 0.5xd1 |
| 1.4542   |  |                             | X5CrNiCuNb16-4          | AISI 630 / ASTM 17-4 PH |        |         |         |              |         |         |              |         |         |             |         |         |              |         |         |                      |         |         |                      |         |            |                       |           |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |
| 1.4545   |  |                             | X5CrNiCuNb15-5          | ASTM 15-5 PH            |        |         |         |              |         |         |              |         |         |             |         |         |              |         |         |                      |         |         |                      |         |            |                       |           |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |
| Stainless steel austenitic                             | 1.4301   | X5CrNi18-10                 | AISI 304                | 120                     | 0.007  | 0.5xd1  | 140     | 0.011        | 0.5xd1  | 160     | 0.017        | 0.5xd1  | 180     | 0.025       | 0.5xd1  | 200     | 0.027        | 0.5xd1  | 200     | 0.027                | 0.5xd1  | 220     | 0.028                | 0.5xd1  |            |                       |           |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |
|  | 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                 | 100    | 0.007   | 0.5xd1  | 120          | 0.015   | 0.5xd1  | 140          | 0.017   | 0.5xd1  | 160         | 0.025   | 0.5xd1  | 180          | 0.031   | 0.5xd1  | 200                  | 0.031   | 0.5xd1  | 200                  | 0.032   | 0.5xd1     |                       |           |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |
|  |  | 0.6030                      | GG30                    | ASTM 40B                |        |         |         |              |         |         |              |         |         |             |         |         |              |         |         |                      |         |         |                      |         |            |                       |           |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |
|  |  | 0.7040                      | GGG40                   | ASTM 60-40-18           |        |         |         |              |         |         |              |         |         |             |         |         |              |         |         |                      |         |         |                      |         |            |                       |           |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |
|  |  | 0.7060                      | GGG60                   | ASTM 80-60-03           |        |         |         |              |         |         |              |         |         |             |         |         |              |         |         |                      |         |         |                      |         |            |                       |           |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |
|  |  | N                           | Aluminium alloy wrought | 3.2315                  |        |         |         |              |         |         |              |         |         |             |         |         |              |         |         |                      |         |         |                      |         |            | AlMgSi1               | ASTM 6351 | 170   | 0.010  | 0.5xd1 | 190   | 0.016  | 0.5xd1 | 210   | 0.021  | 0.5xd1 | 230   | 0.034  | 0.5xd1 | 250   | 0.035  | 0.5xd1 | 250   | 0.036  | 0.5xd1 | 270   | 0.037  |
| 3.4365   | AlZnMgCu1.5  |                             |                         | ASTM 7075               |        |         |         |              |         |         |              |         |         |             |         |         |              |         |         |                      |         |         |                      |         |            |                       |           |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |
| Aluminium alloy cast                                   | 3.2163   |                             | GD-ALSi9Cu3             | ASTM A380               | 170    | 0.010   | 0.5xd1  | 190          | 0.016   | 0.5xd1  | 210          | 0.021   | 0.5xd1  | 230         | 0.032   | 0.5xd1  | 250          | 0.034   | 0.5xd1  | 250                  | 0.034   | 0.5xd1  | 270                  | 0.036   | 0.5xd1     |                       |           |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |
|  | 3.2381   |                             | GD-ALSi10Mg             | UNS A03590              |        |         |         |              |         |         |              |         |         |             |         |         |              |         |         |                      |         |         |                      |         |            |                       |           |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |
| Copper   | 2.0040   |                             | Cu-OF / CW008A          | UNS C10100              | 170    | 0.012   | 0.5xd1  | 190          | 0.016   | 0.5xd1  | 210          | 0.021   | 0.5xd1  | 230         | 0.034   | 0.5xd1  | 250          | 0.035   | 0.5xd1  | 250                  | 0.036   | 0.5xd1  | 270                  | 0.037   | 0.5xd1     |                       |           |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |
|  | 2.0065   |                             | Cu-ETP / CW004A         | UNS C11000              |        |         |         |              |         |         |              |         |         |             |         |         |              |         |         |                      |         |         |                      |         |            |                       |           |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |
| Brass lead free  | 2.0321   |                             | CuZn37 CW508L           | UNS C27400              | 170    | 0.012   | 0.5xd1  | 190          | 0.016   | 0.5xd1  | 210          | 0.021   | 0.5xd1  | 230         | 0.034   | 0.5xd1  | 250          | 0.035   | 0.5xd1  | 250                  | 0.036   | 0.5xd1  | 270                  | 0.037   | 0.5xd1     |                       |           |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |
|  | 2.0360   |                             | CuZn40 CW509L           | UNS C28000              |        |         |         |              |         |         |              |         |         |             |         |         |              |         |         |                      |         |         |                      |         |            |                       |           |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |
| Brass, Bronze<br>Rm < 400 N/mm <sup>2</sup>            | 2.0401   |                             | CuZn39Pb3 / CW614N      | UNS C38500              | 170    | 0.012   | 0.5xd1  | 190          | 0.016   | 0.5xd1  | 210          | 0.021   | 0.5xd1  | 230         | 0.034   | 0.5xd1  | 250          | 0.035   | 0.5xd1  | 250                  | 0.036   | 0.5xd1  | 270                  | 0.037   | 0.5xd1     |                       |           |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |
|  | 2.1020   |                             | CuSn6                   | UNS C51900              |        |         |         |              |         |         |              |         |         |             |         |         |              |         |         |                      |         |         |                      |         |            |                       |           |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |
| Bronze<br>Rm < 600 N/mm <sup>2</sup>                   | 2.0966   | CuAl10Ni5Fe4                | UNS C63000              | 170                     | 0.011  | 0.5xd1  | 190     | 0.016        | 0.5xd1  | 210     | 0.021        | 0.5xd1  | 230     | 0.034       | 0.5xd1  | 250     | 0.035        | 0.5xd1  | 250     | 0.036                | 0.5xd1  | 270     | 0.037                | 0.5xd1  |            |                       |           |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |
|  | 2.0960   | CuAl9Mn2                    | UNS C63200              |                         |        |         |         |              |         |         |              |         |         |             |         |         |              |         |         |                      |         |         |                      |         |            |                       |           |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |
| S <sub>1</sub>   | Super alloys   | 2.4856                      |                         | Inconel 625             | 80     | 0.005   | 0.25xd1 | 80           | 0.006   | 0.25xd1 | 100          | 0.007   | 0.25xd1 | 100         | 0.010   | 0.25xd1 | 120          | 0.013   | 0.25xd1 | 120                  | 0.013   | 0.25xd1 | 120                  | 0.013   | 0.25xd1    |                       |           |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |
|  |  | 2.4668                      |                         | Inconel 718             |        |         |         |              |         |         |              |         |         |             |         |         |              |         |         |                      |         |         |                      |         |            |                       |           |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |
|  |  | 2.4617                      | NiMo28                  | Hastelloy B-2           |        |         |         |              |         |         |              |         |         |             |         |         |              |         |         |                      |         |         |                      |         |            |                       |           |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |
|  |  | 2.4665                      | NiCr22Fe18Mo            | Hastelloy X             |        |         |         |              |         |         |              |         |         |             |         |         |              |         |         |                      |         |         |                      |         |            |                       |           |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |
| S <sub>2</sub>   | Titanium pure  | 3.7035                      | Gr.2                    | ASTM B348 / F67         | 80     | 0.009   | 0.25xd1 | 80           | 0.012   | 0.25xd1 | 100          | 0.017   | 0.25xd1 | 100         | 0.027   | 0.25xd1 | 120          | 0.027   | 0.25xd1 | 120                  | 0.027   | 0.25xd1 | 140                  | 0.028   | 0.25xd1    |                       |           |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |
|  |  | 3.7065                      | Gr.4                    | ASTM B348 / F68         |        |         |         |              |         |         |              |         |         |             |         |         |              |         |         |                      |         |         |                      |         |            |                       |           |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |
| S <sub>3</sub>   | Titanium alloys                                      | 3.7165                      | TiAl6V4                 | ASTM B348 / F136        | 80     | 0.009   | 0.25xd1 | 80           | 0.012   | 0.25xd1 | 100          | 0.017   | 0.25xd1 | 100         | 0.027   | 0.25xd1 | 120          | 0.027   | 0.25xd1 | 120                  | 0.027   | 0.25xd1 | 140                  | 0.028   | 0.25xd1    |                       |           |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |
|  |  | 9.9367                      | TiAl6Nb7                | ASTM F1295              |        |         |         |              |         |         |              |         |         |             |         |         |              |         |         |                      |         |         |                      |         |            |                       |           |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |
| H <sub>1</sub>   | Hardened steel<br>< 55 HRC                           | 2.4964                      | CoCr20W15Ni             | Haynes 25               | 80     | 0.005   | 0.25xd1 | 80           | 0.006   | 0.25xd1 | 100          | 0.007   | 0.25xd1 | 100         | 0.010   | 0.25xd1 | 120          | 0.013   | 0.25xd1 | 120                  | 0.013   | 0.25xd1 | 120                  | 0.013   | 0.25xd1    |                       |           |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |
|  |  |                             | CrCoMo28                | ASTM F1537              |        |         |         |              |         |         |              |         |         |             |         |         |              |         |         |                      |         |         |                      |         |            |                       |           |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |
| H <sub>2</sub>   | Hardened steel<br>≥ 55 HRC                           | 1.2510                      | 100MnCrMoW4             | AISI O1                 |        |         |         |              |         |         |              |         |         |             |         |         |              |         |         |                      |         |         |                      |         |            |                       |           |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |
|  |  | 1.2379                      | X153CrMoV12             | AISI D2                 |        |         |         |              |         |         |              |         |         |             |         |         |              |         |         |                      |         |         |                      |         |            |                       |           |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |        |       |        |



**NEW**

# Type C - Side milling - Semi-finishing

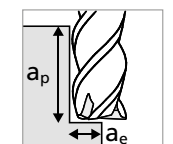
$v_c$  [m/min]  
 $f_z$  [mm]

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

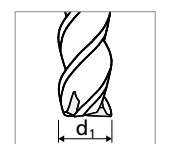
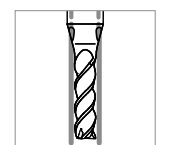


## MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

Semi-finishing



■  $a_p = 1 \times d_1 - 2 \times d_1$   
■  $a_e = 0.1 \times d_1$



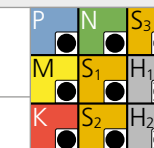
| Materials group  | Material   | Mat. no.           | DIN                  | AISI/ASTM/UNS           | 1.0 mm |       | 1.5 mm<br>1/16" |       | 2.0 mm<br>3/32" |       | 3.0 mm<br>1/8" |       | Ød <sub>1</sub><br>4.0 mm<br>5/32" |       | 5.0 mm<br>3/16" - 7/32" |       | 6.0 mm<br>1/4" |       | 8.0 mm |       |       |       |
|--|--|--------------------|----------------------|-------------------------|--------|-------|-----------------|-------|-----------------|-------|----------------|-------|------------------------------------|-------|-------------------------|-------|----------------|-------|--------|-------|-------|-------|
|  |  |                    |                      |                         | $v_c$  | $f_z$ | $v_c$           | $f_z$ | $v_c$           | $f_z$ | $v_c$          | $f_z$ | $v_c$                              | $f_z$ | $v_c$                   | $f_z$ | $v_c$          | $f_z$ | $v_c$  | $f_z$ |       |       |
| P  | Unalloyed carbon steel<br>Rm < 800 N/mm <sup>2</sup> | 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<br>Rm > 900 N/mm <sup>2</sup>      | 1.5752             | 15NiCr13             | ASTM 3415 / AISI 3310   |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |       |       |       |
|  |  | 1.7131             | 16MnCr5              | AISI 5115               |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |       |       |       |
|  |  | 1.3505             | 100Cr6               | AISI 52100              |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |       |       |       |
|  |  | 1.7225             | 42CrMo4              | AISI 4140               |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |       |       |       |
|  |  | 1.2842             | 90MnCrV8             | AISI O2                 |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |       |       |       |
| High alloyed tool steel<br>Rm < 1200 N/mm <sup>2</sup> | 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   | 120    | 0.018 | 140             | 0.026 | 160             | 0.038 | 180            | 0.046 | 200                                | 0.048 | 200                     | 0.050 | 220            | 0.055 | 220    | 0.062 | 220   | 0.062 |
|  |  | 1.4105             | X6CrMoS17            | AISI 430F               |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |       |       |       |
|  | Stainless steel martensitic                          | 1.4034             | X46Cr13              | AISI 420C               | 120    | 0.017 | 140             | 0.025 | 160             | 0.036 | 180            | 0.044 | 200                                | 0.046 | 200                     | 0.048 | 220            | 0.052 | 220    | 0.060 | 220   | 0.060 |
|  |  | 1.4112             | X90CrMoV18           | AISI 440B               |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |       |       |       |
|  | Stainless steel martensitic – PH                     | 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 | 220   | 0.060 |
|  |  | 1.4545             | X5CrNiCuNb15-5       | ASTM 15-5 PH            |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |       |       |       |
|  | Stainless steel austenitic                           | 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  | 220   | 0.058 |       |
| 1.4441   |  | X2CrNiMo18-15-3    | AISI 316LM           |                         |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |       |       |       |
| K  | Cast iron  | 0.6020             | GG20                 | ASTM 30                 |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |       |       |       |
|  |  | 0.6030             | GG30                 | ASTM 40B                |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |       |       |       |
|  |  | 0.7040             | GGG40                | 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 | 200   | 0.070 |
|  |  | 0.7060             | GGG60                | ASTM 80-60-03           |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |       |       |       |
| N  | Aluminium alloy wrought                              | 3.2315             | AlMgSi1              | ASTM 6351               | 170    | 0.020 | 190             | 0.029 | 210             | 0.040 | 230            | 0.060 | 250                                | 0.062 | 250                     | 0.064 | 270            | 0.068 | 270    | 0.084 | 270   | 0.084 |
|  |  | 3.4365             | AlZnMgCu1.5          | ASTM 7075               |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |       |       |       |
|  | Aluminium alloy cast                                 | 3.2163             | GD-AlSi9Cu3          | ASTM A380               | 170    | 0.020 | 190             | 0.029 | 210             | 0.040 | 230            | 0.060 | 250                                | 0.062 | 250                     | 0.064 | 270            | 0.068 | 270    | 0.084 | 270   | 0.084 |
|  |  | 3.2381             | GD-AlSi10Mg          | UNS A03590              |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |       |       |       |
|  | Copper   | 2.0040             | Cu-OF / CW008A       | UNS C10100              | 170    | 0.022 | 190             | 0.029 | 210             | 0.040 | 230            | 0.060 | 250                                | 0.062 | 250                     | 0.064 | 270            | 0.068 | 270    | 0.084 | 270   | 0.084 |
|  |  | 2.0065             | Cu-ETP / CW004A      | UNS C11000              |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |       |       |       |
|  | Brass lead free                                      | 2.0321             | CuZn37 CW508L        | UNS C27400              | 170    | 0.022 | 190             | 0.029 | 210             | 0.040 | 230            | 0.060 | 250                                | 0.062 | 250                     | 0.064 | 270            | 0.068 | 270    | 0.084 | 270   | 0.084 |
|  |  | 2.0360             | CuZn40 CW509L        | UNS C28000              |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |       |       |       |
| Brass, Bronze<br>Rm < 400 N/mm <sup>2</sup>            | 2.0401   | CuZn39Pb3 / CW614N | UNS C38500           | 170                     | 0.022  | 190   | 0.029           | 210   | 0.040           | 230   | 0.060          | 250   | 0.062                              | 250   | 0.064                   | 270   | 0.068          | 270   | 0.084  | 270   | 0.084 |       |
|  | 2.1020   | CuSn6              | UNS C51900           |                         |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |       |       |       |
| Bronze<br>Rm < 600 N/mm <sup>2</sup>                   | 2.0966   | CuAl10Ni5Fe4       | UNS C63000           | 170                     | 0.020  | 190   | 0.029           | 210   | 0.040           | 230   | 0.060          | 250   | 0.062                              | 250   | 0.064                   | 270   | 0.068          | 270   | 0.084  | 270   | 0.084 |       |
|  | 2.0960   | CuAl9Mn2           | UNS C63200           |                         |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |       |       |       |
| S <sub>1</sub>   | Super alloys   | 2.4856             |                      | Inconel 625             | 100    | 0.008 | 100             | 0.010 | 120             | 0.012 | 120            | 0.016 | 140                                | 0.018 | 140                     | 0.020 | 160            | 0.022 | 160    | 0.024 | 160   | 0.024 |
|  |  | 2.4668             |                      | Inconel 718             |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |       |       |       |
|  |  | 2.4617             | NiMo28               | Hastelloy B-2           |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |       |       |       |
|  |  | 2.4665             | NiCr22Fe18Mo         | Hastelloy X             |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |       |       |       |
| S <sub>2</sub>   | Titanium pure  | 3.7035             | Gr.2                 | ASTM B348 / F67         | 100    | 0.018 | 100             | 0.022 | 120             | 0.032 | 120            | 0.042 | 140                                | 0.044 | 140                     | 0.046 | 160            | 0.048 | 160    | 0.054 | 160   | 0.054 |
|  |  | 3.7065             | Gr.4                 | ASTM B348 / F68         |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |       |       |       |
| S <sub>3</sub>   | Titanium alloys                                      | 3.7165             | TiAl6V4              | ASTM B348 / F136        | 100    | 0.018 | 100             | 0.022 | 120             | 0.032 | 120            | 0.042 | 140                                | 0.044 | 140                     | 0.046 | 160            | 0.048 | 160    | 0.054 | 160   | 0.054 |
|  |  | 9.9367             | TiAl6Nb7             | ASTM F1295              |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |       |       |       |
| H <sub>1</sub>   | Hardened steel<br>< 55 HRC                           | 2.4964             | CoCr20W15Ni          | Haynes 25               | 100    | 0.008 | 100             | 0.010 | 120             | 0.012 | 120            | 0.016 | 140                                | 0.018 | 140                     | 0.020 | 160            | 0.022 | 160    | 0.024 | 160   | 0.024 |
|  |  |                    | CrCoMo28             | ASTM F1537              |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |       |       |       |
| H <sub>2</sub>   | Hardened steel<br>≥ 55 HRC                           | 1.2510             | 100MnCrMoW4          | AISI O1                 |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |       |       |       |
|  |  | 1.2379             | X153CrMoV12          | AISI D2                 |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |       |       |       |

**NEW**

# Type C - Side milling - Finishing

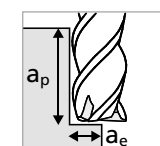
$v_c$  [m/min]  
 $f_z$  [mm]

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

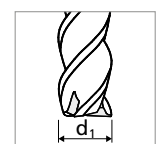
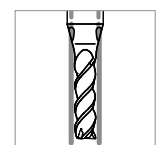


## MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

Finishing



■  $a_p = 2 \times d_1$   
■  $a_e = 0.02 \times d_1$



| Materials group  | Material   | Mat. no.                 | DIN                  | AISI/ASTM/UNS           | 1.0 mm |       | 1.5 mm<br>1/16" |       | 2.0 mm<br>3/32" |       | 3.0 mm<br>1/8" |       | Ød <sub>1</sub><br>4.0 mm<br>5/32" |       | 5.0 mm<br>3/16" - 7/32" |       | 6.0 mm<br>1/4" |       | 8.0 mm |        |
|--|--|--------------------------|----------------------|-------------------------|--------|-------|-----------------|-------|-----------------|-------|----------------|-------|------------------------------------|-------|-------------------------|-------|----------------|-------|--------|--------|
|  |  |                          |                      |                         | $v_c$  | $f_z$ | $v_c$           | $f_z$ | $v_c$           | $f_z$ | $v_c$          | $f_z$ | $v_c$                              | $f_z$ | $v_c$                   | $f_z$ | $v_c$          | $f_z$ | $v_c$  | $f_z$  |
| P  | Unalloyed carbon steel<br>Rm < 800 N/mm <sup>2</sup> | 1.0301                   | C10                  | AISI 1010               | 130    | 0.008 | 180             | 0.012 | 200             | 0.017 | 210            | 0.023 | 220                                | 0.025 | 220                     | 0.028 | 220            | 0.033 | 220    | 0.042  |
|  |  | 1.0401                   | C15                  | AISI 1015               |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |        |
|  |  | 1.1191                   | C45E/CK45            | AISI 1045               |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |        |
|  |  | 1.0044                   | S275JR               | AISI 1020               |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |        |
|  |  | 1.0715                   | 11SMn30              | AISI 1215               |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |        |
|  | Low alloyed steel<br>Rm > 900 N/mm <sup>2</sup>      | 1.5752                   | 15NiCr13             | ASTM 3415 / AISI 3310   | 130    | 0.007 | 180             | 0.011 | 200             | 0.016 | 210            | 0.022 | 220                                | 0.024 | 220                     | 0.026 | 220            | 0.029 | 220    | 0.038  |
|  |  | 1.7131                   | 16MnCr5              | AISI 5115               |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |        |
|  |  | 1.3505                   | 100Cr6               | AISI 52100              |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |        |
|  |  | 1.7225                   | 42CrMo4              | AISI 4140               |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |        |
|  |  | 1.2842                   | 90MnCrV8             | AISI O2                 |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |        |
| High alloyed tool steel<br>Rm < 1200 N/mm <sup>2</sup> | 1.2379   | X153CrMoV12              | AISI D2              | 130                     | 0.006  | 180   | 0.010           | 200   | 0.015           | 210   | 0.020          | 220   | 0.021                              | 220   | 0.023                   | 220   | 0.025          | 220   | 0.034  |        |
|  | 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 |
| 1.4105   |  |                          | X6CrMoS17            | AISI 430F               |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |        |
| Stainless steel martensitic                            |  | 1.4034                   | X46Cr13              | AISI 420C               | 130    | 0.008 | 180             | 0.011 | 200             | 0.016 | 210            | 0.022 | 220                                | 0.023 | 220                     | 0.025 | 220            | 0.028 | 220    | 0.037  |
|  |  | 1.4112                   | X90CrMoV18           | AISI 440B               |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |        |
| Stainless steel martensitic - PH                       |  | 1.4542                   | X5CrNiCuNb16-4       | AISI 630 / ASTM 17-4 PH | 130    | 0.008 | 180             | 0.011 | 200             | 0.016 | 210            | 0.022 | 220                                | 0.023 | 220                     | 0.025 | 220            | 0.028 | 220    | 0.037  |
|  |  | 1.4545                   | X5CrNiCuNb15-5       | ASTM 15-5 PH            |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |        |
| Stainless steel austenitic                             |  | 1.4301                   | X5CrNi18-10          | AISI 304                | 130    | 0.006 | 180             | 0.008 | 200             | 0.015 | 210            | 0.020 | 220                                | 0.022 | 220                     | 0.024 | 220            | 0.026 | 220    | 0.035  |
|  |  | 1.4435                   | X2CrNiMo18-14-3      | AISI 316L               |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |        |
|  | 1.4441   | X2CrNiMo18-15-3          | AISI 316LM           |                         |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |        |
| K  | Cast iron  | 0.6020                   | GG20                 | ASTM 30                 | 110    | 0.006 | 130             | 0.012 | 150             | 0.014 | 160            | 0.022 | 170                                | 0.025 | 170                     | 0.029 | 170            | 0.031 | 200    | 0.040  |
|  |  | 0.6030                   | GG30                 | ASTM 40B                |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |        |
|  |  | 0.7040                   | GGG40                | ASTM 60-40-18           |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |        |
|  |  | 0.7060                   | GGG60                | ASTM 80-60-03           |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |        |
| N  | Aluminium alloy wrought                              | 3.2315                   | AlMgSi1              | ASTM 6351               | 130    | 0.009 | 180             | 0.013 | 200             | 0.018 | 210            | 0.029 | 220                                | 0.030 | 220                     | 0.033 | 220            | 0.036 | 220    | 0.045  |
|  |  | 3.4365                   | AlZnMgCu1.5          | ASTM 7075               |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |        |
|  | Aluminium alloy cast                                 | 3.2163                   | GD-AlSi9Cu3          | ASTM A380               | 130    | 0.009 | 180             | 0.013 | 200             | 0.018 | 210            | 0.029 | 220                                | 0.030 | 220                     | 0.033 | 220            | 0.036 | 220    | 0.045  |
|  |  | 3.2381                   | GD-AlSi10Mg          | UNS A03590              |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |        |
|  | Copper   | 2.0040                   | Cu-OF / CW008A       | UNS C10100              | 130    | 0.010 | 180             | 0.013 | 200             | 0.018 | 210            | 0.029 | 220                                | 0.030 | 220                     | 0.033 | 220            | 0.036 | 220    | 0.045  |
|  |  | 2.0065                   | Cu-ETP / CW004A      | UNS C11000              |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |        |
|  | Brass lead free                                      | 2.0321                   | CuZn37 CW508L        | UNS C27400              | 130    | 0.010 | 180             | 0.013 | 200             | 0.018 | 210            | 0.029 | 220                                | 0.030 | 220                     | 0.033 | 220            | 0.036 | 220    | 0.045  |
|  |  | 2.0360                   | CuZn40 CW509L        | UNS C28000              |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |        |
|  | Brass, Bronze<br>Rm < 400 N/mm <sup>2</sup>          | 2.0401                   | CuZn39Pb3 / CW614N   | UNS C38500              | 130    | 0.010 | 180             | 0.013 | 200             | 0.018 | 210            | 0.029 | 220                                | 0.030 | 220                     | 0.033 | 220            | 0.036 | 220    | 0.045  |
|  |  | 2.1020                   | CuSn6                | UNS C51900              |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |        |
| Bronze<br>Rm < 600 N/mm <sup>2</sup>                   | 2.0966   | CuAl10Ni5Fe4             | UNS C63000           | 130                     | 0.009  | 180   | 0.013           | 200   | 0.018           | 210   | 0.029          | 220   | 0.030                              | 220   | 0.033                   | 220   | 0.036          | 220   | 0.045  |        |
|  | 2.0960   | CuAl9Mn2                 | UNS C63200           |                         |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |        |
| S <sub>1</sub>   | Super alloys   | 2.4856                   |                      | Inconel 625             | 110    | 0.004 | 120             | 0.005 | 130             | 0.005 | 130            | 0.008 | 140                                | 0.010 | 140                     | 0.011 | 150            | 0.012 | 150    | 0.021  |
|  |  | 2.4668                   |                      | Inconel 718             |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |        |
|  |  | 2.4617                   | NiMo28               | Hastelloy B-2           |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |        |
|  |  | 2.4665                   | NiCr22Fe18Mo         | Hastelloy X             |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |        |
| S <sub>2</sub>   | Titanium pure  | 3.7035                   | Gr.2                 | ASTM B348 / F67         | 110    | 0.008 | 120             | 0.010 | 130             | 0.014 | 130            | 0.020 | 140                                | 0.022 | 140                     | 0.024 | 150            | 0.026 | 150    | 0.035  |
|  |  | 3.7065                   | Gr.4                 | ASTM B348 / F68         |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |        |
| S <sub>3</sub>   | Titanium alloys                                      | 3.7165                   | TiAl6V4              | ASTM B348 / F136        | 110    | 0.008 | 120             | 0.010 | 130             | 0.014 | 130            | 0.020 | 140                                | 0.022 | 140                     | 0.024 | 150            | 0.026 | 150    | 0.035  |
|  |  | 9.9367                   | TiAl6Nb7             | ASTM F1295              |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |        |
| H <sub>1</sub>   | Hardened steel<br>< 55 HRC                           | 2.4964                   | CoCr20W15Ni          | Haynes 25               | 110    | 0.004 | 120             | 0.005 | 130             | 0.005 | 130            | 0.008 | 140                                | 0.010 | 140                     | 0.011 | 150            | 0.012 | 150    | 0.021  |
|  |  |                          | CrCoMo28             | ASTM F1537              |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |        |
| H <sub>2</sub>   | Hardened steel<br>≥ 55 HRC                           | 1.2510                   | 100MnCrMoW4          | AISI O1                 |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |        |
|  |  | 1.2379                   | X153CrMoV12          | AISI D2                 |        |       |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |        |

NEW

## Process CrazyMill Cool P&S

### 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  $\leq 0.05$  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.

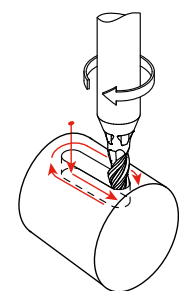
| Revolution       | [rpm] | $\leq 10'000$ | $> 10'000$ |
|------------------|-------|---------------|------------|
| Minimal pressure | [bar] | 15            | 30         |

#### 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



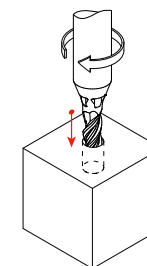
Mikron Tool recommends a machining process in 3 steps to guarantee the tolerance of the slot:

- 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 (vertical). As an alternative, plunging with a linear ramp is also possible.

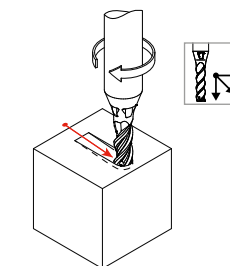
### MILLING PROCESS

#### 1. Plunge milling or Linear ramp



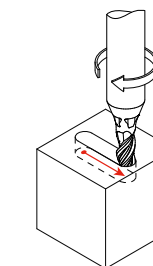
When plunge milling, an increase of the drilling diameter of approx. 0.05 mm respect to the tool diameter needs to be applied. The maximum milling depth is  $2.5 \times d_1$  ( $a_{p,max} = 1 \times d_1$ ). For data regarding feed  $f_{z,p}$  refer to cutting data for plunge milling (page 550).

#### Linear ramp



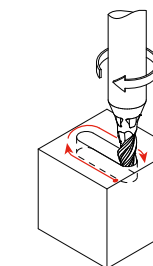
The maximum plunge angle  $\alpha$  depends on the material and cannot be overcut (see table below). For data regarding feed  $f_{z,s}$  refer to cutting data for keyway milling (page 550).

#### 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).

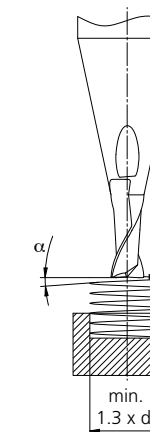
#### 3. Side milling



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

#### Maximum plunge angles in linear ramp or helical interpolation

| Material   | $\alpha$ - Linear ramp | $\alpha$ - Helical interpolation |
|--|------------------------|----------------------------------|
| <b>P</b> Unalloyed carbon steel                        | 45°                    | 47°                              |
| Low alloyed steel                                      | 45°                    | 47°                              |
| High alloyed tool steel                                | 27°                    | 28°                              |
| <b>M</b> Stainless steel ferritic                      | 45°                    | 47°                              |
| Stainless steel martensitic                            | 27°                    | 28°                              |
| Stainless steel martensitic - PH                       | 27°                    | 28°                              |
| Stainless steel austenitic                             | 45°                    | 47°                              |
| <b>K</b> Cast iron                                     | 45°                    | 47°                              |
| Aluminium alloy wrought                                | 45°                    | 47°                              |
| Aluminium alloy cast                                   | 45°                    | 47°                              |
| <b>N</b> Copper  | 45°                    | 47°                              |
| Brass lead free  | 45°                    | 47°                              |
| Brass, Bronze Rm < 400 N/mm <sup>2</sup>               | 45°                    | 47°                              |
| Bronze Rm < 600 N/mm <sup>2</sup>                      | 45°                    | 47°                              |
| <b>S<sub>1</sub></b> Super alloys                      | 14°                    | 15°                              |
| <b>S<sub>2</sub></b> Titanium pure and titanium alloys | 14°                    | 15°                              |
| <b>S<sub>3</sub></b> CrCo alloys                       | 27°                    | 28°                              |



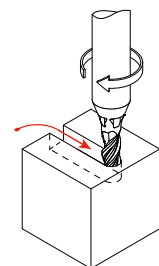


NEW

## Process CrazyMill Cool P&S

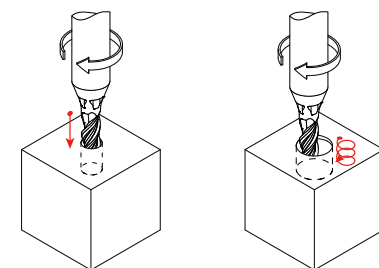
### MILLING PROCESS

#### 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.

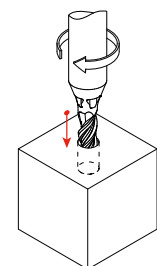
#### C. Plunge milling



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

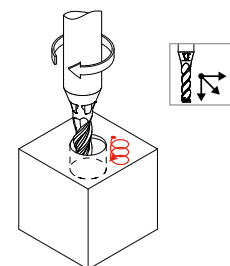
- 1. Direct plunge milling
- 2. Plunging with helical interpolation

##### 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).

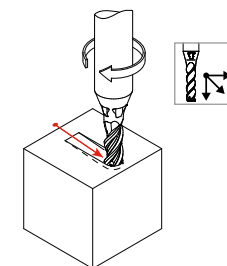
##### 2. Plunging with helical interpolation



The maximum plunge angle  $\alpha$  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  $d_{hole} = 1.3 \times d_{tool}$

### MILLING PROCESS

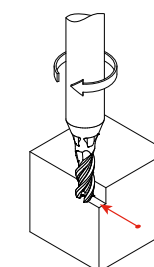
#### D. Linear ramp



The maximum plunge angle  $\alpha$  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).

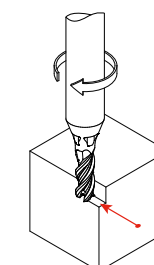
#### E. Side milling

##### Semi-finishing



Recommended cutting parameters:  
 $v_c$  and  $f_z$  = 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  $f_z$  = 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] | w slot [inch] | d <sub>1</sub> Tool [mm]   [inch] | l <sub>1, max</sub> [mm] | Item number        |
|-------------|---------------|-----------------------------------|--------------------------|--------------------|
| 1.1         |               | 1.0                               | 2.50                     | 2.CMC42.A8Z3.100.1 |
| 1.2         |               | 1.0                               | 2.50                     | 2.CMC42.A8Z3.100.1 |
|             |               | 1.1                               | 2.75                     | 2.CMC42.A8Z3.110.1 |
| 1.3         |               | 1.1                               | 2.75                     | 2.CMC42.A8Z3.110.1 |
|             |               | 1.2                               | 3.00                     | 2.CMC42.A8Z3.120.1 |
| 1.4         |               | 1.2                               | 3.00                     | 2.CMC42.A8Z3.120.1 |
|             |               | 1.3                               | 3.25                     | 2.CMC42.A8Z3.130.1 |
| 1.5         |               | 1.3                               | 3.25                     | 2.CMC42.A8Z3.130.1 |
|             |               | 1.4                               | 3.50                     | 2.CMC42.A8Z3.140.1 |
| 1.587       | 1/16          | 1.3                               | 3.25                     | 2.CMC42.A8Z3.130.1 |
|             |               | 1.4                               | 3.50                     | 2.CMC42.A8Z3.140.1 |
| 1.6         |               | 1.4                               | 3.50                     | 2.CMC42.A8Z3.140.1 |
|             |               | 1.5                               | 3.75                     | 2.CMC42.A8Z3.150.1 |
| 1.7         |               | 1.5                               | 3.75                     | 2.CMC42.A8Z3.150.1 |
|             |               | 1/16                              | 3.97                     | 2.CMC.PSSAZ3.F116  |
|             |               | 1.6                               | 4.00                     | 2.CMC42.A8Z3.160.1 |
| 1.8         |               | 1.5                               | 3.75                     | 2.CMC42.A8Z3.150.1 |
|             |               | 1/16                              | 3.97                     | 2.CMC.PSSAZ3.F116  |
|             |               | 1.6                               | 4.00                     | 2.CMC42.A8Z3.160.1 |
| 1.9         |               | 1.6                               | 4.00                     | 2.CMC42.A8Z3.160.1 |
|             |               | 1.7                               | 4.25                     | 2.CMC42.A8Z3.170.1 |
| 2.0         |               | 1.7                               | 4.25                     | 2.CMC42.A8Z3.170.1 |
|             |               | 1.8                               | 4.50                     | 2.CMC42.A8Z3.180.1 |
| 2.1         |               | 1.8                               | 4.50                     | 2.CMC42.A8Z3.180.1 |
|             |               | 1.9                               | 4.75                     | 2.CMC42.A8Z3.190.1 |
| 2.2         |               | 1.9                               | 4.75                     | 2.CMC42.A8Z3.190.1 |
|             |               | 2.0                               | 5.00                     | 2.CMC42.A8Z3.200.1 |
| 2.3         |               | 2.0                               | 5.00                     | 2.CMC42.A8Z3.200.1 |
|             |               | 2.1                               | 5.25                     | 2.CMC42.A8Z3.210.1 |
| 2.381       | 3/32          | 2.0                               | 5.00                     | 2.CMC42.A8Z3.200.1 |
|             |               | 2.1                               | 5.25                     | 2.CMC42.A8Z3.210.1 |
|             |               | 2.2                               | 5.50                     | 2.CMC42.A8Z3.220.1 |
| 2.4         |               | 2.0                               | 5.00                     | 2.CMC42.A8Z3.200.1 |
|             |               | 2.1                               | 5.25                     | 2.CMC42.A8Z3.210.1 |
|             |               | 2.2                               | 5.50                     | 2.CMC42.A8Z3.220.1 |
| 2.5         |               | 2.1                               | 5.25                     | 2.CMC42.A8Z3.210.1 |
|             |               | 2.2                               | 5.50                     | 2.CMC42.A8Z3.220.1 |
|             |               | 2.3                               | 5.75                     | 2.CMC42.A8Z3.230.1 |
| 2.6         |               | 2.2                               | 5.50                     | 2.CMC42.A8Z3.220.1 |
|             |               | 2.3                               | 5.75                     | 2.CMC42.A8Z3.230.1 |
|             |               | 3/32                              | 5.95                     | 2.CMC.PSSAZ3.F332  |
|             |               | 2.4                               | 6.00                     | 2.CMC42.A8Z3.240.1 |
| 2.7         |               | 2.3                               | 5.75                     | 2.CMC42.A8Z3.230.1 |
|             |               | 3/32                              | 5.95                     | 2.CMC.PSSAZ3.F332  |
|             |               | 2.4                               | 6.00                     | 2.CMC42.A8Z3.240.1 |
|             |               | 2.5                               | 6.25                     | 2.CMC42.A8Z3.250.1 |
| 2.8         |               | 2.4                               | 6.00                     | 2.CMC42.A8Z3.240.1 |
|             |               | 2.5                               | 6.25                     | 2.CMC42.A8Z3.250.1 |
|             |               | 2.6                               | 6.50                     | 2.CMC42.A8Z3.260.1 |
| 2.9         |               | 2.5                               | 6.25                     | 2.CMC42.A8Z3.250.1 |
|             |               | 2.6                               | 6.50                     | 2.CMC42.A8Z3.260.1 |
|             |               | 2.7                               | 6.75                     | 2.CMC42.A8Z3.270.1 |
| 3.0         |               | 2.6                               | 6.50                     | 2.CMC42.A8Z3.260.1 |
|             |               | 2.7                               | 6.75                     | 2.CMC42.A8Z3.270.1 |
|             |               | 2.8                               | 7.00                     | 2.CMC42.A8Z3.280.1 |

| w slot [mm] | w slot [inch] | d <sub>1</sub> Tool [mm]   [inch] | l <sub>1, max</sub> [mm] | Item number        |
|-------------|---------------|-----------------------------------|--------------------------|--------------------|
| 3.1         |               | 2.6                               | 6.50                     | 2.CMC42.A8Z3.260.1 |
|             |               | 2.7                               | 6.75                     | 2.CMC42.A8Z3.270.1 |
|             |               | 2.8                               | 7.00                     | 2.CMC42.A8Z3.280.1 |
|             |               | 2.9                               | 7.25                     | 2.CMC42.A8Z3.290.1 |
| 3.175       | 1/8           | 2.7                               | 6.75                     | 2.CMC42.A8Z3.270.1 |
|             |               | 2.8                               | 7.00                     | 2.CMC42.A8Z3.280.1 |
|             |               | 2.9                               | 7.25                     | 2.CMC42.A8Z3.290.1 |
| 3.2         |               | 2.7                               | 6.75                     | 2.CMC42.A8Z3.270.1 |
|             |               | 2.8                               | 7.00                     | 2.CMC42.A8Z3.280.1 |
|             |               | 2.9                               | 7.25                     | 2.CMC42.A8Z3.290.1 |
|             |               | 3.0                               | 7.50                     | 2.CMC42.A8Z3.300.1 |
| 3.3         |               | 2.8                               | 7.00                     | 2.CMC42.A8Z3.280.1 |
|             |               | 2.9                               | 7.25                     | 2.CMC42.A8Z3.290.1 |
|             |               | 3.0                               | 7.50                     | 2.CMC42.A8Z3.300.1 |
|             |               | 3.1                               | 7.75                     | 2.CMC42.A8Z3.310.1 |
| 3.4         |               | 2.9                               | 7.25                     | 2.CMC42.A8Z3.290.1 |
|             |               | 3.0                               | 7.50                     | 2.CMC42.A8Z3.300.1 |
|             |               | 3.1                               | 7.75                     | 2.CMC42.A8Z3.310.1 |
| 3.5         |               | 3.0                               | 7.50                     | 2.CMC42.A8Z3.300.1 |
|             |               | 3.1                               | 7.75                     | 2.CMC42.A8Z3.310.1 |
|             |               | 1/8                               | 7.94                     | 2.CMC.PSSAZ3.F18   |
|             |               | 3.3                               | 8.25                     | 2.CMC42.A8Z3.330.1 |
| 3.6         |               | 3.0                               | 7.50                     | 2.CMC42.A8Z3.300.1 |
|             |               | 3.1                               | 7.75                     | 2.CMC42.A8Z3.310.1 |
|             |               | 1/8                               | 7.94                     | 2.CMC.PSSAZ3.F18   |
|             |               | 3.3                               | 8.25                     | 2.CMC42.A8Z3.330.1 |
| 3.7         |               | 3.1                               | 7.75                     | 2.CMC42.A8Z3.310.1 |
|             |               | 1/8                               | 7.94                     | 2.CMC.PSSAZ3.F18   |
|             |               | 3.3                               | 8.25                     | 2.CMC42.A8Z3.330.1 |
| 3.8         |               | 3.3                               | 8.25                     | 2.CMC42.A8Z3.330.1 |
| 3.9         |               | 3.3                               | 8.25                     | 2.CMC42.A8Z3.330.1 |
|             |               | 3.7                               | 9.25                     | 2.CMC42.A8Z3.370.1 |
| 3.968       | 5/32          | 3.3                               | 8.25                     | 2.CMC42.A8Z3.330.1 |
|             |               | 3.7                               | 9.25                     | 2.CMC42.A8Z3.370.1 |
| 4.0         |               | 3.7                               | 9.25                     | 2.CMC42.A8Z3.370.1 |
| 4.1         |               | 3.7                               | 9.25                     | 2.CMC42.A8Z3.370.1 |
|             |               | 3.7                               | 9.25                     | 2.CMC42.A8Z3.370.1 |
| 4.2         |               | 3.7                               | 9.25                     | 2.CMC42.A8Z3.370.1 |
|             |               | 5/32                              | 9.92                     | 2.CMC.PSSAZ3.F532  |
|             |               | 4.0                               | 10.00                    | 2.CMC42.A8Z3.400.1 |
| 4.3         |               | 3.7                               | 9.25                     | 2.CMC42.A8Z3.370.1 |
|             |               | 5/32                              | 9.92                     | 2.CMC.PSSAZ3.F532  |
|             |               | 4.0                               | 10.00                    | 2.CMC42.A8Z3.400.1 |
| 4.4         |               | 4.0                               | 10.00                    | 2.CMC42.A8Z3.400.1 |
|             |               | 3.7                               | 9.25                     | 2.CMC42.A8Z3.370.1 |
|             |               | 5/32                              | 9.92                     | 2.CMC.PSSAZ3.F532  |
| 4.5         |               | 4.0                               | 10.00                    | 2.CMC42.A8Z3.400.1 |
|             |               | 4.3                               | 10.75                    | 2.CMC42.A8Z3.430.1 |
| 4.6         |               | 4.0                               | 10.00                    | 2.CMC42.A8Z3.400.1 |
|             |               | 4.3                               | 10.75                    | 2.CMC42.A8Z3.430.1 |
| 4.7         |               | 4.0                               | 10.00                    | 2.CMC42.A8Z3.400.1 |
|             |               | 4.3                               | 10.75                    | 2.CMC42.A8Z3.430.1 |
| 4.762       | 3/16          | 4.0                               | 10.00                    | 2.CMC42.A8Z3.400.1 |
|             |               | 4.3                               | 10.75                    | 2.CMC42.A8Z3.430.1 |
| 4.8         |               | 4.0                               | 10.00                    | 2.CMC42.A8Z3.400.1 |
|             |               | 4.3                               | 10.75                    | 2.CMC42.A8Z3.430.1 |

| w slot [mm] | w slot [inch] | d <sub>1</sub> Tool [mm]   [inch] | l <sub>1, max</sub> [mm] | Item number        |
|-------------|---------------|-----------------------------------|--------------------------|--------------------|
| 4.9         |               | 4.3                               | 10.75                    | 2.CMC42.A8Z3.430.1 |
|             |               | 4.7                               | 11.75                    | 2.CMC42.A8Z3.470.1 |
| 5.0         |               | 4.3                               | 10.75                    | 2.CMC42.A8Z3.430.1 |
|             |               | 4.7                               | 11.75                    | 2.CMC42.A8Z3.470.1 |
|             |               | 3/16                              | 11.91                    | 2.CMC.PSSAZ3.F316  |
|             |               | 4.8                               | 12.00                    | 2.CMC42.A8Z3.480.1 |
| 5.1         |               | 4.3                               | 10.75                    | 2.CMC42.A8Z3.430.1 |
|             |               | 4.7                               | 11.75                    | 2.CMC42.A8Z3.470.1 |
|             |               | 3/16                              | 11.91                    | 2.CMC.PSSAZ3.F316  |
|             |               | 4.8                               | 12.00                    | 2.CMC42.A8Z3.480.1 |
| 5.2         |               | 4.7                               | 11.75                    | 2.CMC42.A8Z3.470.1 |
|             |               | 3/16                              | 11.91                    | 2.CMC.PSSAZ3.F316  |
|             |               | 4.8                               | 12.00                    | 2.CMC42.A8Z3.480.1 |
|             |               | 5.0                               | 12.50                    | 2.CMC42.A8Z3.500.1 |
| 5.3         |               | 4.7                               | 11.75                    | 2.CMC42.A8Z3.470.1 |
|             |               | 3/16                              | 11.91                    | 2.CMC.PSSAZ3.F316  |
|             |               | 4.8                               | 12.00                    | 2.CMC42.A8Z3.480.1 |
|             |               | 5.0                               | 12.50                    | 2.CMC42.A8Z3.500.1 |
| 5.4         |               | 4.7                               | 11.75                    | 2.CMC42.A8Z3.470.1 |
|             |               | 3/16                              | 11.91                    | 2.CMC.PSSAZ3.F316  |
|             |               | 4.8                               | 12.00                    | 2.CMC42.A8Z3.480.1 |
|             |               | 5.0                               | 12.50                    | 2.CMC42.A8Z3.500.1 |
| 5.5         |               | 4.7                               | 11.75                    | 2.CMC42.A8Z3.470.1 |
|             |               | 3/16                              | 11.91                    | 2.CMC.PSSAZ3.F316  |
|             |               | 4.8                               | 12.00                    | 2.CMC42.A8Z3.480.1 |
|             |               | 5.0                               | 12.50                    | 2.CMC42.A8Z3.500.1 |
|             |               | 5.3                               | 13.25                    | 2.CMC42.A8Z3.530.1 |
| 5.560       | 7/32          | 4.7                               | 11.75                    | 2.CMC42.A8Z3.470.1 |
|             |               | 3/16                              | 11.91                    | 2.CMC.PSSAZ3.F316  |
|             |               | 4.8                               | 12.00                    | 2.CMC42.A8Z3.480.1 |
|             |               | 5.0                               | 12.50                    | 2.CMC42.A8Z3.500.1 |
|             |               | 5.3                               | 13.25                    | 2.CMC42.A8Z3.530.1 |
| 5.6         |               | 4.7                               | 11.75                    | 2.CMC42.A8Z3.470.1 |
|             |               | 3/16                              | 11.91                    | 2.CMC.PSSAZ3.F316  |
|             |               | 4.8                               | 12.00                    | 2.CMC42.A8Z3.480.1 |
|             |               | 5.0                               | 12.50                    | 2.CMC42.A8Z3.500.1 |
|             |               | 5.3                               | 13.25                    | 2.CMC42.A8Z3.530.1 |
| 5.7         |               | 4.8                               | 12.00                    | 2.CMC42.A8Z3.480.1 |
|             |               | 5.0                               | 12.50                    | 2.CMC42.A8Z3.500.1 |
|             |               | 5.3                               | 13.25                    | 2.CMC42.A8Z3.530.1 |
| 5.8         |               | 5.0                               | 12.50                    | 2.CMC42.A8Z3.500.1 |
|             |               | 5.3                               | 13.25                    | 2.CMC42.A8Z3.530.1 |
| 5.9         |               | 5.0                               | 12.50                    | 2.CMC42.A8Z3.500.1 |
|             |               | 5.3                               | 13.25                    | 2.CMC42.A8Z3.530.1 |
|             |               | 7/32                              | 13.90                    | 2.CMC.PSSAZ3.F732  |
|             |               | 5.7                               | 14.25                    | 2.CMC42.A8Z3.570.1 |

| w slot [mm] | w slot [inch] | d <sub>1</sub> Tool [mm]   [inch] | l <sub>1, max</sub> [mm] | Item number        |
|-------------|---------------|-----------------------------------|--------------------------|--------------------|
| 6.0         |               | 5.0                               | 12.50                    | 2.CMC42.A8Z3.500.1 |
|             |               | 5.3                               | 13.25                    | 2.CMC42.A8Z3.530.1 |
|             |               | 7/32                              | 13.90                    | 2.CMC.PSSAZ3.F732  |
|             |               | 5.7                               | 14.25                    | 2.CMC42.A8Z3.570.1 |
| 6.1         |               | 5.3                               | 13.25                    | 2.CMC42.A8Z3.530.1 |
|             |               | 7/32                              | 13.90                    | 2.CMC.PSSAZ3.F732  |
|             |               | 5.7                               | 14.25                    | 2.CMC42.A8Z3.570.1 |
| 6.2         |               | 5.3                               | 13.25                    | 2.CMC42.A8Z3.530.1 |
|             |               | 7/32                              | 13.90                    | 2.CMC.PSSAZ3.F732  |
|             |               | 5.7                               | 14.25                    | 2.CMC42.A8Z3.570.1 |
| 6.3         |               | 6.0                               | 15.00                    | 2.CMC42.A8Z3.600.1 |
|             |               | 5.3                               | 13.25                    | 2.CMC42.A8Z3.530.1 |
|             |               | 7/32                              | 13.90                    | 2.CMC.PSSAZ3.F732  |
|             |               | 5.7                               | 14.25                    | 2.CMC42.A8Z3.570.1 |
| 6.350       | 1/4           | 5.3                               | 13.25                    | 2.CMC42.A8Z3.530.1 |
|             |               | 7/32                              | 13.90                    | 2.CMC.PSSAZ3.F732  |
|             |               | 5.7                               | 14.25                    | 2.CMC42.A8Z3.570.1 |
|             |               | 6.0                               | 15.00                    | 2.CMC42.A8Z3.600.1 |
| 6.4         |               | 5.7                               | 14.25                    | 2.CMC42.A8Z3.570.1 |
|             |               | 6.0                               | 15.00                    | 2.CMC42.A8Z3.600.1 |
| 6.5         |               | 5.7                               | 14.25                    | 2.CMC42.A8Z3.570.1 |
|             |               | 6.0                               | 15.00                    | 2.CMC42.A8Z3.600.1 |
| 6.6         |               | 5.7                               | 14.25                    | 2.CMC42.A8Z3.570.1 |
|             |               | 6.0                               | 15.00                    | 2.CMC42.A8Z3.600.1 |
|             |               | 1/4                               | 15.88                    | 2.CMC.PSSAZ3.F14   |
| 6.7         |               | 5.7                               | 14.25                    | 2.CMC42.A8Z3.570.1 |
|             |               | 6.0                               | 15.00                    | 2.CMC42.A8Z3.600.1 |
|             |               | 1/4                               | 15.88                    | 2.CMC.PSSAZ3.F14   |
| 6.8         |               | 5.7                               | 14.25                    | 2.CMC42.A8Z3.570.1 |
|             |               | 6.0                               | 15.00                    | 2.CMC42.A8Z3.600.1 |
|             |               | 1/4                               | 15.88                    | 2.CMC.PSSAZ3.F14   |
| 6.9         |               | 6.0                               | 15.00                    | 2.CMC42.A8Z3.600.1 |
|             |               | 1/4                               | 15.88                    | 2.CMC.PSSAZ3.F14   |
| 7.0         |               | 6.0                               | 15.00                    | 2.CMC42.A8Z3.600.1 |
|             |               | 1/4                               | 15.88                    | 2.CMC.PSSAZ3.F14   |
| 7.1         |               | 6.0                               | 15.00                    | 2.CMC42.A8Z3.600.1 |
|             |               | 1/4                               | 15.88                    | 2.CMC.PSSAZ3.F14   |
| 7.2         |               | 6.0                               | 15.00                    | 2.CMC42.A8Z3.600.1 |
|             |               | 1/4                               | 15.88                    | 2.CMC.PSSAZ3.F14   |
| 7.3         |               | 6.0                               | 15.00                    | 2.CMC42.A8Z3.600.1 |
|             |               | 1/4                               | 15.88                    | 2.CMC.PSSAZ3.F14   |
| 7.4         |               | 6.0                               | 15.00                    | 2.CMC42.A8Z3.600.1 |
|             |               | 1/4                               | 15.88                    | 2.CMC.PSSAZ3.F14   |
| 7.5         |               | 6.0                               | 15.00                    | 2.CMC42.A8Z3.600.1 |
|             |               | 1/4                               | 15.88                    | 2.CMC.PSSAZ3.F14   |
| 7.6         |               | 6.0                               | 15.00                    | 2.CMC42.A8Z3.600.1 |
|             |               | 1/4                               | 15.88                    | 2.CMC.PSSAZ3.F14   |
| 8.2 - 9.6   |               | 8.0                               | 20.00                    | 2.CMC42.A8Z3.800.1 |

### Example:

Milling of keyway slot 3x1.8 mm DIN 6885

Width of keyway: w = 3 mm; Depth of keyway: l<sub>1</sub> = 1.8 mm;

Mikron Tool recommends the following diameters: d<sub>1</sub> = 2.6 mm or d<sub>1</sub> = 2.7 mm or d<sub>1</sub> = 2.8 mm