



**crazy about**

**milling**

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**CRAZYMILL COOL P&S**

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NEW: CORNER RADIUS

**NEW**

## CrazyMill Cool P&S Corner Radius - Z3

### PLUNGE AND SLOT ENDMILL WITH CORNER RADIUS

#### Micro-grain carbide

Developed to achieve all requirements in terms of mechanical properties as perfect hardness-toughness ratio

#### High-performance coating

eXedur SNP coating is heat and wear resistant and guarantees optimum chip flushing

#### New corner radius geometry

Endmill with corner radius in multiple dimensions

#### Diameter range and length

$d = 1 - 8 \text{ mm}$ ;  
Type A -  $2.5 \times d$  / Type C -  $5 \times d$

#### Integrated cooling

Constant and massive cooling of the cutting edges

#### Special end face geometry

Developed for plunging perpendicularly into the material and slot, pocket, side milling in minimal spaces



**NEW**

Mikron Tool expands the CrazyMill Cool P&S family, developed for roughing and finishing operations. The new endmill is used for applications where a rounded corner is required. The new design of the cutting edges permits to machine many materials, with emphasis on stainless steels, titanium, CoCr alloys and super alloys. Due to its special features it can plunge perpendicularly into the material and is well adapted for milling of slots, pockets and sides in minimal spaces.

### Advantages

- |                                    |                                                             |
|------------------------------------|-------------------------------------------------------------|
| ■ <b>SHORT MACHINING TIME</b>      | <b>Highest chip removal rate</b>                            |
| ■ <b>LONG TOOL LIFE</b>            | <b>Thanks to efficient and patented cooling</b>             |
| ■ <b>EXCELLENT SURFACE QUALITY</b> | <b><math>Ra \leq 0.5 \mu m</math></b>                       |
| ■ <b>PERFECT CHIP CONTROL</b>      | <b>Thanks to specific geometry and greater coolant flow</b> |

Discover it!



**NEW**

## P&S in medical applications



### COMPONENT

Hip stem

### MATERIAL

TiAl6V4-ELI / 3.7165 / ASTM F136

### MACHINING

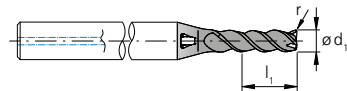
Helical interpolation and side milling of a flat hole

■ Hole depth = 5 mm

■ Hole diameter = 5.2 mm

### TOOL

Mikron Tool - CrazyMill Cool P&S Corner radius - Type A



| DATA          | MIKRON TOOL                                                                                                                                                                                                                                                                                                                                                                               | COMPETITOR                                                                                                                                                                                                                                                                                                                                                                                   |
|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Tool type     | CrazyMill Cool P&S<br>Corner radius<br>- Carbide<br>- Coated<br>- Integrated cooling                                                                                                                                                                                                                                                                                                      | Conventional<br>corner radius endmill<br>- Carbide<br>- Coated<br>- External cooling                                                                                                                                                                                                                                                                                                         |
| Item number   | 2.CMC42.A3Z3.400.1                                                                                                                                                                                                                                                                                                                                                                        | -                                                                                                                                                                                                                                                                                                                                                                                            |
| Tool features | d <sub>1</sub> = 4 mm<br>l <sub>1</sub> = 2.5 x d<br>r = 0.5 mm<br>Z = 3 flutes                                                                                                                                                                                                                                                                                                           | d <sub>1</sub> = 4 mm<br>l <sub>1</sub> = 3.75 x d<br>r = 0.5 mm<br>Z = 3 flutes                                                                                                                                                                                                                                                                                                             |
| Cutting data  | <p>Helical interpolation<br/>v<sub>c</sub> = 120 m/min<br/>f<sub>z</sub> = 0.013 mm<br/>a<sub>p</sub> = 1.0 mm<br/>a<sub>e</sub> = 2.52 mm<br/>α = 15°<br/><b>Q = 0.94 cm³/min</b><br/><b>Δt = 13.2 s</b></p> <p>Finishing<br/>v<sub>c</sub> = 120 m/min<br/>f<sub>z</sub> = 0.022 mm<br/>a<sub>p</sub> = 5 mm<br/>a<sub>e</sub> = 0.08 mm<br/>Q = 0.29 cm³/min<br/><b>Δt = 1.3 s</b></p> | <p>Helical interpolation<br/>v<sub>c</sub> = 52 m/min<br/>f<sub>z</sub> = 0.026 mm<br/>a<sub>p</sub> = 0.2 mm<br/>a<sub>e</sub> = 2.52 mm<br/>α = 3.5°<br/><b>Q = 0.17 cm³/min</b><br/><b>Δt = 1 min 10 s</b></p> <p>Finishing<br/>v<sub>c</sub> = 95 m/min<br/>f<sub>z</sub> = 0.060 mm<br/>a<sub>p</sub> = 5 mm<br/>a<sub>e</sub> = 0.08 mm<br/>Q = 0.54 cm³/min<br/><b>Δt = 0.7 s</b></p> |



■ Results:

|                     | CrazyMill Cool P&S Corner radius |       | Conventional corner radius endmill |
|---------------------|----------------------------------|-------|------------------------------------|
| Chip removal rate Q | Q = 0.94 cm³/min                 | 5.5 x | Q = 0.17 cm³/min                   |
| Total cycle time    | 15 s                             | 5 x   | 1 min 11 s                         |

The combination of the newly developed cutting geometry and the patented integrated cooling system allows to achieve higher speed and depth  $a_p$ , as well as the pitch angle  $\alpha$ . The result is a higher chip removal rate and a cycle time reduction of 5 times compared to a conventional corner radius tool.

**Reduction of cycle time per part: 56 s**

**NEW**

## P&S in aerospace applications



### COMPONENT

Turbine rotor

### MATERIAL

X12Cr13 / 1.4006 / AISI 410

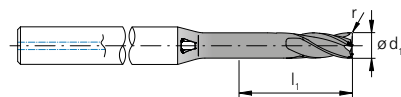
### MACHINING

Roughing and finishing of 14 slots

- Slot depth = 10 mm
- Slot length = 20 mm
- Slot width = 3.8 mm

### TOOL

Mikron Tool - CrazyMill Cool P&S Corner radius - Type C



| DATA          | MIKRON TOOL                                                                                                                                                                                                                                                                                                                                                          | COMPETITOR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Tool type     | CrazyMill Cool P&S<br>Corner radius<br>- Carbide<br>- Coated<br>- Integrated cooling                                                                                                                                                                                                                                                                                 | Conventional<br>corner radius endmill<br>- Carbide<br>- Coated<br>- External cooling                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Item number   | 2.CMC42.C3Z3.370.1                                                                                                                                                                                                                                                                                                                                                   | -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Tool features | d <sub>1</sub> = 3.7 mm<br>l <sub>1</sub> = 5 x d<br>r = 0.5 mm<br>Z = 3 flutes                                                                                                                                                                                                                                                                                      | d <sub>1</sub> = 3.0 mm<br>l <sub>1</sub> = 3 x d<br>r = 0.3 mm<br>Z = 3 flutes                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Cutting data  | <p>Roughing</p> <p>v<sub>c</sub> = 190 m/min<br/>f<sub>z</sub> = 0.028 mm<br/>a<sub>p</sub> = 1.85 mm<br/>a<sub>e</sub> = 3.7 mm<br/><b>Q = 9.4 cm³/min</b><br/><b>Δt = 1 min 13 s</b></p> <p>Finishing</p> <p>v<sub>c</sub> = 215 m/min<br/>f<sub>z</sub> = 0.023 mm<br/>a<sub>p</sub> = 5<br/>a<sub>e</sub> = 0.05 mm<br/>Q = 0.3 cm³/min<br/><b>Δt = 52 s</b></p> | <p>Roughing</p> <p>v<sub>c</sub> = 44 m/min<br/>f<sub>z</sub> = 0.015 mm<br/>a<sub>p</sub> = 0.77 mm<br/>a<sub>e</sub> = 3 mm<br/><b>Q = 0.5 cm³/min</b><br/><b>Δt = 16 min 42 s</b></p> <p>Semi-finishing</p> <p>v<sub>c</sub> = 81 m/min<br/>f<sub>z</sub> = 0.032 mm<br/>a<sub>p</sub> = 0.77 mm<br/>a<sub>e</sub> = 0.34 mm<br/>Q = 0.22 cm³/min<br/><b>Δt = 8 min 45 s</b></p> <p>Finishing</p> <p>v<sub>c</sub> = 105 m/min<br/>f<sub>z</sub> = 0.052 mm<br/>a<sub>p</sub> = 5<br/>a<sub>e</sub> = 0.06 mm<br/>Q = 0.5 cm³/min<br/><b>Δt = 39 s</b></p> |



■ **Results:**

|                            | CrazyMill Cool P&S Corner radius | Conventional corner radius endmill |
|----------------------------|----------------------------------|------------------------------------|
| <b>Chip removal rate Q</b> | Q = 9.4 cm³/min <b>19 x</b>      | Q = 0.5 cm³/min                    |
| <b>Total cycle time</b>    | 2 min 5 s <b>12 x</b>            | 26 min 6 s                         |

The combination of the newly developed cutting geometry and the patented integrated cooling system allows to achieve higher speed and depth  $a_p$ , as well as the pitch angle  $\alpha$ . The result is a chip removal rate 19 times higher and a cycle time reduction of 12 times compared to a conventional corner radius tool.

**Reduction of cycle time per part: 24 min**

**NEW**

## P&S in other applications



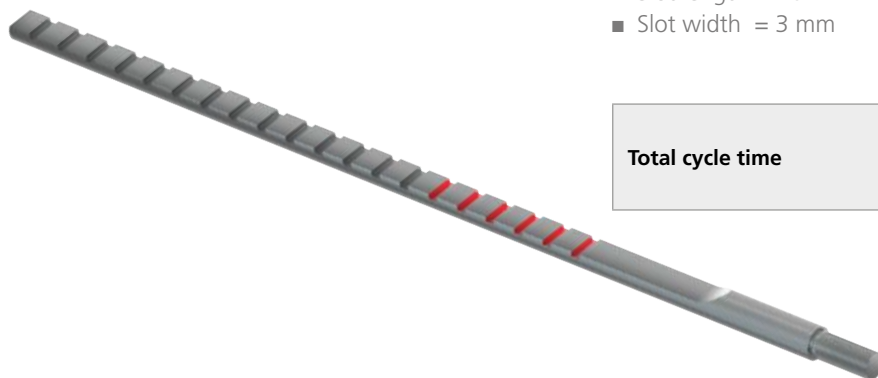
### 3. Turbine blade

Material: X5NiCrTi26-15 / 1.4943 / Incoloy A-286

Machining: Roughing and finishing slotting

- Slot depth = 4.6 mm
- Slot length = 10 mm
- Slot width = 2.6 mm

|                  | Mikron Tool      | Competitor |
|------------------|------------------|------------|
| Total cycle time | 16 s <b>15 x</b> | 4 min 8 s  |



### 4. Transmission system

Material: X40CrMoV5-1 / 1.2344 / AISI H13

Machining: Roughing 20 slots (batch 100 pcs)

- Slot depth = 1.5 mm
- Slot length = 10 mm
- Slot width = 3 mm

|                  | Mikron Tool       | Competitor  |
|------------------|-------------------|-------------|
| Total cycle time | 15 min <b>3 x</b> | 45 min 30 s |

NEW



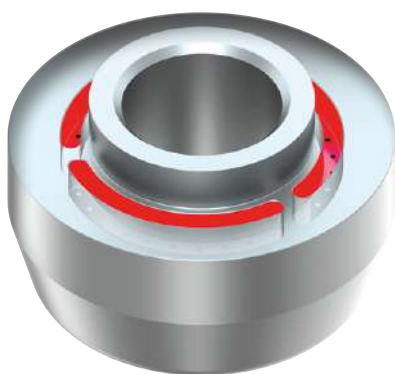
#### 5. Gear box cover

Material: GGG60 / 0.7060 / ASTM 80-60-03

Machining: Linear ramp and slot milling of gasket seat

- Slot depth = 2 mm
- Slot length = 800 mm
- Slot width = 2 mm

|                  | Mikron Tool           | Competitor |
|------------------|-----------------------|------------|
| Total cycle time | 1 min 45 s <b>2 x</b> | 3 min 10 s |



#### 6. Paint atomizer

Material: TiAl6V4-ELI / 3.7165 / ASTM F136

Machining: Plunging, roughing and finishing slotting

- Slot depth = 8 mm
- Slot length = 210 mm
- Slot width = 5.2 mm

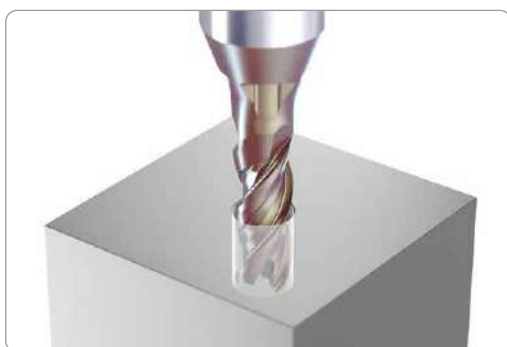
|                  | Mikron Tool           | Competitor |
|------------------|-----------------------|------------|
| Total cycle time | 2 min 10 s <b>2 x</b> | 3 min 56 s |

**NEW**

## One tool for many applications

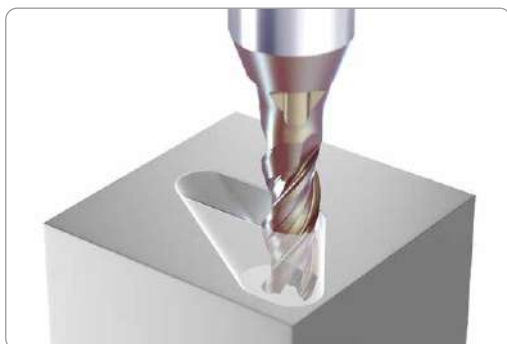
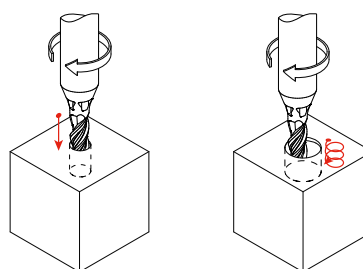
### MILLING PROCESS

CrazyMill Cool P&S Corner radius for:



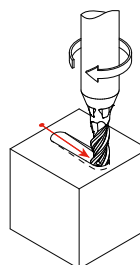
#### 1. Plunge milling

Direct or with helical interpolation



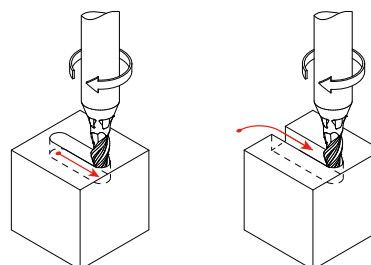
#### 2. Linear ramp milling

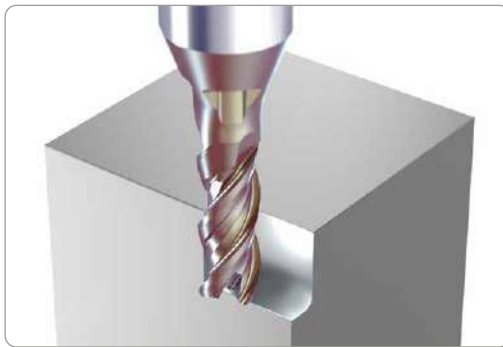
Angle depending on material



#### 3. Slot milling

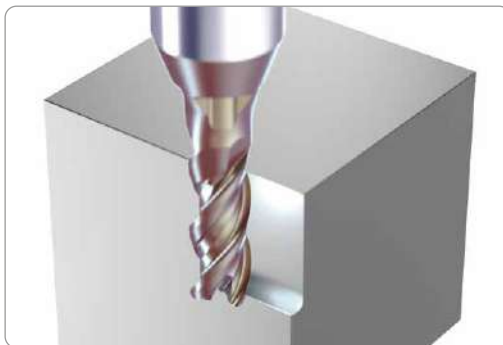
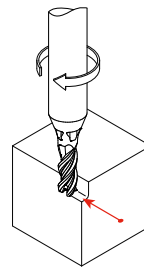
Pockets or through slots





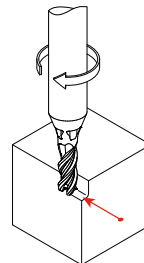
#### 4. Side milling - Semi-finishing

$$a_p = 1 - 2 \times d$$



#### 5. Side milling - Finishing

$$a_p = 2.5 \times d - \text{Type A} / a_p = 2 \times d - \text{Type C}$$



**NEW**

## Highest performance in smallest dimensions

### PLUNGE AND SLOT ENDMILL WITH INTEGRATED COOLING

With CrazyMill Cool P&S Corner radius Mikron Tool expands its range of milling cutters for difficult to machine materials. The new endmill is used for applications where a rounded corner is required. The three flute CrazyMill Cool P&S Corner radius allows perpendicular plunging with subsequent milling into solid material. It is available with integrated cooling, in the diameter range from 1 mm to 8 mm and for maximal milling depth of 5 x d.

- CrazyMill Cool P&S Corner radius, type A – milling depth 2.5 x d, cutting length 2.5 x d, through shaft cooling, Z = 3
- CrazyMill Cool P&S Corner radius, type C – milling depth 5 x d, cutting length 2 x d, through shaft cooling, Z = 3

2.5 x d

5 x d

Type A

Type C

- Coated
- Integrated cooling

- Coated
- Integrated cooling



**NEW**

#### 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.

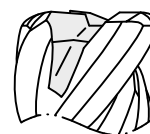
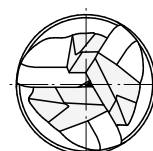
#### 6 | GEOMETRY OF THE END FACE

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.

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End face geometry - 3 Flutes

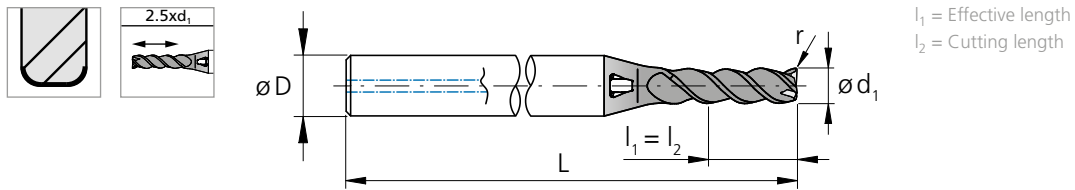


**NEW**

## Type A - 2.5 x d - Corner radius - Z3

### MILLING WITH INTEGRATED COOLING

#### P&S - Corner radius



| $d_1$<br>[mm] | $d_1$<br>[inch] | $l_1$<br>[mm] | $l_2$<br>[mm] | D<br>(h6)<br>[mm] | L<br>[mm] | r<br>[mm] | r<br>[inch] | Item<br>number     | Availability |
|---------------|-----------------|---------------|---------------|-------------------|-----------|-----------|-------------|--------------------|--------------|
| 1.0           |                 | 2.50          | 2.50          | 4                 | 40        | 0.10      |             | 2.CMC42.A2Z3.100.1 | ■            |
| 1.0           |                 | 2.50          | 2.50          | 4                 | 40        | 0.20      |             | 2.CMC42.A3Z3.100.1 | ■            |
| 1.1           |                 | 2.75          | 2.75          | 4                 | 40        | 0.10      |             | 2.CMC42.A2Z3.110.1 | ■            |
| 1.1           |                 | 2.75          | 2.75          | 4                 | 40        | 0.20      |             | 2.CMC42.A3Z3.110.1 | ■            |
| 1.2           |                 | 3.00          | 3.00          | 4                 | 40        | 0.10      |             | 2.CMC42.A2Z3.120.1 | ■            |
| 1.2           |                 | 3.00          | 3.00          | 4                 | 40        | 0.20      |             | 2.CMC42.A3Z3.120.1 | ■            |
| 1.3           |                 | 3.25          | 3.25          | 4                 | 40        | 0.10      |             | 2.CMC42.A2Z3.130.1 | ■            |
| 1.3           |                 | 3.25          | 3.25          | 4                 | 40        | 0.20      |             | 2.CMC42.A3Z3.130.1 | ■            |
| 1.4           |                 | 3.50          | 3.50          | 4                 | 40        | 0.10      |             | 2.CMC42.A2Z3.140.1 | ■            |
| 1.4           |                 | 3.50          | 3.50          | 4                 | 40        | 0.20      |             | 2.CMC42.A3Z3.140.1 | ■            |
| 1.5           |                 | 3.75          | 3.75          | 4                 | 40        | 0.10      |             | 2.CMC42.A2Z3.150.1 | ■            |
| 1.5           |                 | 3.75          | 3.75          | 4                 | 40        | 0.30      |             | 2.CMC42.A3Z3.150.1 | ■            |
| 1.587         | <b>1/16</b>     | 3.97          | 3.97          | 4                 | 40        | 0.127     | .005        | 2.CMC.PSRA2Z3.F116 | ■            |
| 1.587         | <b>1/16</b>     | 3.97          | 3.97          | 4                 | 40        | 0.254     | .010        | 2.CMC.PSRA3Z3.F116 | ■            |
| 1.6           |                 | 4.00          | 4.00          | 4                 | 40        | 0.10      |             | 2.CMC42.A2Z3.160.1 | ■            |
| 1.6           |                 | 4.00          | 4.00          | 4                 | 40        | 0.30      |             | 2.CMC42.A3Z3.160.1 | ■            |
| 1.7           |                 | 4.25          | 4.25          | 4                 | 40        | 0.10      |             | 2.CMC42.A2Z3.170.1 | ■            |
| 1.7           |                 | 4.25          | 4.25          | 4                 | 40        | 0.30      |             | 2.CMC42.A3Z3.170.1 | ■            |
| 1.8           |                 | 4.50          | 4.50          | 4                 | 40        | 0.10      |             | 2.CMC42.A2Z3.180.1 | ■            |
| 1.8           |                 | 4.50          | 4.50          | 4                 | 40        | 0.30      |             | 2.CMC42.A3Z3.180.1 | ■            |
| 1.9           |                 | 4.75          | 4.75          | 4                 | 40        | 0.10      |             | 2.CMC42.A2Z3.190.1 | ■            |
| 1.9           |                 | 4.75          | 4.75          | 4                 | 40        | 0.30      |             | 2.CMC42.A3Z3.190.1 | ■            |
| 2.0           |                 | 5.00          | 5.00          | 4                 | 40        | 0.10      |             | 2.CMC42.A2Z3.200.1 | ■            |
| 2.0           |                 | 5.00          | 5.00          | 4                 | 40        | 0.20      |             | 2.CMC42.A3Z3.200.1 | ■            |
| 2.0           |                 | 5.00          | 5.00          | 4                 | 40        | 0.50      |             | 2.CMC42.A4Z3.200.1 | ■            |
| 2.1           |                 | 5.25          | 5.25          | 4                 | 40        | 0.20      |             | 2.CMC42.A2Z3.210.1 | ■            |
| 2.1           |                 | 5.25          | 5.25          | 4                 | 40        | 0.50      |             | 2.CMC42.A3Z3.210.1 | ■            |
| 2.2           |                 | 5.50          | 5.50          | 4                 | 40        | 0.20      |             | 2.CMC42.A2Z3.220.1 | ■            |
| 2.2           |                 | 5.50          | 5.50          | 4                 | 40        | 0.50      |             | 2.CMC42.A3Z3.220.1 | ■            |
| 2.3           |                 | 5.75          | 5.75          | 4                 | 40        | 0.20      |             | 2.CMC42.A2Z3.230.1 | ■            |
| 2.3           |                 | 5.75          | 5.75          | 4                 | 40        | 0.50      |             | 2.CMC42.A3Z3.230.1 | ■            |
| 2.381         | <b>3/32</b>     | 5.95          | 5.95          | 4                 | 40        | 0.127     | .005        | 2.CMC.PSRA2Z3.F332 | ■            |
| 2.381         | <b>3/32</b>     | 5.95          | 5.95          | 4                 | 40        | 0.254     | .010        | 2.CMC.PSRA3Z3.F332 | ■            |
| 2.381         | <b>3/32</b>     | 5.95          | 5.95          | 4                 | 40        | 0.381     | .015        | 2.CMC.PSRA4Z3.F332 | ■            |
| 2.4           |                 | 6.00          | 6.00          | 4                 | 40        | 0.20      |             | 2.CMC42.A2Z3.240.1 | ■            |
| 2.4           |                 | 6.00          | 6.00          | 4                 | 40        | 0.50      |             | 2.CMC42.A3Z3.240.1 | ■            |
| 2.5           |                 | 6.25          | 6.25          | 6                 | 50        | 0.20      |             | 2.CMC42.A2Z3.250.1 | ■            |
| 2.5           |                 | 6.25          | 6.25          | 6                 | 50        | 0.50      |             | 2.CMC42.A3Z3.250.1 | ■            |
| 2.6           |                 | 6.50          | 6.50          | 6                 | 50        | 0.20      |             | 2.CMC42.A2Z3.260.1 | ■            |
| 2.6           |                 | 6.50          | 6.50          | 6                 | 50        | 0.50      |             | 2.CMC42.A3Z3.260.1 | ■            |
| 2.7           |                 | 6.75          | 6.75          | 6                 | 50        | 0.20      |             | 2.CMC42.A2Z3.270.1 | ■            |
| 2.7           |                 | 6.75          | 6.75          | 6                 | 50        | 0.50      |             | 2.CMC42.A3Z3.270.1 | ■            |

■ Stock item

|         |    |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|---------|----|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Carbide | Z3 |  |  |  |  |  |  |  |  |  |  |
|         |    | Ø d <sub>1</sub>                                                                  | 1.0 - 3.0 mm                                                                      |                                                                                   | 3.1 - 6.0 mm                                                                      |                                                                                    | 6.1 - 8.0 mm                                                                        |                                                                                     | r                                                                                   |                                                                                     | 0.1 - 1.524 mm                                                                      |
|         |    | Tolerance                                                                         | - 0.014 mm<br>- 0.028 mm                                                          |                                                                                   | - 0.020 mm<br>- 0.038 mm                                                          |                                                                                    | - 0.025 mm<br>- 0.047 mm                                                            |                                                                                     | Tolerance                                                                           |                                                                                     | ± 0.05 · r mm                                                                       |

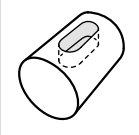
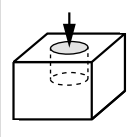
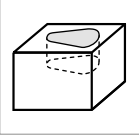
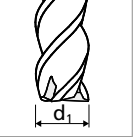
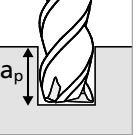
| d <sub>1</sub> | d <sub>1</sub> | l <sub>1</sub> | l <sub>2</sub> | D (h6) | L    | r     | r      | Item number        | Availability |
|----------------|----------------|----------------|----------------|--------|------|-------|--------|--------------------|--------------|
| [mm]           | [inch]         | [mm]           | [mm]           | [mm]   | [mm] | [mm]  | [inch] |                    |              |
| 2.8            |                | 7.00           | 7.00           | 6      | 50   | 0.20  |        | 2.CMC42.A2Z3.280.1 | ■            |
| 2.8            |                | 7.00           | 7.00           | 6      | 50   | 0.50  |        | 2.CMC42.A3Z3.280.1 | ■            |
| 2.9            |                | 7.25           | 7.25           | 6      | 50   | 0.20  |        | 2.CMC42.A2Z3.290.1 | ■            |
| 2.9            |                | 7.25           | 7.25           | 6      | 50   | 0.50  |        | 2.CMC42.A3Z3.290.1 | ■            |
| 3.0            |                | 7.50           | 7.50           | 6      | 50   | 0.20  |        | 2.CMC42.A2Z3.300.1 | ■            |
| 3.0            |                | 7.50           | 7.50           | 6      | 50   | 0.50  |        | 2.CMC42.A3Z3.300.1 | ■            |
| 3.1            |                | 7.75           | 7.75           | 6      | 50   | 0.20  |        | 2.CMC42.A2Z3.310.1 | ■            |
| 3.1            |                | 7.75           | 7.75           | 6      | 50   | 0.50  |        | 2.CMC42.A3Z3.310.1 | ■            |
| 3.175          | 1/8            | 7.94           | 7.94           | 6      | 50   | 0.254 | .010   | 2.CMC.PSRA2Z3.F18  | ■            |
| 3.175          | 1/8            | 7.94           | 7.94           | 6      | 50   | 0.381 | .015   | 2.CMC.PSRA3Z3.F18  | ■            |
| 3.3            |                | 8.25           | 8.25           | 6      | 50   | 0.20  |        | 2.CMC42.A2Z3.330.1 | ■            |
| 3.3            |                | 8.25           | 8.25           | 6      | 50   | 0.50  |        | 2.CMC42.A3Z3.330.1 | ■            |
| 3.7            |                | 9.25           | 9.25           | 6      | 50   | 0.20  |        | 2.CMC42.A2Z3.370.1 | ■            |
| 3.7            |                | 9.25           | 9.25           | 6      | 50   | 0.50  |        | 2.CMC42.A3Z3.370.1 | ■            |
| 3.968          | 5/32           | 9.92           | 9.92           | 6      | 50   | 0.254 | .010   | 2.CMC.PSRA2Z3.F532 | ■            |
| 3.968          | 5/32           | 9.92           | 9.92           | 6      | 50   | 0.381 | .015   | 2.CMC.PSRA3Z3.F532 | ■            |
| 4.0            |                | 10.00          | 10.00          | 6      | 50   | 0.20  |        | 2.CMC42.A2Z3.400.1 | ■            |
| 4.0            |                | 10.00          | 10.00          | 6      | 50   | 0.50  |        | 2.CMC42.A3Z3.400.1 | ■            |
| 4.3            |                | 10.75          | 10.75          | 8      | 60   | 0.20  |        | 2.CMC42.A2Z3.430.1 | ■            |
| 4.3            |                | 10.75          | 10.75          | 8      | 60   | 0.50  |        | 2.CMC42.A3Z3.430.1 | ■            |
| 4.7            |                | 11.75          | 11.75          | 8      | 60   | 0.20  |        | 2.CMC42.A2Z3.470.1 | ■            |
| 4.7            |                | 11.75          | 11.75          | 8      | 60   | 0.50  |        | 2.CMC42.A3Z3.470.1 | ■            |
| 4.762          | 3/16           | 11.91          | 11.91          | 8      | 60   | 0.254 | .010   | 2.CMC.PSRA2Z3.F316 | ■            |
| 4.762          | 3/16           | 11.91          | 11.91          | 8      | 60   | 0.381 | .015   | 2.CMC.PSRA3Z3.F316 | ■            |
| 4.8            |                | 12.00          | 12.00          | 8      | 60   | 0.20  |        | 2.CMC42.A2Z3.480.1 | ■            |
| 4.8            |                | 12.00          | 12.00          | 8      | 60   | 0.50  |        | 2.CMC42.A3Z3.480.1 | ■            |
| 5.0            |                | 12.50          | 12.50          | 8      | 60   | 0.20  |        | 2.CMC42.A2Z3.500.1 | ■            |
| 5.0            |                | 12.50          | 12.50          | 8      | 60   | 0.50  |        | 2.CMC42.A3Z3.500.1 | ■            |
| 5.3            |                | 13.25          | 13.25          | 10     | 65   | 0.20  |        | 2.CMC42.A2Z3.530.1 | ■            |
| 5.3            |                | 13.25          | 13.25          | 10     | 65   | 0.50  |        | 2.CMC42.A3Z3.530.1 | ■            |
| 5.560          | 7/32           | 13.90          | 13.90          | 10     | 65   | 0.381 | .015   | 2.CMC.PSRA2Z3.F732 | ■            |
| 5.560          | 7/32           | 13.90          | 13.90          | 10     | 65   | 0.762 | .030   | 2.CMC.PSRA3Z3.F732 | ■            |
| 5.7            |                | 14.25          | 14.25          | 10     | 65   | 0.20  |        | 2.CMC42.A2Z3.570.1 | ■            |
| 5.7            |                | 14.25          | 14.25          | 10     | 65   | 0.50  |        | 2.CMC42.A3Z3.570.1 | ■            |
| 6.0            |                | 15.00          | 15.00          | 10     | 65   | 0.20  |        | 2.CMC42.A2Z3.600.1 | ■            |
| 6.0            |                | 15.00          | 15.00          | 10     | 65   | 0.50  |        | 2.CMC42.A3Z3.600.1 | ■            |
| 6.0            |                | 15.00          | 15.00          | 10     | 65   | 1.00  |        | 2.CMC42.A4Z3.600.1 | ■            |
| 6.350          | 1/4            | 15.88          | 15.88          | 10     | 65   | 0.381 | .015   | 2.CMC.PSRA2Z3.F14  | ■            |
| 6.350          | 1/4            | 15.88          | 15.88          | 10     | 65   | 0.762 | .030   | 2.CMC.PSRA3Z3.F14  | ■            |
| 6.350          | 1/4            | 15.88          | 15.88          | 10     | 65   | 1.524 | .060   | 2.CMC.PSRA4Z3.F14  | ■            |
| 8.0            |                | 20.00          | 20.00          | 12     | 70   | 0.20  |        | 2.CMC42.A2Z3.800.1 | ■            |
| 8.0            |                | 20.00          | 20.00          | 12     | 70   | 0.50  |        | 2.CMC42.A3Z3.800.1 | ■            |
| 8.0            |                | 20.00          | 20.00          | 12     | 70   | 1.50  |        | 2.CMC42.A4Z3.800.1 | ■            |

■ Stock item

**NEW**

# Type A - Keyways - Plunge - Slot milling

## MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

|                                                                                                                                                                                       | Materials group                              | Material                                               | Mat. no. | DIN                | AISI/ASTM/UNS           | 1.0 mm |           |           |         |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|--------------------------------------------------------|----------|--------------------|-------------------------|--------|-----------|-----------|---------|
|                                                                                                                                                                                       |                                              |                                                        |          |                    |                         | $v_c$  | $f_{z,p}$ | $f_{z,s}$ | $a_p$   |
| <b>Keyway slot milling</b><br><br>■ $f_{z,p}$ : for plunge milling<br>■ $f_{z,s}$ : for slot milling | <b>P</b>                                     | Unalloyed carbon steel<br>$R_m < 800 \text{ N/mm}^2$   | 1.0301   | C10                | AISI 1010               | 100    | 0.0013    | 0.0046    | 1xd1    |
|                                                                                                                                                                                       |                                              |                                                        | 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>$R_m > 900 \text{ N/mm}^2$        | 1.5752   | 15NiCr13           | ASTM 3415 / AISI 3310   | 100    | 0.0014    | 0.0049    | 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>$R_m < 1200 \text{ N/mm}^2$ | 1.2379   | X153CrMoV12        | AISI D2                 | 100    | 0.0012    | 0.0042    | 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    |        |           |           |         |
| <b>Plunge milling</b><br><br>■ $f_{z,p}$ : for plunge milling                                      | <b>M</b>                                     | Stainless steel ferritic                               | 1.4016   | X6Cr17             | AISI 430 / UNS S43000   | 100    | 0.0010    | 0.0035    | 1xd1    |
|                                                                                                                                                                                       |                                              |                                                        | 1.4105   | X6CrMoS17          | AISI 430F               | 100    | 0.0010    | 0.0035    | 0.5xd1  |
|                                                                                                                                                                                       |                                              |                                                        | 1.4034   | X46Cr13            | AISI 420C               |        |           |           |         |
|                                                                                                                                                                                       |                                              | Stainless steel martensitic                            | 1.4112   | X90CrMoV18         | AISI 440B               | 100    | 0.0010    | 0.0035    | 0.5xd1  |
|                                                                                                                                                                                       |                                              |                                                        | 1.4542   | X5CrNiCuNb16-4     | AISI 630 / ASTM 17-4 PH |        |           |           |         |
|                                                                                                                                                                                       |                                              | Stainless steel martensitic – PH                       | 1.4545   | X5CrNiCuNb15-5     | ASTM 15-5 PH            | 100    | 0.0010    | 0.0035    | 0.5xd1  |
|                                                                                                                                                                                       |                                              |                                                        | 1.4301   | X5CrNi18-10        | AISI 304                |        |           |           |         |
|                                                                                                                                                                                       |                                              |                                                        | 1.4435   | X2CrNiMo18-14-3    | AISI 316L               |        |           |           |         |
|                                                                                                                                                                                       |                                              |                                                        | 1.4441   | X2CrNiMo18-15-3    | AISI 316LM              |        |           |           |         |
|                                                                                                                                                                                       |                                              |                                                        | 1.4539   | X1NiCrMoCu25-20-5  | AISI 904L               |        |           |           |         |
| <b>Slot milling</b><br><br>■ $f_{z,p}$ : for plunge milling<br>■ $f_{z,s}$ : for slot milling      | <b>K</b>                                     | Cast iron                                              | 0.6020   | GG20               | ASTM 30                 | 100    | 0.0013    | 0.0042    | 1xd1    |
|                                                                                                                                                                                       |                                              |                                                        | 0.6030   | GG30               | ASTM 40B                |        |           |           |         |
|                                                                                                                                                                                       |                                              |                                                        | 0.7040   | GGG40              | ASTM 60-40-18           |        |           |           |         |
|                                                                                                                                                                                       |                                              |                                                        | 0.7060   | GGG60              | ASTM 80-60-03           |        |           |           |         |
|                                                                                                                                                                                       |                                              |                                                        | 0.7060   | GGG60              | ASTM 80-60-03           |        |           |           |         |
| <br>■ $f_{z,p}$ : for plunge milling<br>■ $f_{z,s}$ : for slot milling                             | <b>N</b>                                     | Aluminium alloy wrought                                | 3.2315   | AlMgSi1            | ASTM 6351               | 100    | 0.0012    | 0.0100    | 1xd1    |
|                                                                                                                                                                                       |                                              |                                                        | 3.4365   | AlZnMgCu1.5        | ASTM 7075               |        |           |           |         |
|                                                                                                                                                                                       |                                              | Aluminium alloy cast                                   | 3.2163   | GD-AlSi9Cu3        | ASTM A380               | 100    | 0.0012    | 0.0100    | 1xd1    |
|                                                                                                                                                                                       |                                              |                                                        | 3.2381   | GD-AlSi10Mg        | UNS A03590              |        |           |           |         |
|                                                                                                                                                                                       |                                              | Copper                                                 | 2.0040   | Cu-OF / CW008A     | UNS C10100              | 100    | 0.0012    | 0.0100    | 1xd1    |
|                                                                                                                                                                                       |                                              |                                                        | 2.0065   | Cu-ETP / CW004A    | UNS C11000              |        |           |           |         |
|                                                                                                                                                                                       |                                              | Brass lead free                                        | 2.0321   | CuZn37 CW508L      | UNS C27400              | 100    | 0.0012    | 0.0100    | 1xd1    |
|                                                                                                                                                                                       |                                              |                                                        | 2.0360   | CuZn40 CW509L      | UNS C28000              |        |           |           |         |
|                                                                                                                                                                                       |                                              | Brass, Bronze<br>$R_m < 400 \text{ N/mm}^2$            | 2.0401   | CuZn39Pb3 / CW614N | UNS C38500              | 100    | 0.0012    | 0.0100    | 1xd1    |
|                                                                                                                                                                                       |                                              |                                                        | 2.1020   | CuSn6              | UNS C51900              |        |           |           |         |
|                                                                                                                                                                                       |                                              | Bronze<br>$R_m < 600 \text{ N/mm}^2$                   | 2.0966   | CuAl10Ni5Fe4       | UNS C63000              | 100    | 0.0012    | 0.0100    | 1xd1    |
|                                                                                                                                                                                       |                                              |                                                        | 2.0960   | CuAl9Mn2           | UNS C63200              |        |           |           |         |
| <br>            | <b>S<sub>1</sub></b>                         | Super alloys                                           | 2.4856   |                    | Inconel 625             | 40     | 0.0010    | 0.0035    | 0.25xd1 |
|                                                                                                                                                                                       |                                              |                                                        | 2.4668   |                    | Inconel 718             |        |           |           |         |
|                                                                                                                                                                                       |                                              |                                                        | 2.4617   | NiMo28             | Hastelloy B-2           |        |           |           |         |
|                                                                                                                                                                                       |                                              |                                                        | 2.4665   | NiCr22Fe18Mo       | Hastelloy X             |        |           |           |         |
|                                                                                                                                                                                       |                                              | Titanium pure                                          | 3.7035   | Gr.2               | ASTM B348 / F67         | 80     | 0.0010    | 0.0032    | 0.25xd1 |
|                                                                                                                                                                                       |                                              |                                                        | 3.7065   | Gr.4               | ASTM B348 / F68         |        |           |           |         |
|                                                                                                                                                                                       | <b>S<sub>2</sub></b>                         | Titanium alloys                                        | 3.7165   | TiAl6V4            | ASTM B348 / F136        | 80     | 0.0010    | 0.0032    | 0.25xd1 |
|                                                                                                                                                                                       |                                              |                                                        | 9.9367   | TiAl6Nb7           | ASTM F1295              |        |           |           |         |
|                                                                                                                                                                                       | <b>S<sub>3</sub></b>                         | CrCo alloys                                            | 2.4964   | CoCr20W15Ni        | Haynes 25               | 60     | 0.0010    | 0.0035    | 0.5xd1  |
|                                                                                                                                                                                       |                                              |                                                        |          | CrCoMo28           | ASTM F1537              |        |           |           |         |
|                                                                                                    | <b>H<sub>1</sub></b><br><b>H<sub>2</sub></b> | Hardened steel<br>$< 55 \text{ HRC}$                   | 1.2510   | 100MnCrMoW4        | AISI O1                 |        |           |           |         |
|                                                                                                                                                                                       |                                              | Hardened steel<br>$\geq 55 \text{ HRC}$                | 1.2379   | X153CrMoV12        | AISI D2                 |        |           |           |         |

**v<sub>c</sub>** [m/min]   **a<sub>p</sub>** [mm]  
**f<sub>z,p</sub>** [mm]   **f<sub>z,s</sub>** [mm]

RECOMMENDATION FOR USE

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

|   |                |                |
|---|----------------|----------------|
| P | N              | S <sub>3</sub> |
| M | S <sub>1</sub> | H <sub>1</sub> |
| K | S <sub>2</sub> | H <sub>2</sub> |

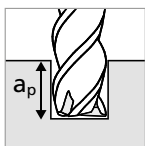
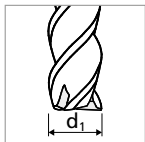
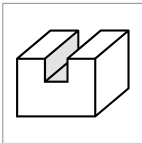
| Ød <sub>1</sub> |                  |                  |                |                 |                  |                  |                |                |                  |                  |                |                 |                  |                  |                |                         |                  |                  |                |                         |                  |                  |                |
|-----------------|------------------|------------------|----------------|-----------------|------------------|------------------|----------------|----------------|------------------|------------------|----------------|-----------------|------------------|------------------|----------------|-------------------------|------------------|------------------|----------------|-------------------------|------------------|------------------|----------------|
| 1.5 mm<br>1/16" |                  |                  |                | 2.0 mm<br>3/32" |                  |                  |                | 3.0 mm<br>1/8" |                  |                  |                | 4.0 mm<br>5/32" |                  |                  |                | 5.0 mm<br>3/16" - 7/32" |                  |                  |                | 6.0 mm - 8.0 mm<br>1/4" |                  |                  |                |
| v <sub>c</sub>  | f <sub>z,p</sub> | f <sub>z,s</sub> | a <sub>p</sub> | v <sub>c</sub>  | f <sub>z,p</sub> | f <sub>z,s</sub> | a <sub>p</sub> | v <sub>c</sub> | f <sub>z,p</sub> | f <sub>z,s</sub> | a <sub>p</sub> | v <sub>c</sub>  | f <sub>z,p</sub> | f <sub>z,s</sub> | a <sub>p</sub> | v <sub>c</sub>          | f <sub>z,p</sub> | f <sub>z,s</sub> | a <sub>p</sub> | v <sub>c</sub>          | f <sub>z,p</sub> | f <sub>z,s</sub> | a <sub>p</sub> |
| 120             | 0.0020           | 0.0065           | 1xd1           | 120             | 0.0026           | 0.0091           | 1xd1           | 140            | 0.004            | 0.013            | 1xd1           | 140             | 0.005            | 0.020            | 1xd1           | 150                     | 0.005            | 0.026            | 1xd1           | 160                     | 0.006            | 0.033            | 1xd1           |
| 120             | 0.0021           | 0.0070           | 1xd1           | 120             | 0.0028           | 0.0098           | 1xd1           | 140            | 0.004            | 0.014            | 1xd1           | 140             | 0.005            | 0.021            | 1xd1           | 150                     | 0.006            | 0.027            | 1xd1           | 160                     | 0.006            | 0.034            | 1xd1           |
| 120             | 0.0018           | 0.0060           | 0.5xd1         | 120             | 0.0024           | 0.0084           | 0.5xd1         | 140            | 0.003            | 0.012            | 0.5xd1         | 140             | 0.004            | 0.017            | 0.5xd1         | 150                     | 0.004            | 0.022            | 0.5xd1         | 160                     | 0.005            | 0.028            | 0.5xd1         |
| 120             | 0.0015           | 0.0050           | 1xd1           | 120             | 0.0020           | 0.0070           | 1xd1           | 140            | 0.003            | 0.010            | 1xd1           | 140             | 0.004            | 0.015            | 1xd1           | 150                     | 0.004            | 0.020            | 1xd1           | 160                     | 0.005            | 0.025            | 1xd1           |
| 120             | 0.0015           | 0.0050           | 0.5xd1         | 120             | 0.0020           | 0.0070           | 0.5xd1         | 140            | 0.003            | 0.010            | 0.5xd1         | 140             | 0.004            | 0.015            | 0.5xd1         | 150                     | 0.004            | 0.020            | 0.5xd1         | 160                     | 0.005            | 0.025            | 0.5xd1         |
| 120             | 0.0015           | 0.0050           | 0.5xd1         | 120             | 0.0020           | 0.0070           | 0.5xd1         | 140            | 0.003            | 0.010            | 0.5xd1         | 140             | 0.004            | 0.015            | 0.5xd1         | 150                     | 0.004            | 0.020            | 0.5xd1         | 160                     | 0.005            | 0.025            | 0.5xd1         |
| 120             | 0.0015           | 0.0050           | 1xd1           | 120             | 0.0020           | 0.0070           | 1xd1           | 140            | 0.003            | 0.010            | 1xd1           | 140             | 0.004            | 0.015            | 1xd1           | 150                     | 0.004            | 0.020            | 1xd1           | 160                     | 0.005            | 0.025            | 1xd1           |
| 120             | 0.0019           | 0.0060           | 1xd1           | 120             | 0.0024           | 0.0084           | 1xd1           | 140            | 0.004            | 0.012            | 1xd1           | 140             | 0.004            | 0.017            | 1xd1           | 150                     | 0.005            | 0.022            | 1xd1           | 160                     | 0.005            | 0.028            | 1xd1           |
| 120             | 0.0018           | 0.0160           | 1xd1           | 120             | 0.0024           | 0.0210           | 1xd1           | 150            | 0.004            | 0.034            | 1xd1           | 160             | 0.004            | 0.035            | 1xd1           | 170                     | 0.005            | 0.036            | 1xd1           | 180                     | 0.005            | 0.037            | 1xd1           |
| 120             | 0.0018           | 0.0160           | 1xd1           | 120             | 0.0024           | 0.0210           | 1xd1           | 150            | 0.004            | 0.034            | 1xd1           | 160             | 0.004            | 0.035            | 1xd1           | 170                     | 0.005            | 0.036            | 1xd1           | 180                     | 0.005            | 0.037            | 1xd1           |
| 120             | 0.0018           | 0.0160           | 1xd1           | 120             | 0.0024           | 0.0210           | 1xd1           | 150            | 0.004            | 0.034            | 1xd1           | 160             | 0.004            | 0.035            | 1xd1           | 170                     | 0.005            | 0.036            | 1xd1           | 180                     | 0.005            | 0.037            | 1xd1           |
| 120             | 0.0018           | 0.0160           | 1xd1           | 120             | 0.0024           | 0.0210           | 1xd1           | 150            | 0.004            | 0.034            | 1xd1           | 160             | 0.004            | 0.035            | 1xd1           | 170                     | 0.005            | 0.036            | 1xd1           | 180                     | 0.005            | 0.037            | 1xd1           |
| 120             | 0.0018           | 0.0160           | 1xd1           | 120             | 0.0024           | 0.0210           | 1xd1           | 150            | 0.004            | 0.034            | 1xd1           | 160             | 0.004            | 0.035            | 1xd1           | 170                     | 0.005            | 0.036            | 1xd1           | 180                     | 0.005            | 0.037            | 1xd1           |
| 120             | 0.0018           | 0.0160           | 1xd1           | 120             | 0.0024           | 0.0210           | 1xd1           | 150            | 0.004            | 0.034            | 1xd1           | 160             | 0.004            | 0.035            | 1xd1           | 170                     | 0.005            | 0.036            | 1xd1           | 180                     | 0.005            | 0.037            | 1xd1           |
| 40              | 0.0015           | 0.0050           | 0.25xd1        | 50              | 0.0020           | 0.0070           | 0.25xd1        | 50             | 0.003            | 0.010            | 0.25xd1        | 60              | 0.004            | 0.014            | 0.25xd1        | 80                      | 0.004            | 0.018            | 0.25xd1        | 80                      | 0.005            | 0.021            | 0.25xd1        |
| 90              | 0.0014           | 0.0045           | 0.25xd1        | 100             | 0.0018           | 0.0063           | 0.25xd1        | 110            | 0.003            | 0.010            | 0.25xd1        | 120             | 0.004            | 0.013            | 0.25xd1        | 120                     | 0.004            | 0.016            | 0.25xd1        | 120                     | 0.005            | 0.019            | 0.25xd1        |
| 90              | 0.0014           | 0.0045           | 0.25xd1        | 100             | 0.0018           | 0.0063           | 0.25xd1        | 110            | 0.003            | 0.010            | 0.25xd1        | 120             | 0.004            | 0.013            | 0.25xd1        | 120                     | 0.004            | 0.016            | 0.25xd1        | 120                     | 0.005            | 0.019            | 0.25xd1        |
| 60              | 0.0015           | 0.0050           | 0.5xd1         | 80              | 0.0020           | 0.0070           | 0.5xd1         | 80             | 0.003            | 0.010            | 0.5xd1         | 100             | 0.004            | 0.014            | 0.5xd1         | 100                     | 0.004            | 0.018            | 0.5xd1         | 120                     | 0.005            | 0.021            | 0.5xd1         |
|                 |                  |                  |                |                 |                  |                  |                |                |                  |                  |                |                 |                  |                  |                |                         |                  |                  |                |                         |                  |                  |                |
|                 |                  |                  |                |                 |                  |                  |                |                |                  |                  |                |                 |                  |                  |                |                         |                  |                  |                |                         |                  |                  |                |

**NEW**

## Type A - Milling of through slots

### MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

Through slot  
milling



| Materials group      | Material                                               | Mat. no. | DIN                | AISI/ASTM/UNS           | 1.0 mm |       |        |  |
|----------------------|--------------------------------------------------------|----------|--------------------|-------------------------|--------|-------|--------|--|
|                      |                                                        |          |                    |                         | $v_c$  | $f_z$ | $a_p$  |  |
| <b>P</b>             | Unalloyed carbon steel<br>$R_m < 800 \text{ N/mm}^2$   | 1.0301   | C10                | AISI 1010               | 140    | 0.009 | 1xd1   |  |
|                      |                                                        | 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>$R_m > 900 \text{ N/mm}^2$        | 1.5752   | 15NiCr13           | ASTM 3415 / AISI 3310   | 140    | 0.008 | 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>$R_m < 1200 \text{ N/mm}^2$ | 1.2379   | X153CrMoV12        | AISI D2                 | 140    | 0.006 | 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    |        |       |        |  |
|                      |                                                        |          |                    |                         |        |       |        |  |
| <b>M</b>             | Stainless steel ferritic                               | 1.4016   | X6Cr17             | AISI 430 / UNS S43000   | 140    | 0.009 | 1xd1   |  |
|                      |                                                        | 1.4105   | X6CrMoS17          | AISI 430F               |        |       |        |  |
|                      |                                                        | 1.4034   | X46Cr13            | AISI 420C               | 140    | 0.009 | 1xd1   |  |
|                      | Stainless steel martensitic                            | 1.4112   | X90CrMoV18         | AISI 440B               |        |       |        |  |
|                      |                                                        | 1.4542   | X5CrNiCuNb16-4     | AISI 630 / ASTM 17-4 PH | 140    | 0.009 | 1xd1   |  |
|                      | Stainless steel martensitic – PH                       | 1.4545   | X5CrNiCuNb15-5     | ASTM 15-5 PH            |        |       |        |  |
|                      |                                                        | 1.4301   | X5CrNi18-10        | AISI 304                |        |       |        |  |
|                      |                                                        | 1.4435   | X2CrNiMo18-14-3    | AISI 316L               | 140    | 0.007 | 1xd1   |  |
|                      |                                                        | 1.4441   | X2CrNiMo18-15-3    | AISI 316LM              |        |       |        |  |
|                      |                                                        | 1.4539   | X1NiCrMoCu25-20-5  | AISI 904L               |        |       |        |  |
| <b>K</b>             | Cast iron                                              | 0.6020   | GG20               | ASTM 30                 | 120    | 0.007 | 1xd1   |  |
|                      |                                                        | 0.6030   | GG30               | ASTM 40B                |        |       |        |  |
|                      |                                                        | 0.7040   | GGG40              | ASTM 60-40-18           |        |       |        |  |
|                      |                                                        | 0.7060   | GGG60              | ASTM 80-60-03           |        |       |        |  |
|                      |                                                        |          |                    |                         |        |       |        |  |
| <b>N</b>             | Aluminium alloy wrought                                | 3.2315   | AlMgSi1            | ASTM 6351               | 140    | 0.010 | 1xd1   |  |
|                      |                                                        | 3.4365   | AlZnMgCu1.5        | ASTM 7075               |        |       |        |  |
|                      | Aluminium alloy cast                                   | 3.2163   | GD-AlSi9Cu3        | ASTM A380               | 140    | 0.010 | 1xd1   |  |
|                      |                                                        | 3.2381   | GD-AlSi10Mg        | UNS A03590              |        |       |        |  |
|                      | Copper                                                 | 2.0040   | Cu-OF / CW008A     | UNS C10100              | 140    | 0.012 | 1xd1   |  |
|                      |                                                        | 2.0065   | Cu-ETP / CW004A    | UNS C11000              |        |       |        |  |
|                      | Brass lead free                                        | 2.0321   | CuZn37 CW508L      | UNS C27400              | 140    | 0.012 | 1xd1   |  |
|                      |                                                        | 2.0360   | CuZn40 CW509L      | UNS C28000              |        |       |        |  |
|                      | Brass, Bronze<br>$R_m < 400 \text{ N/mm}^2$            | 2.0401   | CuZn39Pb3 / CW614N | UNS C38500              | 140    | 0.012 | 1xd1   |  |
|                      |                                                        | 2.1020   | CuSn6              | UNS C51900              |        |       |        |  |
|                      | Bronze<br>$R_m < 600 \text{ N/mm}^2$                   | 2.0966   | CuAl10Ni5Fe4       | UNS C63000              | 140    | 0.011 | 1xd1   |  |
|                      |                                                        | 2.0960   | CuAl9Mn2           | UNS C63200              |        |       |        |  |
| <b>S<sub>1</sub></b> | Super alloys                                           | 2.4856   |                    | Inconel 625             | 80     | 0.005 | 0.5xd1 |  |
|                      |                                                        | 2.4668   |                    | Inconel 718             |        |       |        |  |
|                      |                                                        | 2.4617   | NiMo28             | Hastelloy B-2           |        |       |        |  |
|                      |                                                        | 2.4665   | NiCr22Fe18Mo       | Hastelloy X             |        |       |        |  |
| <b>S<sub>2</sub></b> | Titanium pure                                          | 3.7035   | Gr.2               | ASTM B348 / F67         | 100    | 0.009 | 0.5xd1 |  |
|                      |                                                        | 3.7065   | Gr.4               | ASTM B348 / F68         |        |       |        |  |
|                      | Titanium alloys                                        | 3.7165   | TiAl6V4            | ASTM B348 / F136        | 100    | 0.009 | 0.5xd1 |  |
| <b>S<sub>3</sub></b> | CrCo alloys                                            | 9.9367   | TiAl6Nb7           | ASTM F1295              | 80     | 0.005 | 0.5xd1 |  |
|                      |                                                        | 2.4964   | CoCr20W15Ni        | Haynes 25               |        |       |        |  |
| <b>H<sub>1</sub></b> | Hardened steel<br>$< 55 \text{ HRC}$                   |          | CrCoMo28           | ASTM F1537              |        |       |        |  |
| <b>H<sub>2</sub></b> | Hardened steel<br>$\geq 55 \text{ HRC}$                | 1.2510   | 100MnCrMoW4        | AISI O1                 |        |       |        |  |
|                      |                                                        | 1.2379   | X153CrMoV12        | AISI D2                 |        |       |        |  |

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

RECOMMENDATION FOR USE

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

|   |                |                |
|---|----------------|----------------|
| P | N              | S <sub>3</sub> |
| M | S <sub>1</sub> | H <sub>1</sub> |
| K | S <sub>2</sub> | H <sub>2</sub> |

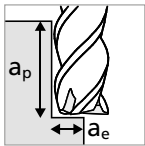
|  | 1.5 mm<br>1/16" |       |        | 2.0 mm<br>3/32" |       |        | 3.0 mm<br>1/8" |       |        | 4.0 mm<br>5/32" |       |        | 5.0 mm<br>3/16" - 7/32" |       |        | 6.0 mm - 8.0 mm<br>1/4" |       |        |
|--|-----------------|-------|--------|-----------------|-------|--------|----------------|-------|--------|-----------------|-------|--------|-------------------------|-------|--------|-------------------------|-------|--------|
|  | $v_c$           | $f_z$ | $a_p$  | $v_c$           | $f_z$ | $a_p$  | $v_c$          | $f_z$ | $a_p$  | $v_c$           | $f_z$ | $a_p$  | $v_c$                   | $f_z$ | $a_p$  | $v_c$                   | $f_z$ | $a_p$  |
|  | 180             | 0.015 | 1xd1   | 200             | 0.020 | 1xd1   | 220            | 0.029 | 1xd1   | 230             | 0.031 | 1xd1   | 240                     | 0.031 | 1xd1   | 260                     | 0.032 | 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   |
|  | 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 |
|  | 180             | 0.015 | 1xd1   | 200             | 0.020 | 1xd1   | 220            | 0.028 | 1xd1   | 230             | 0.029 | 1xd1   | 240                     | 0.030 | 1xd1   | 260                     | 0.031 | 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   |
|  | 180             | 0.013 | 1xd1   | 200             | 0.019 | 1xd1   | 220            | 0.027 | 1xd1   | 230             | 0.028 | 1xd1   | 240                     | 0.029 | 1xd1   | 260                     | 0.029 | 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   |
|  | 140             | 0.015 | 1xd1   | 160             | 0.017 | 1xd1   | 180            | 0.025 | 1xd1   | 200             | 0.031 | 1xd1   | 200                     | 0.031 | 1xd1   | 200                     | 0.032 | 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   |
|  | 180             | 0.016 | 1xd1   | 200             | 0.021 | 1xd1   | 220            | 0.032 | 1xd1   | 260             | 0.034 | 1xd1   | 300                     | 0.034 | 1xd1   | 340                     | 0.036 | 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   |
|  | 180             | 0.016 | 1xd1   | 200             | 0.021 | 1xd1   | 220            | 0.034 | 1xd1   | 260             | 0.035 | 1xd1   | 300                     | 0.036 | 1xd1   | 340                     | 0.037 | 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   |
|  | 180             | 0.016 | 1xd1   | 200             | 0.021 | 1xd1   | 220            | 0.034 | 1xd1   | 260             | 0.035 | 1xd1   | 300                     | 0.036 | 1xd1   | 340                     | 0.037 | 1xd1   |
|  | 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 |
|  | 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 |
|  | 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 |
|  | 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 |
|  |                 |       |        |                 |       |        |                |       |        |                 |       |        |                         |       |        |                         |       |        |
|  |                 |       |        |                 |       |        |                |       |        |                 |       |        |                         |       |        |                         |       |        |

**NEW**

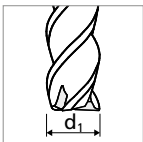
## Type A - Side milling - Semi-finishing

### 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 |       |  |
|----------------------|--------------------------------------------------------|----------|--------------------|-------------------------|--------|-------|--|
|                      |                                                        |          |                    |                         | $v_c$  | $f_z$ |  |
| <b>P</b>             | Unalloyed carbon steel<br>$R_m < 800 \text{ N/mm}^2$   | 1.0301   | C10                | AISI 1010               | 140    | 0.013 |  |
|                      |                                                        | 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>$R_m > 900 \text{ N/mm}^2$        | 1.5752   | 15NiCr13           | ASTM 3415 / AISI 3310   | 140    | 0.012 |  |
|                      |                                                        | 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>$R_m < 1200 \text{ N/mm}^2$ | 1.2379   | X153CrMoV12        | AISI D2                 | 140    | 0.009 |  |
|                      |                                                        | 1.2436   | X210CrW12          | AISI D4/D6              |        |       |  |
|                      |                                                        | 1.3343   | HS6-5-2C           | AISI M2 / UNS T11302    |        |       |  |
|                      |                                                        | 1.3355   | HS18-0-1           | AISI T1 / UNS T12001    |        |       |  |
|                      |                                                        |          |                    |                         |        |       |  |
| <b>M</b>             | Stainless steel ferritic                               | 1.4016   | X6Cr17             | AISI 430 / UNS S43000   | 140    | 0.014 |  |
|                      |                                                        | 1.4105   | X6CrMoS17          | AISI 430F               |        |       |  |
|                      | Stainless steel martensitic                            | 1.4034   | X46Cr13            | AISI 420C               | 140    | 0.013 |  |
|                      |                                                        | 1.4112   | X90CrMoV18         | AISI 440B               |        |       |  |
|                      | Stainless steel martensitic – PH                       | 1.4542   | X5CrNiCuNb16-4     | AISI 630 / ASTM 17-4 PH | 140    | 0.013 |  |
|                      |                                                        | 1.4545   | X5CrNiCuNb15-5     | ASTM 15-5 PH            |        |       |  |
|                      | Stainless steel austenitic                             | 1.4301   | X5CrNi18-10        | AISI 304                | 140    | 0.010 |  |
|                      |                                                        | 1.4435   | X2CrNiMo18-14-3    | AISI 316L               |        |       |  |
|                      |                                                        | 1.4441   | X2CrNiMo18-15-3    | AISI 316LM              |        |       |  |
|                      |                                                        | 1.4539   | X1NiCrMoCu25-20-5  | AISI 904L               |        |       |  |
| <b>K</b>             | Cast iron                                              | 0.6020   | GG20               | ASTM 30                 | 120    | 0.009 |  |
|                      |                                                        | 0.6030   | GG30               | ASTM 40B                |        |       |  |
|                      |                                                        | 0.7040   | GGG40              | ASTM 60-40-18           |        |       |  |
|                      |                                                        | 0.7060   | GGG60              | ASTM 80-60-03           |        |       |  |
|                      |                                                        |          |                    |                         |        |       |  |
| <b>N</b>             | Aluminium alloy wrought                                | 3.2315   | AlMgSi1            | ASTM 6351               | 140    | 0.015 |  |
|                      |                                                        | 3.4365   | AlZnMgCu1.5        | ASTM 7075               |        |       |  |
|                      | Aluminium alloy cast                                   | 3.2163   | GD-AlSi9Cu3        | ASTM A380               | 140    | 0.015 |  |
|                      |                                                        | 3.2381   | GD-AlSi10Mg        | UNS A03590              |        |       |  |
|                      | Copper                                                 | 2.0040   | Cu-OF / CW008A     | UNS C10100              | 140    | 0.017 |  |
|                      |                                                        | 2.0065   | Cu-ETP / CW004A    | UNS C11000              |        |       |  |
|                      | Brass lead free                                        | 2.0321   | CuZn37 CW508L      | UNS C27400              | 140    | 0.017 |  |
|                      |                                                        | 2.0360   | CuZn40 CW509L      | UNS C28000              |        |       |  |
|                      | Brass, Bronze<br>$R_m < 400 \text{ N/mm}^2$            | 2.0401   | CuZn39Pb3 / CW614N | UNS C38500              | 140    | 0.017 |  |
|                      |                                                        | 2.1020   | CuSn6              | UNS C51900              |        |       |  |
|                      | Bronze<br>$R_m < 600 \text{ N/mm}^2$                   | 2.0966   | CuAl10Ni5Fe4       | UNS C63000              | 140    | 0.015 |  |
|                      |                                                        | 2.0960   | CuAl9Mn2           | UNS C63200              |        |       |  |
| <b>S<sub>1</sub></b> | Super alloys                                           | 2.4856   |                    | Inconel 625             | 80     | 0.006 |  |
|                      |                                                        | 2.4668   |                    | Inconel 718             |        |       |  |
|                      |                                                        | 2.4617   | NiMo28             | Hastelloy B-2           |        |       |  |
|                      |                                                        | 2.4665   | NiCr22Fe18Mo       | Hastelloy X             |        |       |  |
| <b>S<sub>2</sub></b> | Titanium pure                                          | 3.7035   | Gr.2               | ASTM B348 / F67         | 120    | 0.014 |  |
|                      |                                                        | 3.7065   | Gr.4               | ASTM B348 / F68         |        |       |  |
|                      | Titanium alloys                                        | 3.7165   | TiAl6V4            | ASTM B348 / F136        | 120    | 0.014 |  |
|                      |                                                        | 9.9367   | TiAl6Nb7           | ASTM F1295              |        |       |  |
| <b>S<sub>3</sub></b> | CrCo alloys                                            | 2.4964   | CoCr20W15Ni        | Haynes 25               | 80     | 0.006 |  |
|                      |                                                        |          | CrCoMo28           | ASTM F1537              |        |       |  |
| <b>H<sub>1</sub></b> | Hardened steel<br>$< 55 \text{ HRC}$                   | 1.2510   | 100MnCrMoW4        | AISI O1                 |        |       |  |
| <b>H<sub>2</sub></b> | Hardened steel<br>$\geq 55 \text{ HRC}$                | 1.2379   | X153CrMoV12        | AISI D2                 |        |       |  |

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

RECOMMENDATION FOR USE

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



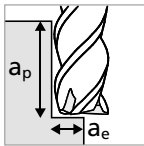
|  | 1.5 mm<br>1/16" |       | 2.0 mm<br>3/32" |       | 3.0 mm<br>1/8" |       | Ød <sub>1</sub><br>4.0 mm<br>5/32" |       | 5.0 mm<br>3/16" - 7/32" |       | 6.0 mm<br>1/4" |       | 8.0 mm |       |
|--|-----------------|-------|-----------------|-------|----------------|-------|------------------------------------|-------|-------------------------|-------|----------------|-------|--------|-------|
|  | $v_c$           | $f_z$ | $v_c$           | $f_z$ | $v_c$          | $f_z$ | $v_c$                              | $f_z$ | $v_c$                   | $f_z$ | $v_c$          | $f_z$ | $v_c$  | $f_z$ |
|  | 200             | 0.020 | 220             | 0.029 | 240            | 0.037 | 260                                | 0.040 | 260                     | 0.040 | 260            | 0.043 | 260    | 0.051 |
|  | 200             | 0.019 | 220             | 0.027 | 240            | 0.035 | 260                                | 0.038 | 260                     | 0.038 | 260            | 0.041 | 260    | 0.049 |
|  | 200             | 0.017 | 220             | 0.026 | 240            | 0.032 | 260                                | 0.034 | 260                     | 0.034 | 260            | 0.036 | 260    | 0.043 |
|  | 200             | 0.020 | 220             | 0.029 | 240            | 0.035 | 260                                | 0.038 | 260                     | 0.038 | 260            | 0.041 | 260    | 0.046 |
|  | 200             | 0.019 | 220             | 0.027 | 240            | 0.035 | 260                                | 0.037 | 260                     | 0.037 | 260            | 0.039 | 260    | 0.045 |
|  | 200             | 0.019 | 220             | 0.027 | 240            | 0.035 | 260                                | 0.037 | 260                     | 0.037 | 260            | 0.039 | 260    | 0.045 |
|  | 200             | 0.014 | 220             | 0.026 | 240            | 0.032 | 260                                | 0.035 | 260                     | 0.035 | 260            | 0.037 | 260    | 0.043 |
|  | 140             | 0.020 | 160             | 0.024 | 180            | 0.034 | 200                                | 0.040 | 200                     | 0.042 | 200            | 0.044 | 200    | 0.052 |
|  | 200             | 0.022 | 220             | 0.031 | 240            | 0.046 | 260                                | 0.048 | 260                     | 0.048 | 260            | 0.051 | 260    | 0.063 |
|  | 200             | 0.022 | 220             | 0.031 | 240            | 0.046 | 260                                | 0.048 | 260                     | 0.048 | 260            | 0.051 | 260    | 0.063 |
|  | 200             | 0.022 | 220             | 0.031 | 240            | 0.046 | 260                                | 0.048 | 260                     | 0.048 | 260            | 0.051 | 260    | 0.063 |
|  | 200             | 0.022 | 220             | 0.031 | 240            | 0.046 | 260                                | 0.048 | 260                     | 0.048 | 260            | 0.051 | 260    | 0.063 |
|  | 200             | 0.022 | 220             | 0.031 | 240            | 0.046 | 260                                | 0.048 | 260                     | 0.048 | 260            | 0.051 | 260    | 0.063 |
|  | 200             | 0.022 | 220             | 0.031 | 240            | 0.046 | 260                                | 0.048 | 260                     | 0.048 | 260            | 0.051 | 260    | 0.063 |
|  | 100             | 0.008 | 100             | 0.009 | 100            | 0.012 | 120                                | 0.016 | 120                     | 0.016 | 120            | 0.017 | 120    | 0.018 |
|  | 120             | 0.017 | 130             | 0.024 | 130            | 0.032 | 150                                | 0.035 | 150                     | 0.035 | 150            | 0.037 | 150    | 0.040 |
|  | 120             | 0.017 | 130             | 0.024 | 130            | 0.032 | 150                                | 0.035 | 150                     | 0.035 | 150            | 0.037 | 150    | 0.040 |
|  | 100             | 0.008 | 100             | 0.009 | 100            | 0.012 | 120                                | 0.016 | 120                     | 0.016 | 120            | 0.017 | 120    | 0.018 |
|  |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |       |
|  |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |       |

**NEW**

## Type A - Side milling - Finishing

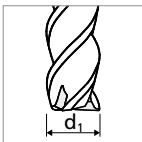
### MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

#### Finishing



$$a_p = 2.5 \times d_1$$

$$a_e = 0.05 - 0.10 \times d_1$$



| Materials group      | Material                                               | Mat. no. | DIN                | AISI/ASTM/UNS           | 1.0 mm |       |
|----------------------|--------------------------------------------------------|----------|--------------------|-------------------------|--------|-------|
|                      |                                                        |          |                    |                         | $v_c$  | $f_z$ |
| <b>P</b>             | Unalloyed carbon steel<br>$R_m < 800 \text{ N/mm}^2$   | 1.0301   | C10                | AISI 1010               | 130    | 0.008 |
|                      |                                                        | 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>$R_m > 900 \text{ N/mm}^2$        | 1.5752   | 15NiCr13           | ASTM 3415 / AISI 3310   | 130    | 0.007 |
|                      |                                                        | 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>$R_m < 1200 \text{ N/mm}^2$ | 1.2379   | X153CrMoV12        | AISI D2                 | 130    | 0.006 |
|                      |                                                        | 1.2436   | X210CrW12          | AISI D4/D6              |        |       |
|                      |                                                        | 1.3343   | HS6-5-2C           | AISI M2 / UNS T11302    |        |       |
|                      |                                                        | 1.3355   | HS18-0-1           | AISI T1 / UNS T12001    |        |       |
|                      |                                                        |          |                    |                         |        |       |
| <b>M</b>             | Stainless steel ferritic                               | 1.4016   | X6Cr17             | AISI 430 / UNS S43000   | 130    | 0.008 |
|                      |                                                        | 1.4105   | X6CrMoS17          | AISI 430F               |        |       |
|                      | Stainless steel martensitic                            | 1.4034   | X46Cr13            | AISI 420C               | 130    | 0.008 |
|                      |                                                        | 1.4112   | X90CrMoV18         | AISI 440B               |        |       |
|                      | Stainless steel martensitic – PH                       | 1.4542   | X5CrNiCuNb16-4     | AISI 630 / ASTM 17-4 PH | 130    | 0.008 |
|                      |                                                        | 1.4545   | X5CrNiCuNb15-5     | ASTM 15-5 PH            |        |       |
|                      | Stainless steel austenitic                             | 1.4301   | X5CrNi18-10        | AISI 304                | 130    | 0.006 |
|                      |                                                        | 1.4435   | X2CrNiMo18-14-3    | AISI 316L               |        |       |
|                      |                                                        | 1.4441   | X2CrNiMo18-15-3    | AISI 316LM              |        |       |
| <b>K</b>             | Cast iron                                              | 0.6020   | GG20               | ASTM 30                 | 110    | 0.006 |
|                      |                                                        | 0.6030   | GG30               | ASTM 40B                |        |       |
|                      |                                                        | 0.7040   | GGG40              | ASTM 60-40-18           |        |       |
|                      |                                                        | 0.7060   | GGG60              | ASTM 80-60-03           |        |       |
|                      |                                                        |          |                    |                         |        |       |
| <b>N</b>             | Aluminium alloy wrought                                | 3.2315   | AlMgSi1            | ASTM 6351               | 130    | 0.009 |
|                      |                                                        | 3.4365   | AlZnMgCu1.5        | ASTM 7075               |        |       |
|                      | Aluminium alloy cast                                   | 3.2163   | GD-AlSi9Cu3        | ASTM A380               | 130    | 0.009 |
|                      |                                                        | 3.2381   | GD-AlSi10Mg        | UNS A03590              |        |       |
|                      | Copper                                                 | 2.0040   | Cu-OF / CW008A     | UNS C10100              | 130    | 0.010 |
|                      |                                                        | 2.0065   | Cu-ETP / CW004A    | UNS C11000              |        |       |
|                      | Brass lead free                                        | 2.0321   | CuZn37 CW508L      | UNS C27400              | 130    | 0.010 |
|                      |                                                        | 2.0360   | CuZn40 CW509L      | UNS C28000              |        |       |
|                      | Brass, Bronze<br>$R_m < 400 \text{ N/mm}^2$            | 2.0401   | CuZn39Pb3 / CW614N | UNS C38500              | 130    | 0.010 |
|                      |                                                        | 2.1020   | CuSn6              | UNS C51900              |        |       |
|                      | Bronze<br>$R_m < 600 \text{ N/mm}^2$                   | 2.0966   | CuAl10Ni5Fe4       | UNS C63000              | 130    | 0.009 |
|                      |                                                        | 2.0960   | CuAl9Mn2           | UNS C63200              |        |       |
| <b>S<sub>1</sub></b> | Super alloys                                           | 2.4856   |                    | Inconel 625             | 110    | 0.004 |
|                      |                                                        | 2.4668   |                    | Inconel 718             |        |       |
|                      |                                                        | 2.4617   | NiMo28             | Hastelloy B-2           |        |       |
|                      |                                                        | 2.4665   | NiCr22Fe18Mo       | Hastelloy X             |        |       |
| <b>S<sub>2</sub></b> | Titanium pure                                          | 3.7035   | Gr.2               | ASTM B348 / F67         | 110    | 0.008 |
|                      |                                                        | 3.7065   | Gr.4               | ASTM B348 / F68         |        |       |
|                      | Titanium alloys                                        | 3.7165   | TiAl6V4            | ASTM B348 / F136        | 110    | 0.008 |
| <b>S<sub>3</sub></b> | CrCo alloys                                            | 9.9367   | TiAl6Nb7           | ASTM F1295              | 110    | 0.004 |
|                      |                                                        | 2.4964   | CoCr20W15Ni        | Haynes 25               |        |       |
| <b>H<sub>1</sub></b> | Hardened steel<br>$< 55 \text{ HRC}$                   |          | CrCoMo28           | ASTM F1537              |        |       |
| <b>H<sub>2</sub></b> | Hardened steel<br>$\geq 55 \text{ HRC}$                | 1.2510   | 100MnCrMoW4        | AISI O1                 |        |       |
|                      |                                                        | 1.2379   | X153CrMoV12        | AISI D2                 |        |       |

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

RECOMMENDATION FOR USE

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

|   |                |                |
|---|----------------|----------------|
| P | N              | S <sub>3</sub> |
| M | S <sub>1</sub> | H <sub>1</sub> |
| K | S <sub>2</sub> | H <sub>2</sub> |

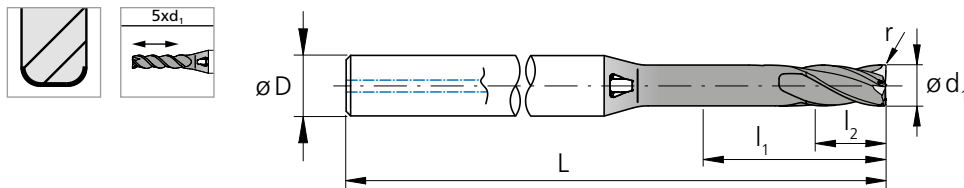
|  | 1.5 mm<br>1/16" |       | 2.0 mm<br>3/32" |       | 3.0 mm<br>1/8" |       | Ød <sub>1</sub><br>4.0 mm<br>5/32" |       | 5.0 mm<br>3/16" - 7/32" |       | 6.0 mm<br>1/4" |       | 8.0 mm |       |
|--|-----------------|-------|-----------------|-------|----------------|-------|------------------------------------|-------|-------------------------|-------|----------------|-------|--------|-------|
|  | $v_c$           | $f_z$ | $v_c$           | $f_z$ | $v_c$          | $f_z$ | $v_c$                              | $f_z$ | $v_c$                   | $f_z$ | $v_c$          | $f_z$ | $v_c$  | $f_z$ |
|  | 180             | 0.012 | 200             | 0.017 | 210            | 0.023 | 220                                | 0.025 | 220                     | 0.028 | 220            | 0.033 | 220    | 0.042 |
|  | 180             | 0.011 | 200             | 0.016 | 210            | 0.022 | 220                                | 0.024 | 220                     | 0.026 | 220            | 0.029 | 220    | 0.038 |
|  | 180             | 0.010 | 200             | 0.015 | 210            | 0.020 | 220                                | 0.021 | 220                     | 0.023 | 220            | 0.025 | 220    | 0.034 |
|  | 180             | 0.012 | 200             | 0.017 | 210            | 0.022 | 220                                | 0.024 | 220                     | 0.026 | 220            | 0.029 | 220    | 0.036 |
|  | 180             | 0.011 | 200             | 0.016 | 210            | 0.022 | 220                                | 0.023 | 220                     | 0.025 | 220            | 0.028 | 220    | 0.037 |
|  | 180             | 0.011 | 200             | 0.016 | 210            | 0.022 | 220                                | 0.023 | 220                     | 0.025 | 220            | 0.028 | 220    | 0.037 |
|  | 180             | 0.008 | 200             | 0.015 | 210            | 0.020 | 220                                | 0.022 | 220                     | 0.024 | 220            | 0.026 | 220    | 0.035 |
|  | 130             | 0.012 | 150             | 0.014 | 160            | 0.022 | 170                                | 0.025 | 170                     | 0.029 | 170            | 0.031 | 200    | 0.040 |
|  | 180             | 0.013 | 200             | 0.018 | 210            | 0.029 | 220                                | 0.030 | 220                     | 0.033 | 220            | 0.036 | 270    | 0.045 |
|  | 180             | 0.013 | 200             | 0.018 | 210            | 0.029 | 220                                | 0.030 | 220                     | 0.033 | 220            | 0.036 | 270    | 0.045 |
|  | 180             | 0.013 | 200             | 0.018 | 210            | 0.029 | 220                                | 0.030 | 220                     | 0.033 | 220            | 0.036 | 270    | 0.045 |
|  | 180             | 0.013 | 200             | 0.018 | 210            | 0.029 | 220                                | 0.030 | 220                     | 0.033 | 220            | 0.036 | 270    | 0.045 |
|  | 180             | 0.013 | 200             | 0.018 | 210            | 0.029 | 220                                | 0.030 | 220                     | 0.033 | 220            | 0.036 | 270    | 0.045 |
|  | 180             | 0.013 | 200             | 0.018 | 210            | 0.029 | 220                                | 0.030 | 220                     | 0.033 | 220            | 0.036 | 270    | 0.045 |
|  | 120             | 0.005 | 130             | 0.005 | 130            | 0.008 | 140                                | 0.010 | 140                     | 0.011 | 150            | 0.012 | 160    | 0.021 |
|  | 120             | 0.010 | 130             | 0.014 | 130            | 0.020 | 140                                | 0.022 | 140                     | 0.024 | 150            | 0.026 | 160    | 0.035 |
|  | 120             | 0.010 | 130             | 0.014 | 130            | 0.020 | 140                                | 0.022 | 140                     | 0.024 | 150            | 0.026 | 160    | 0.035 |
|  | 120             | 0.005 | 130             | 0.005 | 130            | 0.008 | 140                                | 0.010 | 140                     | 0.011 | 150            | 0.012 | 160    | 0.021 |
|  |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |       |
|  |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |       |

**NEW**

## Type C - 5 x d - Corner radius - Z3

### MILLING WITH INTEGRATED COOLING

#### P&S - Corner radius



$l_1$  = Effective length  
 $l_2$  = Cutting length

| $d_1$<br>[mm] | $d_1$<br>[inch] | $l_1$<br>[mm] | $l_2$<br>[mm] | D<br>(h6)<br>[mm] | L<br>[mm] | r<br>[mm] | r<br>[inch] | Item<br>number     | Availability |
|---------------|-----------------|---------------|---------------|-------------------|-----------|-----------|-------------|--------------------|--------------|
| 1.0           |                 | 5.00          | 2.00          | 4                 | 40        | 0.10      |             | 2.CMC42.C2Z3.100.1 | ■            |
| 1.0           |                 | 5.00          | 2.00          | 4                 | 40        | 0.20      |             | 2.CMC42.C3Z3.100.1 | ■            |
| 1.1           |                 | 5.50          | 2.20          | 4                 | 40        | 0.10      |             | 2.CMC42.C2Z3.110.1 | ■            |
| 1.1           |                 | 5.50          | 2.20          | 4                 | 40        | 0.20      |             | 2.CMC42.C3Z3.110.1 | ■            |
| 1.2           |                 | 6.00          | 2.40          | 4                 | 40        | 0.10      |             | 2.CMC42.C2Z3.120.1 | ■            |
| 1.2           |                 | 6.00          | 2.40          | 4                 | 40        | 0.20      |             | 2.CMC42.C3Z3.120.1 | ■            |
| 1.3           |                 | 6.50          | 2.60          | 4                 | 40        | 0.10      |             | 2.CMC42.C2Z3.130.1 | ■            |
| 1.3           |                 | 6.50          | 2.60          | 4                 | 40        | 0.20      |             | 2.CMC42.C3Z3.130.1 | ■            |
| 1.4           |                 | 7.00          | 2.80          | 4                 | 40        | 0.10      |             | 2.CMC42.C2Z3.140.1 | ■            |
| 1.4           |                 | 7.00          | 2.80          | 4                 | 40        | 0.20      |             | 2.CMC42.C3Z3.140.1 | ■            |
| 1.5           |                 | 7.50          | 3.00          | 4                 | 40        | 0.10      |             | 2.CMC42.C2Z3.150.1 | ■            |
| 1.5           |                 | 7.50          | 3.00          | 4                 | 40        | 0.30      |             | 2.CMC42.C3Z3.150.1 | ■            |
| 1.587         | <b>1/16</b>     | 7.94          | 3.17          | 4                 | 45        | 0.127     | .005        | 2.CMC.PSRC2Z3.F116 | ■            |
| 1.587         | <b>1/16</b>     | 7.94          | 3.17          | 4                 | 45        | 0.254     | .010        | 2.CMC.PSRC3Z3.F116 | ■            |
| 1.6           |                 | 8.00          | 3.20          | 4                 | 45        | 0.10      |             | 2.CMC42.C2Z3.160.1 | ■            |
| 1.6           |                 | 8.00          | 3.20          | 4                 | 45        | 0.30      |             | 2.CMC42.C3Z3.160.1 | ■            |
| 1.7           |                 | 8.50          | 3.40          | 4                 | 45        | 0.10      |             | 2.CMC42.C2Z3.170.1 | ■            |
| 1.7           |                 | 8.50          | 3.40          | 4                 | 45        | 0.30      |             | 2.CMC42.C3Z3.170.1 | ■            |
| 1.8           |                 | 9.00          | 3.60          | 4                 | 45        | 0.10      |             | 2.CMC42.C2Z3.180.1 | ■            |
| 1.8           |                 | 9.00          | 3.60          | 4                 | 45        | 0.30      |             | 2.CMC42.C3Z3.180.1 | ■            |
| 1.9           |                 | 9.50          | 3.80          | 4                 | 44        | 0.10      |             | 2.CMC42.C2Z3.190.1 | ■            |
| 1.9           |                 | 9.50          | 3.80          | 4                 | 44        | 0.30      |             | 2.CMC42.C3Z3.190.1 | ■            |
| 2.0           |                 | 10.00         | 4.00          | 4                 | 44        | 0.10      |             | 2.CMC42.C2Z3.200.1 | ■            |
| 2.0           |                 | 10.00         | 4.00          | 4                 | 44        | 0.20      |             | 2.CMC42.C3Z3.200.1 | ■            |
| 2.0           |                 | 10.00         | 4.00          | 4                 | 44        | 0.50      |             | 2.CMC42.C4Z3.200.1 | ■            |
| 2.1           |                 | 10.50         | 4.20          | 4                 | 44        | 0.20      |             | 2.CMC42.C2Z3.210.1 | ■            |
| 2.1           |                 | 10.50         | 4.20          | 4                 | 44        | 0.50      |             | 2.CMC42.C3Z3.210.1 | ■            |
| 2.2           |                 | 11.00         | 4.40          | 4                 | 44        | 0.20      |             | 2.CMC42.C2Z3.220.1 | ■            |
| 2.2           |                 | 11.00         | 4.40          | 4                 | 44        | 0.50      |             | 2.CMC42.C3Z3.220.1 | ■            |
| 2.3           |                 | 11.50         | 4.60          | 4                 | 44        | 0.20      |             | 2.CMC42.C2Z3.230.1 | ■            |
| 2.3           |                 | 11.50         | 4.60          | 4                 | 44        | 0.50      |             | 2.CMC42.C3Z3.230.1 | ■            |
| 2.381         | <b>3/32</b>     | 11.91         | 4.76          | 4                 | 44        | 0.127     | .005        | 2.CMC.PSRC2Z3.F332 | ■            |
| 2.381         | <b>3/32</b>     | 11.91         | 4.76          | 4                 | 44        | 0.254     | .010        | 2.CMC.PSRC3Z3.F332 | ■            |
| 2.381         | <b>3/32</b>     | 11.91         | 4.76          | 4                 | 44        | 0.381     | .015        | 2.CMC.PSRC4Z3.F332 | ■            |
| 2.4           |                 | 12.00         | 4.80          | 4                 | 44        | 0.20      |             | 2.CMC42.C2Z3.240.1 | ■            |
| 2.4           |                 | 12.00         | 4.80          | 4                 | 44        | 0.50      |             | 2.CMC42.C3Z3.240.1 | ■            |
| 2.5           |                 | 12.50         | 5.00          | 6                 | 55        | 0.20      |             | 2.CMC42.C2Z3.250.1 | ■            |
| 2.5           |                 | 12.50         | 5.00          | 6                 | 55        | 0.50      |             | 2.CMC42.C3Z3.250.1 | ■            |
| 2.6           |                 | 13.00         | 5.20          | 6                 | 55        | 0.20      |             | 2.CMC42.C2Z3.260.1 | ■            |
| 2.6           |                 | 13.00         | 5.20          | 6                 | 55        | 0.50      |             | 2.CMC42.C3Z3.260.1 | ■            |
| 2.7           |                 | 13.50         | 5.40          | 6                 | 55        | 0.20      |             | 2.CMC42.C2Z3.270.1 | ■            |
| 2.7           |                 | 13.50         | 5.40          | 6                 | 55        | 0.50      |             | 2.CMC42.C3Z3.270.1 | ■            |

■ Stock item

|         |    |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                |
|---------|----|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|----------------|
| Carbide | Z3 |  |  |  |  |  |  |  |  |                |
|         |    | Ø d <sub>1</sub>                                                                  | 1.0 - 3.0 mm                                                                      |                                                                                   | 3.1 - 6.0 mm                                                                      |                                                                                    | 6.1 - 8.0 mm                                                                        |                                                                                     | r                                                                                   | 0.1 - 1.524 mm |
|         |    | Tolerance                                                                         | - 0.014 mm<br>- 0.028 mm                                                          |                                                                                   | - 0.020 mm<br>- 0.038 mm                                                          |                                                                                    | - 0.025 mm<br>- 0.047 mm                                                            |                                                                                     | Tolerance                                                                           | ± 0.05 · r mm  |

| d <sub>1</sub> | d <sub>1</sub> | l <sub>1</sub> | l <sub>2</sub> | D (h6) | L    | r     | r      | Item number        | Availability |
|----------------|----------------|----------------|----------------|--------|------|-------|--------|--------------------|--------------|
| [mm]           | [inch]         | [mm]           | [mm]           | [mm]   | [mm] | [mm]  | [inch] |                    |              |
| 2.8            |                | 14.00          | 5.60           | 6      | 55   | 0.20  |        | 2.CMC42.C2Z3.280.1 | ■            |
| 2.8            |                | 14.00          | 5.60           | 6      | 55   | 0.50  |        | 2.CMC42.C3Z3.280.1 | ■            |
| 2.9            |                | 14.50          | 5.80           | 6      | 55   | 0.20  |        | 2.CMC42.C2Z3.290.1 | ■            |
| 2.9            |                | 14.50          | 5.80           | 6      | 55   | 0.50  |        | 2.CMC42.C3Z3.290.1 | ■            |
| 3.0            |                | 15.00          | 6.00           | 6      | 55   | 0.20  |        | 2.CMC42.C2Z3.300.1 | ■            |
| 3.0            |                | 15.00          | 6.00           | 6      | 55   | 0.50  |        | 2.CMC42.C3Z3.300.1 | ■            |
| 3.1            |                | 15.50          | 6.20           | 6      | 60   | 0.20  |        | 2.CMC42.C2Z3.310.1 | ■            |
| 3.1            |                | 15.50          | 6.20           | 6      | 60   | 0.50  |        | 2.CMC42.C3Z3.310.1 | ■            |
| 3.175          | 1/8            | 15.88          | 6.35           | 6      | 60   | 0.254 | .010   | 2.CMC.PSRC2Z3.F18  | ■            |
| 3.175          | 1/8            | 15.88          | 6.35           | 6      | 60   | 0.381 | .015   | 2.CMC.PSRC3Z3.F18  | ■            |
| 3.3            |                | 16.50          | 6.60           | 6      | 60   | 0.20  |        | 2.CMC42.C2Z3.330.1 | ■            |
| 3.3            |                | 16.50          | 6.60           | 6      | 60   | 0.50  |        | 2.CMC42.C3Z3.330.1 | ■            |
| 3.7            |                | 18.50          | 7.40           | 6      | 60   | 0.20  |        | 2.CMC42.C2Z3.370.1 | ■            |
| 3.7            |                | 18.50          | 7.40           | 6      | 60   | 0.50  |        | 2.CMC42.C3Z3.370.1 | ■            |
| 3.968          | 5/32           | 19.84          | 7.94           | 6      | 60   | 0.254 | .010   | 2.CMC.PSRC2Z3.F532 | ■            |
| 3.968          | 5/32           | 19.84          | 7.94           | 6      | 60   | 0.381 | .015   | 2.CMC.PSRC3Z3.F532 | ■            |
| 4.0            |                | 20.00          | 8.00           | 6      | 60   | 0.20  |        | 2.CMC42.C2Z3.400.1 | ■            |
| 4.0            |                | 20.00          | 8.00           | 6      | 60   | 0.50  |        | 2.CMC42.C3Z3.400.1 | ■            |
| 4.3            |                | 21.50          | 8.60           | 8      | 70   | 0.20  |        | 2.CMC42.C2Z3.430.1 | ■            |
| 4.3            |                | 21.50          | 8.60           | 8      | 70   | 0.50  |        | 2.CMC42.C3Z3.430.1 | ■            |
| 4.7            |                | 23.50          | 9.40           | 8      | 70   | 0.20  |        | 2.CMC42.C2Z3.470.1 | ■            |
| 4.7            |                | 23.50          | 9.40           | 8      | 70   | 0.50  |        | 2.CMC42.C3Z3.470.1 | ■            |
| 4.762          | 3/16           | 23.81          | 9.52           | 8      | 70   | 0.254 | .010   | 2.CMC.PSRC2Z3.F316 | ■            |
| 4.762          | 3/16           | 23.81          | 9.52           | 8      | 70   | 0.381 | .015   | 2.CMC.PSRC3Z3.F316 | ■            |
| 4.8            |                | 24.00          | 9.60           | 8      | 70   | 0.20  |        | 2.CMC42.C2Z3.480.1 | ■            |
| 4.8            |                | 24.00          | 9.60           | 8      | 70   | 0.50  |        | 2.CMC42.C3Z3.480.1 | ■            |
| 5.0            |                | 25.00          | 10.00          | 8      | 70   | 0.20  |        | 2.CMC42.C2Z3.500.1 | ■            |
| 5.0            |                | 25.00          | 10.00          | 8      | 70   | 0.50  |        | 2.CMC42.C3Z3.500.1 | ■            |
| 5.3            |                | 26.50          | 10.60          | 10     | 70   | 0.20  |        | 2.CMC42.C2Z3.530.1 | ■            |
| 5.3            |                | 26.50          | 10.60          | 10     | 70   | 0.50  |        | 2.CMC42.C3Z3.530.1 | ■            |
| 5.560          | 7/32           | 27.80          | 11.12          | 10     | 70   | 0.381 | .015   | 2.CMC.PSRC2Z3.F732 | ■            |
| 5.560          | 7/32           | 27.80          | 11.12          | 10     | 70   | 0.762 | .030   | 2.CMC.PSRC3Z3.F732 | ■            |
| 5.7            |                | 28.50          | 11.40          | 10     | 70   | 0.20  |        | 2.CMC42.C2Z3.570.1 | ■            |
| 5.7            |                | 28.50          | 11.40          | 10     | 70   | 0.50  |        | 2.CMC42.C3Z3.570.1 | ■            |
| 6.0            |                | 30.00          | 12.00          | 10     | 70   | 0.20  |        | 2.CMC42.C2Z3.600.1 | ■            |
| 6.0            |                | 30.00          | 12.00          | 10     | 70   | 0.50  |        | 2.CMC42.C3Z3.600.1 | ■            |
| 6.0            |                | 30.00          | 12.00          | 10     | 70   | 1.00  |        | 2.CMC42.C4Z3.600.1 | ■            |
| 6.350          | 1/4            | 31.75          | 12.70          | 10     | 70   | 0.381 | .015   | 2.CMC.PSRC2Z3.F14  | ■            |
| 6.350          | 1/4            | 31.75          | 12.70          | 10     | 70   | 0.762 | .030   | 2.CMC.PSRC3Z3.F14  | ■            |
| 6.350          | 1/4            | 31.75          | 12.70          | 10     | 70   | 1.524 | .060   | 2.CMC.PSRC4Z3.F14  | ■            |
| 8.0            |                | 40.00          | 16.00          | 12     | 90   | 0.20  |        | 2.CMC42.C2Z3.800.1 | ■            |
| 8.0            |                | 40.00          | 16.00          | 12     | 90   | 0.50  |        | 2.CMC42.C3Z3.800.1 | ■            |
| 8.0            |                | 40.00          | 16.00          | 12     | 90   | 1.50  |        | 2.CMC42.C4Z3.800.1 | ■            |

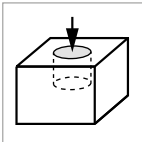
■ Stock item

**NEW**

# Type C - Plunge - Slot milling

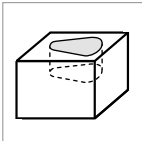
## MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

### Plunge milling



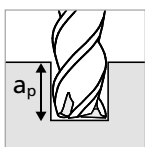
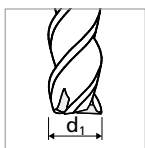
■  $f_{z,p}$ : for plunge milling

### Slot milling



■  $f_{z,p}$ : for plunge milling

■  $f_{z,s}$ : for slot milling



| Materials group      | Material                                               | Mat. no. | DIN                | AISI/ASTM/UNS           | 1.0 mm |           |           |         |
|----------------------|--------------------------------------------------------|----------|--------------------|-------------------------|--------|-----------|-----------|---------|
|                      |                                                        |          |                    |                         | $v_c$  | $f_{z,p}$ | $f_{z,s}$ | $a_p$   |
| <b>P</b>             | Unalloyed carbon steel<br>$R_m < 800 \text{ N/mm}^2$   | 1.0301   | C10                | AISI 1010               | 100    | 0.0013    | 0.0046    | 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>$R_m > 900 \text{ N/mm}^2$        | 1.5752   | 15NiCr13           | ASTM 3415 / AISI 3310   | 100    | 0.0014    | 0.0049    | 0.5xd1  |
|                      |                                                        | 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>$R_m < 1200 \text{ N/mm}^2$ | 1.2379   | X153CrMoV12        | AISI D2                 | 100    | 0.0012    | 0.0042    | 0.25xd1 |
|                      |                                                        | 1.2436   | X210CrW12          | AISI D4/D6              |        |           |           |         |
|                      |                                                        | 1.3343   | HS6-5-2C           | AISI M2 / UNS T11302    |        |           |           |         |
|                      |                                                        | 1.3355   | HS18-0-1           | AISI T1 / UNS T12001    |        |           |           |         |
| <b>M</b>             | Stainless steel ferritic                               | 1.4016   | X6Cr17             | AISI 430 / UNS S43000   | 100    | 0.0010    | 0.0035    | 0.5xd1  |
|                      |                                                        | 1.4105   | X6CrMoS17          | AISI 430F               |        |           |           |         |
|                      | Stainless steel martensitic                            | 1.4034   | X46Cr13            | AISI 420C               | 100    | 0.0010    | 0.0035    | 0.25xd1 |
|                      |                                                        | 1.4112   | X90CrMoV18         | AISI 440B               |        |           |           |         |
|                      | Stainless steel martensitic – PH                       | 1.4542   | X5CrNiCuNb16-4     | AISI 630 / ASTM 17-4 PH | 100    | 0.0010    | 0.0035    | 0.25xd1 |
|                      |                                                        | 1.4545   | X5CrNiCuNb15-5     | ASTM 15-5 PH            |        |           |           |         |
|                      | Stainless steel austenitic                             | 1.4301   | X5CrNi18-10        | AISI 304                | 100    | 0.0010    | 0.0035    | 0.5xd1  |
|                      |                                                        | 1.4435   | X2CrNiMo18-14-3    | AISI 316L               |        |           |           |         |
|                      |                                                        | 1.4441   | X2CrNiMo18-15-3    | AISI 316LM              |        |           |           |         |
| <b>K</b>             | Cast iron                                              | 1.4539   | X1NiCrMoCu25-20-5  | AISI 904L               |        |           |           |         |
|                      |                                                        | 0.6020   | GG20               | ASTM 30                 | 100    | 0.0013    | 0.0042    | 0.5xd1  |
|                      |                                                        | 0.6030   | GG30               | ASTM 40B                |        |           |           |         |
|                      |                                                        | 0.7040   | GGG40              | ASTM 60-40-18           |        |           |           |         |
| <b>N</b>             | Aluminium alloy wrought                                | 0.7060   | GGG60              | ASTM 80-60-03           |        |           |           |         |
|                      |                                                        | 3.2315   | AlMgSi1            | ASTM 6351               | 100    | 0.0012    | 0.0100    | 0.5xd1  |
|                      |                                                        | 3.4365   | AlZnMgCu1.5        | ASTM 7075               |        |           |           |         |
|                      | Aluminium alloy cast                                   | 3.2163   | GD-AlSi9Cu3        | ASTM A380               | 100    | 0.0012    | 0.0100    | 0.5xd1  |
|                      |                                                        | 3.2381   | GD-AlSi10Mg        | UNS A03590              |        |           |           |         |
|                      | Copper                                                 | 2.0040   | Cu-OF / CW008A     | UNS C10100              | 100    | 0.0012    | 0.0100    | 0.5xd1  |
|                      |                                                        | 2.0065   | Cu-ETP / CW004A    | UNS C11000              |        |           |           |         |
|                      | Brass lead free                                        | 2.0321   | CuZn37 CW508L      | UNS C27400              | 100    | 0.0012    | 0.0100    | 0.5xd1  |
|                      |                                                        | 2.0360   | CuZn40 CW509L      | UNS C28000              |        |           |           |         |
|                      | Brass, Bronze<br>$R_m < 400 \text{ N/mm}^2$            | 2.0401   | CuZn39Pb3 / CW614N | UNS C38500              | 100    | 0.0012    | 0.0100    | 0.5xd1  |
|                      |                                                        | 2.1020   | CuSn6              | UNS C51900              |        |           |           |         |
|                      | Bronze<br>$R_m < 600 \text{ N/mm}^2$                   | 2.0966   | CuAl10Ni5Fe4       | UNS C63000              | 100    | 0.0012    | 0.0100    | 0.5xd1  |
|                      |                                                        | 2.0960   | CuAl9Mn2           | UNS C63200              |        |           |           |         |
| <b>S<sub>1</sub></b> | Super alloys                                           | 2.4856   |                    | Inconel 625             | 40     | 0.0010    | 0.0035    | 0.25xd1 |
|                      |                                                        | 2.4668   |                    | Inconel 718             |        |           |           |         |
|                      |                                                        | 2.4617   | NiMo28             | Hastelloy B-2           |        |           |           |         |
|                      |                                                        | 2.4665   | NiCr22Fe18Mo       | Hastelloy X             |        |           |           |         |
| <b>S<sub>2</sub></b> | Titanium pure                                          | 3.7035   | Gr.2               | ASTM B348 / F67         | 80     | 0.0010    | 0.0032    | 0.25xd1 |
|                      |                                                        | 3.7065   | Gr.4               | ASTM B348 / F68         |        |           |           |         |
| <b>S<sub>3</sub></b> | Titanium alloys                                        | 3.7165   | TiAl6V4            | ASTM B348 / F136        | 80     | 0.0010    | 0.0032    | 0.25xd1 |
|                      |                                                        | 9.9367   | TiAl6Nb7           | ASTM F1295              |        |           |           |         |
| <b>H<sub>1</sub></b> | CrCo alloys                                            | 2.4964   | CoCr20W15Ni        | Haynes 25               | 60     | 0.0010    | 0.0035    | 0.25xd1 |
|                      |                                                        |          | CrCoMo28           | ASTM F1537              |        |           |           |         |
| <b>H<sub>2</sub></b> | Hardened steel<br>$< 55 \text{ HRC}$                   | 1.2510   | 100MnCrMoW4        | AISI O1                 |        |           |           |         |
|                      | Hardened steel<br>$\geq 55 \text{ HRC}$                | 1.2379   | X153CrMoV12        | AISI D2                 |        |           |           |         |

**v<sub>c</sub>** [m/min]   **a<sub>p</sub>** [mm]  
**f<sub>z,p</sub>** [mm]   **f<sub>z,s</sub>** [mm]

RECOMMENDATION FOR USE

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

|   |                |                |
|---|----------------|----------------|
| P | N              | S <sub>3</sub> |
| M | S <sub>1</sub> | H <sub>1</sub> |
| K | S <sub>2</sub> | H <sub>2</sub> |

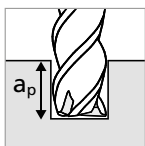
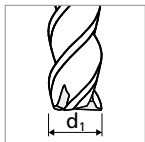
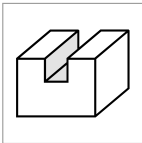
| Ød <sub>1</sub> |                  |                  |                |                 |                  |                  |                |                |                  |                  |                |                 |                  |                  |                |                         |                  |                  |                |                         |                  |                  |                |
|-----------------|------------------|------------------|----------------|-----------------|------------------|------------------|----------------|----------------|------------------|------------------|----------------|-----------------|------------------|------------------|----------------|-------------------------|------------------|------------------|----------------|-------------------------|------------------|------------------|----------------|
| 1.5 mm<br>1/16" |                  |                  |                | 2.0 mm<br>3/32" |                  |                  |                | 3.0 mm<br>1/8" |                  |                  |                | 4.0 mm<br>5/32" |                  |                  |                | 5.0 mm<br>3/16" - 7/32" |                  |                  |                | 6.0 mm - 8.0 mm<br>1/4" |                  |                  |                |
| v <sub>c</sub>  | f <sub>z,p</sub> | f <sub>z,s</sub> | a <sub>p</sub> | v <sub>c</sub>  | f <sub>z,p</sub> | f <sub>z,s</sub> | a <sub>p</sub> | v <sub>c</sub> | f <sub>z,p</sub> | f <sub>z,s</sub> | a <sub>p</sub> | v <sub>c</sub>  | f <sub>z,p</sub> | f <sub>z,s</sub> | a <sub>p</sub> | v <sub>c</sub>          | f <sub>z,p</sub> | f <sub>z,s</sub> | a <sub>p</sub> | v <sub>c</sub>          | f <sub>z,p</sub> | f <sub>z,s</sub> | a <sub>p</sub> |
| 120             | 0.0020           | 0.0065           | 0.5xd1         | 120             | 0.0026           | 0.0091           | 0.5xd1         | 140            | 0.004            | 0.013            | 0.5xd1         | 140             | 0.005            | 0.020            | 0.5xd1         | 150                     | 0.005            | 0.026            | 0.5xd1         | 160                     | 0.006            | 0.033            | 0.5xd1         |
| 120             | 0.0021           | 0.0070           | 0.5xd1         | 120             | 0.0028           | 0.0098           | 0.5xd1         | 140            | 0.004            | 0.014            | 0.5xd1         | 140             | 0.005            | 0.021            | 0.5xd1         | 150                     | 0.006            | 0.027            | 0.5xd1         | 160                     | 0.006            | 0.034            | 0.5xd1         |
| 120             | 0.0018           | 0.0060           | 0.25xd1        | 120             | 0.0024           | 0.0084           | 0.25xd1        | 140            | 0.003            | 0.012            | 0.25xd1        | 140             | 0.004            | 0.017            | 0.25xd1        | 150                     | 0.004            | 0.022            | 0.25xd1        | 160                     | 0.005            | 0.028            | 0.25xd1        |
| 120             | 0.0015           | 0.0050           | 0.5xd1         | 120             | 0.0020           | 0.0070           | 0.5xd1         | 140            | 0.003            | 0.010            | 0.5xd1         | 140             | 0.004            | 0.015            | 0.5xd1         | 150                     | 0.004            | 0.020            | 0.5xd1         | 160                     | 0.005            | 0.025            | 0.5xd1         |
| 120             | 0.0015           | 0.0050           | 0.25xd1        | 120             | 0.0020           | 0.0070           | 0.25xd1        | 140            | 0.003            | 0.010            | 0.25xd1        | 140             | 0.004            | 0.015            | 0.25xd1        | 150                     | 0.004            | 0.020            | 0.25xd1        | 160                     | 0.005            | 0.025            | 0.25xd1        |
| 120             | 0.0015           | 0.0050           | 0.25xd1        | 120             | 0.0020           | 0.0070           | 0.25xd1        | 140            | 0.003            | 0.010            | 0.25xd1        | 140             | 0.004            | 0.015            | 0.25xd1        | 150                     | 0.004            | 0.020            | 0.25xd1        | 160                     | 0.005            | 0.025            | 0.25xd1        |
| 120             | 0.0015           | 0.0050           | 0.5xd1         | 120             | 0.0020           | 0.0070           | 0.5xd1         | 140            | 0.003            | 0.010            | 0.5xd1         | 140             | 0.004            | 0.015            | 0.5xd1         | 150                     | 0.004            | 0.020            | 0.5xd1         | 160                     | 0.005            | 0.020            | 0.5xd1         |
| 120             | 0.0019           | 0.0060           | 0.5xd1         | 120             | 0.0024           | 0.0084           | 0.5xd1         | 140            | 0.004            | 0.012            | 0.5xd1         | 140             | 0.004            | 0.017            | 0.5xd1         | 150                     | 0.005            | 0.022            | 0.5xd1         | 160                     | 0.005            | 0.028            | 0.5xd1         |
| 120             | 0.0018           | 0.0160           | 0.5xd1         | 120             | 0.0024           | 0.0210           | 0.5xd1         | 150            | 0.004            | 0.034            | 0.5xd1         | 160             | 0.004            | 0.035            | 0.5xd1         | 170                     | 0.005            | 0.036            | 0.5xd1         | 180                     | 0.005            | 0.037            | 0.5xd1         |
| 120             | 0.0018           | 0.0160           | 0.5xd1         | 120             | 0.0024           | 0.0210           | 0.5xd1         | 150            | 0.004            | 0.034            | 0.5xd1         | 160             | 0.004            | 0.035            | 0.5xd1         | 170                     | 0.005            | 0.036            | 0.5xd1         | 180                     | 0.005            | 0.037            | 0.5xd1         |
| 120             | 0.0018           | 0.0160           | 0.5xd1         | 120             | 0.0024           | 0.0210           | 0.5xd1         | 150            | 0.004            | 0.034            | 0.5xd1         | 160             | 0.004            | 0.035            | 0.5xd1         | 170                     | 0.005            | 0.036            | 0.5xd1         | 180                     | 0.005            | 0.037            | 0.5xd1         |
| 120             | 0.0018           | 0.0160           | 0.5xd1         | 120             | 0.0024           | 0.0210           | 0.5xd1         | 150            | 0.004            | 0.034            | 0.5xd1         | 160             | 0.004            | 0.035            | 0.5xd1         | 170                     | 0.005            | 0.036            | 0.5xd1         | 180                     | 0.005            | 0.037            | 0.5xd1         |
| 120             | 0.0018           | 0.0160           | 0.5xd1         | 120             | 0.0024           | 0.0210           | 0.5xd1         | 150            | 0.004            | 0.034            | 0.5xd1         | 160             | 0.004            | 0.035            | 0.5xd1         | 170                     | 0.005            | 0.036            | 0.5xd1         | 180                     | 0.005            | 0.037            | 0.5xd1         |
| 40              | 0.0015           | 0.0050           | 0.25xd1        | 50              | 0.0020           | 0.0070           | 0.25xd1        | 50             | 0.003            | 0.010            | 0.25xd1        | 60              | 0.004            | 0.014            | 0.25xd1        | 80                      | 0.004            | 0.018            | 0.25xd1        | 80                      | 0.005            | 0.021            | 0.25xd1        |
| 90              | 0.0014           | 0.0045           | 0.25xd1        | 100             | 0.0018           | 0.0063           | 0.25xd1        | 110            | 0.003            | 0.010            | 0.25xd1        | 120             | 0.004            | 0.013            | 0.25xd1        | 120                     | 0.004            | 0.016            | 0.25xd1        | 120                     | 0.005            | 0.019            | 0.25xd1        |
| 90              | 0.0014           | 0.0045           | 0.25xd1        | 100             | 0.0018           | 0.0063           | 0.25xd1        | 110            | 0.003            | 0.010            | 0.25xd1        | 120             | 0.004            | 0.013            | 0.25xd1        | 120                     | 0.004            | 0.016            | 0.25xd1        | 120                     | 0.005            | 0.019            | 0.25xd1        |
| 60              | 0.0015           | 0.0050           | 0.25xd1        | 80              | 0.0020           | 0.0070           | 0.25xd1        | 80             | 0.003            | 0.010            | 0.25xd1        | 100             | 0.004            | 0.014            | 0.25xd1        | 100                     | 0.004            | 0.018            | 0.25xd1        | 120                     | 0.005            | 0.021            | 0.25xd1        |
|                 |                  |                  |                |                 |                  |                  |                |                |                  |                  |                |                 |                  |                  |                |                         |                  |                  |                |                         |                  |                  |                |
|                 |                  |                  |                |                 |                  |                  |                |                |                  |                  |                |                 |                  |                  |                |                         |                  |                  |                |                         |                  |                  |                |

**NEW**

## Type C - Milling of through slots

### MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

Through slot  
milling



| Materials group                                  | Material                                                           | Mat. no.          | DIN                  | AISI/ASTM/UNS           | 1.0 mm         |                |                |  |
|--------------------------------------------------|--------------------------------------------------------------------|-------------------|----------------------|-------------------------|----------------|----------------|----------------|--|
|                                                  |                                                                    |                   |                      |                         | v <sub>c</sub> | f <sub>z</sub> | a <sub>p</sub> |  |
| P                                                | Unalloyed carbon steel<br>R <sub>m</sub> < 800 N/mm <sup>2</sup>   | 1.0301            | C10                  | AISI 1010               | 120            | 0.009          | 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>R <sub>m</sub> > 900 N/mm <sup>2</sup>        | 1.5752            | 15NiCr13             | ASTM 3415 / AISI 3310   | 120            | 0.008          | 0.5xd1         |  |
|                                                  |                                                                    | 1.7131            | 16MnCr5              | AISI 5115               |                |                |                |  |
|                                                  |                                                                    | 1.3505            | 100Cr6               | AISI 52100              |                |                |                |  |
|                                                  |                                                                    | 1.7225            | 42CrMo4              | AISI 4140               |                |                |                |  |
|                                                  | High alloyed tool steel<br>R <sub>m</sub> < 1200 N/mm <sup>2</sup> | 1.2842            | 90MnCrV8             | AISI O2                 | 120            | 0.006          | 0.25xd1        |  |
|                                                  |                                                                    | 1.2379            | X153CrMoV12          | AISI D2                 |                |                |                |  |
|                                                  |                                                                    | 1.2436            | X210CrW12            | AISI D4/D6              |                |                |                |  |
|                                                  |                                                                    | 1.3343            | H56-5-2C             | AISI M2 / UNS T11302    |                |                |                |  |
|                                                  | 1.3355                                                             | H518-0-1          | AISI T1 / UNS T12001 |                         |                |                |                |  |
| M                                                | Stainless steel ferritic                                           | 1.4016            | X6Cr17               | AISI 430 / UNS S43000   | 120            | 0.009          | 0.5xd1         |  |
|                                                  |                                                                    | 1.4105            | X6CrMoS17            | AISI 430F               |                |                |                |  |
|                                                  | Stainless steel martensitic                                        | 1.4034            | X46Cr13              | AISI 420C               | 120            | 0.009          | 0.5xd1         |  |
|                                                  |                                                                    | 1.4112            | X90CrMoV18           | AISI 440B               |                |                |                |  |
|                                                  | Stainless steel martensitic – PH                                   | 1.4542            | X5CrNiCuNb16-4       | AISI 630 / ASTM 17-4 PH | 120            | 0.009          | 0.5xd1         |  |
|                                                  |                                                                    | 1.4545            | X5CrNiCuNb15-5       | ASTM 15-5 PH            |                |                |                |  |
|                                                  | Stainless steel austenitic                                         | 1.4301            | X5CrNi18-10          | AISI 304                | 120            | 0.007          | 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         |  |
|                                                  |                                                                    | 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         |  |
|                                                  |                                                                    | 3.4365            | AlZnMgCu1.5          | ASTM 7075               |                |                |                |  |
|                                                  | Aluminium alloy cast                                               | 3.2163            | GD-AlSi9Cu3          | ASTM A380               | 170            | 0.010          | 0.5xd1         |  |
|                                                  |                                                                    | 3.2381            | GD-AlSi10Mg          | UNS A03590              |                |                |                |  |
|                                                  | Copper                                                             | 2.0040            | Cu-OF / CW008A       | UNS C10100              | 170            | 0.012          | 0.5xd1         |  |
|                                                  |                                                                    | 2.0065            | Cu-ETP / CW004A      | UNS C11000              |                |                |                |  |
|                                                  | Brass lead free                                                    | 2.0321            | CuZn37 CW508L        | UNS C27400              | 170            | 0.012          | 0.5xd1         |  |
|                                                  |                                                                    | 2.0360            | CuZn40 CW509L        | UNS C28000              |                |                |                |  |
|                                                  | Brass, Bronze<br>R <sub>m</sub> < 400 N/mm <sup>2</sup>            | 2.0401            | CuZn39Pb3 / CW614N   | UNS C38500              | 170            | 0.012          | 0.5xd1         |  |
|                                                  |                                                                    | 2.1020            | CuSn6                | UNS C51900              |                |                |                |  |
| Bronze<br>R <sub>m</sub> < 600 N/mm <sup>2</sup> |                                                                    | 2.0966            | CuAl10Ni5Fe4         | UNS C63000              |                |                |                |  |
|                                                  | 2.0960                                                             | CuAl9Mn2          | UNS C63200           |                         |                |                |                |  |
| S <sub>1</sub>                                   | Super alloys                                                       | 2.4856            |                      | Inconel 625             | 80             | 0.005          | 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        |  |
|                                                  |                                                                    | 3.7065            | Gr.4                 | ASTM B348 / F68         |                |                |                |  |
|                                                  | Titanium alloys                                                    | 3.7165            | TiAl6V4              | ASTM B348 / F136        | 80             | 0.009          | 0.25xd1        |  |
| S <sub>3</sub>                                   | CrCo alloys                                                        | 9.9367            | TiAl6Nb7             | ASTM F1295              |                |                |                |  |
|                                                  |                                                                    | 2.4964            | CoCr20W15Ni          | Haynes 25               | 80             | 0.005          | 0.25xd1        |  |
|                                                  |                                                                    | CrCoMo28          | ASTM F1537           |                         |                |                |                |  |
| H <sub>1</sub>                                   | Hardened steel<br>< 55 HRC                                         | 1.2510            | 100MnCrMoW4          | AISI O1                 |                |                |                |  |
| H <sub>2</sub>                                   | Hardened steel<br>≥ 55 HRC                                         | 1.2379            | X153CrMoV12          | AISI D2                 |                |                |                |  |

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

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

|   |                |                |
|---|----------------|----------------|
| P | N              | S <sub>3</sub> |
| M | S <sub>1</sub> | H <sub>1</sub> |
| K | S <sub>2</sub> | H <sub>2</sub> |

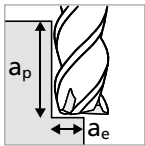
|  | 1.5 mm<br>1/16" |       |         | 2.0 mm<br>3/32" |       |         | 3.0 mm<br>1/8" |       |         | 4.0 mm<br>5/32" |       |         | 5.0 mm<br>3/16" - 7/32" |       |         | 6.0 mm - 8.0 mm<br>1/4" |       |         |
|--|-----------------|-------|---------|-----------------|-------|---------|----------------|-------|---------|-----------------|-------|---------|-------------------------|-------|---------|-------------------------|-------|---------|
|  | $v_c$           | $f_z$ | $a_p$   | $v_c$           | $f_z$ | $a_p$   | $v_c$          | $f_z$ | $a_p$   | $v_c$           | $f_z$ | $a_p$   | $v_c$                   | $f_z$ | $a_p$   | $v_c$                   | $f_z$ | $a_p$   |
|  | 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  |
|  | 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  |
|  | 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 |
|  | 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  |
|  | 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  |
|  | 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  |
|  | 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  |
|  | 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  |
|  | 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  |
|  | 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  |
|  | 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  |
|  | 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  |
|  | 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  |
|  | 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  |
|  | 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 |
|  | 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 |
|  | 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 |
|  | 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 |
|  |                 |       |         |                 |       |         |                |       |         |                 |       |         |                         |       |         |                         |       |         |
|  |                 |       |         |                 |       |         |                |       |         |                 |       |         |                         |       |         |                         |       |         |

**NEW**

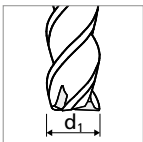
## Type C - Side milling - Semi-finishing

### MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

#### Semi-finishing



$$\begin{aligned} \blacksquare a_p &= 1 \times d_1 - 2 \times d_i \\ \blacksquare a_e &= 0.1 \times d_1 \end{aligned}$$



| Materials group      | Material                                               | Mat. no. | DIN                | AISI/ASTM/UNS           | 1.0 mm |       |
|----------------------|--------------------------------------------------------|----------|--------------------|-------------------------|--------|-------|
|                      |                                                        |          |                    |                         | $v_c$  | $f_z$ |
| <b>P</b>             | Unalloyed carbon steel<br>$R_m < 800 \text{ N/mm}^2$   | 1.0301   | C10                | AISI 1010               | 120    | 0.017 |
|                      |                                                        | 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>$R_m > 900 \text{ N/mm}^2$        | 1.5752   | 15NiCr13           | ASTM 3415 / AISI 3310   | 120    | 0.016 |
|                      |                                                        | 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>$R_m < 1200 \text{ N/mm}^2$ | 1.2379   | X153CrMoV12        | AISI D2                 | 120    | 0.012 |
|                      |                                                        | 1.2436   | X210CrW12          | AISI D4/D6              |        |       |
|                      |                                                        | 1.3343   | HS6-5-2C           | AISI M2 / UNS T11302    |        |       |
|                      |                                                        | 1.3355   | HS18-0-1           | AISI T1 / UNS T12001    |        |       |
|                      |                                                        |          |                    |                         |        |       |
| <b>M</b>             | Stainless steel ferritic                               | 1.4016   | X6Cr17             | AISI 430 / UNS S43000   | 120    | 0.018 |
|                      |                                                        | 1.4105   | X6CrMoS17          | AISI 430F               |        |       |
|                      | Stainless steel martensitic                            | 1.4034   | X46Cr13            | AISI 420C               | 120    | 0.017 |
|                      |                                                        | 1.4112   | X90CrMoV18         | AISI 440B               |        |       |
|                      | Stainless steel martensitic – PH                       | 1.4542   | X5CrNiCuNb16-4     | AISI 630 / ASTM 17-4 PH | 120    | 0.017 |
|                      |                                                        | 1.4545   | X5CrNiCuNb15-5     | ASTM 15-5 PH            |        |       |
|                      | Stainless steel austenitic                             | 1.4301   | X5CrNi18-10        | AISI 304                | 120    | 0.013 |
|                      |                                                        | 1.4435   | X2CrNiMo18-14-3    | AISI 316L               |        |       |
|                      |                                                        | 1.4441   | X2CrNiMo18-15-3    | AISI 316LM              |        |       |
| <b>K</b>             | Cast iron                                              | 0.6020   | GG20               | ASTM 30                 | 100    | 0.012 |
|                      |                                                        | 0.6030   | GG30               | ASTM 40B                |        |       |
|                      |                                                        | 0.7040   | GGG40              | ASTM 60-40-18           |        |       |
|                      |                                                        | 0.7060   | GGG60              | ASTM 80-60-03           |        |       |
|                      |                                                        |          |                    |                         |        |       |
| <b>N</b>             | Aluminium alloy wrought                                | 3.2315   | AlMgSi1            | ASTM 6351               | 170    | 0.020 |
|                      |                                                        | 3.4365   | AlZnMgCu1.5        | ASTM 7075               |        |       |
|                      | Aluminium alloy cast                                   | 3.2163   | GD-AlSi9Cu3        | ASTM A380               | 170    | 0.020 |
|                      |                                                        | 3.2381   | GD-AlSi10Mg        | UNS A03590              |        |       |
|                      | Copper                                                 | 2.0040   | Cu-OF / CW008A     | UNS C10100              | 170    | 0.022 |
|                      |                                                        | 2.0065   | Cu-ETP / CW004A    | UNS C11000              |        |       |
|                      | Brass lead free                                        | 2.0321   | CuZn37 CW508L      | UNS C27400              | 170    | 0.022 |
|                      |                                                        | 2.0360   | CuZn40 CW509L      | UNS C28000              |        |       |
|                      | Brass, Bronze<br>$R_m < 400 \text{ N/mm}^2$            | 2.0401   | CuZn39Pb3 / CW614N | UNS C38500              | 170    | 0.022 |
|                      |                                                        | 2.1020   | CuSn6              | UNS C51900              |        |       |
|                      | Bronze<br>$R_m < 600 \text{ N/mm}^2$                   | 2.0966   | CuAl10Ni5Fe4       | UNS C63000              | 170    | 0.020 |
|                      |                                                        | 2.0960   | CuAl9Mn2           | UNS C63200              |        |       |
| <b>S<sub>1</sub></b> | Super alloys                                           | 2.4856   |                    | Inconel 625             | 100    | 0.008 |
|                      |                                                        | 2.4668   |                    | Inconel 718             |        |       |
|                      |                                                        | 2.4617   | NiMo28             | Hastelloy B-2           |        |       |
|                      |                                                        | 2.4665   | NiCr22Fe18Mo       | Hastelloy X             |        |       |
|                      |                                                        |          |                    |                         |        |       |
| <b>S<sub>2</sub></b> | Titanium pure                                          | 3.7035   | Gr.2               | ASTM B348 / F67         | 100    | 0.018 |
|                      |                                                        | 3.7065   | Gr.4               | ASTM B348 / F68         |        |       |
|                      | Titanium alloys                                        | 3.7165   | TiAl6V4            | ASTM B348 / F136        | 100    | 0.018 |
|                      |                                                        | 9.9367   | TiAl6Nb7           | ASTM F1295              |        |       |
| <b>S<sub>3</sub></b> | CrCo alloys                                            | 2.4964   | CoCr20W15Ni        | Haynes 25               | 100    | 0.008 |
|                      |                                                        |          | CrCoMo28           | ASTM F1537              |        |       |
| <b>H<sub>1</sub></b> | Hardened steel<br>$< 55 \text{ HRC}$                   | 1.2510   | 100MnCrMoW4        | AISI O1                 |        |       |
| <b>H<sub>2</sub></b> | Hardened steel<br>$\geq 55 \text{ HRC}$                | 1.2379   | X153CrMoV12        | AISI D2                 |        |       |

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

RECOMMENDATION FOR USE

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



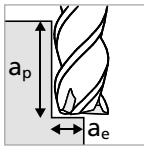
|  | 1.5 mm<br>1/16" |       | 2.0 mm<br>3/32" |       | 3.0 mm<br>1/8" |       | Ød <sub>1</sub><br>4.0 mm<br>5/32" |       | 5.0 mm<br>3/16" - 7/32" |       | 6.0 mm<br>1/4" |       | 8.0 mm |       |
|--|-----------------|-------|-----------------|-------|----------------|-------|------------------------------------|-------|-------------------------|-------|----------------|-------|--------|-------|
|  | $v_c$           | $f_z$ | $v_c$           | $f_z$ | $v_c$          | $f_z$ | $v_c$                              | $f_z$ | $v_c$                   | $f_z$ | $v_c$          | $f_z$ | $v_c$  | $f_z$ |
|  | 140             | 0.026 | 160             | 0.038 | 180            | 0.048 | 200                                | 0.050 | 200                     | 0.052 | 220            | 0.056 | 220    | 0.068 |
|  | 140             | 0.025 | 160             | 0.036 | 180            | 0.044 | 200                                | 0.048 | 200                     | 0.050 | 220            | 0.054 | 220    | 0.066 |
|  | 140             | 0.022 | 160             | 0.035 | 180            | 0.042 | 200                                | 0.043 | 200                     | 0.045 | 220            | 0.048 | 220    | 0.058 |
|  | 140             | 0.026 | 160             | 0.038 | 180            | 0.046 | 200                                | 0.048 | 200                     | 0.050 | 220            | 0.055 | 220    | 0.062 |
|  | 140             | 0.025 | 160             | 0.036 | 180            | 0.044 | 200                                | 0.046 | 200                     | 0.048 | 220            | 0.052 | 220    | 0.060 |
|  | 140             | 0.025 | 160             | 0.036 | 180            | 0.044 | 200                                | 0.046 | 200                     | 0.048 | 220            | 0.052 | 220    | 0.060 |
|  | 140             | 0.016 | 160             | 0.034 | 180            | 0.042 | 200                                | 0.044 | 200                     | 0.046 | 220            | 0.049 | 220    | 0.058 |
|  | 120             | 0.026 | 140             | 0.032 | 160            | 0.043 | 180                                | 0.054 | 180                     | 0.056 | 200            | 0.058 | 200    | 0.070 |
|  | 190             | 0.029 | 210             | 0.040 | 230            | 0.060 | 250                                | 0.062 | 250                     | 0.064 | 270            | 0.068 | 270    | 0.084 |
|  | 190             | 0.029 | 210             | 0.040 | 230            | 0.060 | 250                                | 0.062 | 250                     | 0.064 | 270            | 0.068 | 270    | 0.084 |
|  | 190             | 0.029 | 210             | 0.040 | 230            | 0.060 | 250                                | 0.062 | 250                     | 0.064 | 270            | 0.068 | 270    | 0.084 |
|  | 190             | 0.029 | 210             | 0.040 | 230            | 0.060 | 250                                | 0.062 | 250                     | 0.064 | 270            | 0.068 | 270    | 0.084 |
|  | 190             | 0.029 | 210             | 0.040 | 230            | 0.060 | 250                                | 0.062 | 250                     | 0.064 | 270            | 0.068 | 270    | 0.084 |
|  | 190             | 0.029 | 210             | 0.040 | 230            | 0.060 | 250                                | 0.062 | 250                     | 0.064 | 270            | 0.068 | 270    | 0.084 |
|  | 100             | 0.010 | 120             | 0.012 | 120            | 0.016 | 140                                | 0.018 | 140                     | 0.020 | 160            | 0.022 | 160    | 0.024 |
|  | 100             | 0.022 | 120             | 0.032 | 120            | 0.042 | 140                                | 0.044 | 140                     | 0.046 | 160            | 0.048 | 160    | 0.054 |
|  | 100             | 0.022 | 120             | 0.032 | 120            | 0.042 | 140                                | 0.044 | 140                     | 0.046 | 160            | 0.048 | 160    | 0.054 |
|  | 100             | 0.010 | 120             | 0.012 | 120            | 0.016 | 140                                | 0.018 | 140                     | 0.020 | 160            | 0.022 | 160    | 0.024 |
|  |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |       |
|  |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |       |

**NEW**

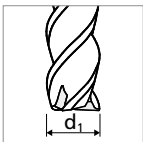
## Type C - Side milling - Finishing

### MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

#### Finishing



- $a_p = 2 \times d_1$
- $a_e = 0.02 - 0.05 \times d_1$



| Materials group | Material                                               | Mat. no. | DIN                | AISI/ASTM/UNS           | 1.0 mm |       |
|-----------------|--------------------------------------------------------|----------|--------------------|-------------------------|--------|-------|
|                 |                                                        |          |                    |                         | $v_c$  | $f_z$ |
| P               | Unalloyed carbon steel<br>$R_m < 800 \text{ N/mm}^2$   | 1.0301   | C10                | AISI 1010               | 130    | 0.008 |
|                 |                                                        | 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>$R_m > 900 \text{ N/mm}^2$        | 1.5752   | 15NiCr13           | ASTM 3415 / AISI 3310   | 130    | 0.007 |
|                 |                                                        | 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>$R_m < 1200 \text{ N/mm}^2$ | 1.2379   | X153CrMoV12        | AISI D2                 | 130    | 0.006 |
|                 |                                                        | 1.2436   | X210CrW12          | AISI D4/D6              |        |       |
|                 |                                                        | 1.3343   | HS6-5-2C           | AISI M2 / UNS T11302    |        |       |
|                 |                                                        | 1.3355   | HS18-0-1           | AISI T1 / UNS T12001    |        |       |
| M               | Stainless steel ferritic                               | 1.4016   | X6Cr17             | AISI 430 / UNS S43000   | 130    | 0.008 |
|                 |                                                        | 1.4105   | X6CrMoS17          | AISI 430F               |        |       |
|                 | Stainless steel martensitic                            | 1.4034   | X46Cr13            | AISI 420C               | 130    | 0.008 |
|                 |                                                        | 1.4112   | X90CrMoV18         | AISI 440B               |        |       |
|                 | Stainless steel martensitic – PH                       | 1.4542   | X5CrNiCuNb16-4     | AISI 630 / ASTM 17-4 PH | 130    | 0.008 |
|                 |                                                        | 1.4545   | X5CrNiCuNb15-5     | ASTM 15-5 PH            |        |       |
|                 | Stainless steel austenitic                             | 1.4301   | X5CrNi18-10        | AISI 304                | 130    | 0.006 |
|                 |                                                        | 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 |
|                 |                                                        | 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 |
|                 |                                                        | 3.4365   | AlZnMgCu1.5        | ASTM 7075               |        |       |
|                 | Aluminium alloy cast                                   | 3.2163   | GD-AlSi9Cu3        | ASTM A380               | 130    | 0.009 |
|                 |                                                        | 3.2381   | GD-AlSi10Mg        | UNS A03590              |        |       |
|                 | Copper                                                 | 2.0040   | Cu-OF / CW008A     | UNS C10100              | 130    | 0.010 |
|                 |                                                        | 2.0065   | Cu-ETP / CW004A    | UNS C11000              |        |       |
|                 | Brass lead free                                        | 2.0321   | CuZn37 CW508L      | UNS C27400              | 130    | 0.010 |
|                 |                                                        | 2.0360   | CuZn40 CW509L      | UNS C28000              |        |       |
|                 | Brass, Bronze<br>$R_m < 400 \text{ N/mm}^2$            | 2.0401   | CuZn39Pb3 / CW614N | UNS C38500              | 130    | 0.010 |
|                 |                                                        | 2.1020   | CuSn6              | UNS C51900              |        |       |
|                 | Bronze<br>$R_m < 600 \text{ N/mm}^2$                   | 2.0966   | CuAl10Ni5Fe4       | UNS C63000              | 130    | 0.009 |
|                 |                                                        | 2.0960   | CuAl9Mn2           | UNS C63200              |        |       |
| S <sub>1</sub>  | Super alloys                                           | 2.4856   |                    | Inconel 625             | 110    | 0.004 |
|                 |                                                        | 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 |
|                 |                                                        | 3.7065   | Gr.4               | ASTM B348 / F68         |        |       |
|                 | Titanium alloys                                        | 3.7165   | TiAl6V4            | ASTM B348 / F136        | 110    | 0.008 |
|                 |                                                        | 9.9367   | TiAl6Nb7           | ASTM F1295              |        |       |
| S <sub>3</sub>  | CrCo alloys                                            | 2.4964   | CoCr20W15Ni        | Haynes 25               | 110    | 0.004 |
|                 |                                                        |          | CrCoMo28           | ASTM F1537              |        |       |
| H <sub>1</sub>  | Hardened steel<br>$< 55 \text{ HRC}$                   | 1.2510   | 100MnCrMoW4        | AISI O1                 |        |       |
| H <sub>2</sub>  | Hardened steel<br>$\geq 55 \text{ HRC}$                | 1.2379   | X153CrMoV12        | AISI D2                 |        |       |

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

RECOMMENDATION FOR USE

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



|  | 1.5 mm<br>1/16" |       | 2.0 mm<br>3/32" |       | 3.0 mm<br>1/8" |       | Ød <sub>t</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 |       |
|--|-----------------|-------|-----------------|-------|----------------|-------|------------------------------------|-------|-------------------------|-------|----------------|-------|--------|-------|
|  | $v_c$           | $f_z$ | $v_c$           | $f_z$ | $v_c$          | $f_z$ | $v_c$                              | $f_z$ | $v_c$                   | $f_z$ | $v_c$          | $f_z$ | $v_c$  | $f_z$ |
|  | 180             | 0.012 | 200             | 0.017 | 210            | 0.023 | 220                                | 0.025 | 220                     | 0.028 | 220            | 0.033 | 220    | 0.042 |
|  | 180             | 0.011 | 200             | 0.016 | 210            | 0.022 | 220                                | 0.024 | 220                     | 0.026 | 220            | 0.029 | 220    | 0.038 |
|  | 180             | 0.010 | 200             | 0.015 | 210            | 0.020 | 220                                | 0.021 | 220                     | 0.023 | 220            | 0.025 | 220    | 0.034 |
|  | 180             | 0.012 | 200             | 0.017 | 210            | 0.022 | 220                                | 0.024 | 220                     | 0.026 | 220            | 0.029 | 220    | 0.036 |
|  | 180             | 0.011 | 200             | 0.016 | 210            | 0.022 | 220                                | 0.023 | 220                     | 0.025 | 220            | 0.028 | 220    | 0.037 |
|  | 180             | 0.011 | 200             | 0.016 | 210            | 0.022 | 220                                | 0.023 | 220                     | 0.025 | 220            | 0.028 | 220    | 0.037 |
|  | 180             | 0.008 | 200             | 0.015 | 210            | 0.020 | 220                                | 0.022 | 220                     | 0.024 | 220            | 0.026 | 220    | 0.035 |
|  | 130             | 0.012 | 150             | 0.014 | 160            | 0.022 | 170                                | 0.025 | 170                     | 0.029 | 170            | 0.031 | 200    | 0.040 |
|  | 180             | 0.013 | 200             | 0.018 | 210            | 0.029 | 220                                | 0.030 | 220                     | 0.033 | 220            | 0.036 | 220    | 0.045 |
|  | 180             | 0.013 | 200             | 0.018 | 210            | 0.029 | 220                                | 0.030 | 220                     | 0.033 | 220            | 0.036 | 220    | 0.045 |
|  | 180             | 0.013 | 200             | 0.018 | 210            | 0.029 | 220                                | 0.030 | 220                     | 0.033 | 220            | 0.036 | 220    | 0.045 |
|  | 180             | 0.013 | 200             | 0.018 | 210            | 0.029 | 220                                | 0.030 | 220                     | 0.033 | 220            | 0.036 | 220    | 0.045 |
|  | 180             | 0.013 | 200             | 0.018 | 210            | 0.029 | 220                                | 0.030 | 220                     | 0.033 | 220            | 0.036 | 220    | 0.045 |
|  | 180             | 0.013 | 200             | 0.018 | 210            | 0.029 | 220                                | 0.030 | 220                     | 0.033 | 220            | 0.036 | 220    | 0.045 |
|  | 120             | 0.005 | 130             | 0.005 | 130            | 0.008 | 140                                | 0.010 | 140                     | 0.011 | 150            | 0.012 | 150    | 0.021 |
|  | 120             | 0.010 | 130             | 0.014 | 130            | 0.020 | 140                                | 0.022 | 140                     | 0.024 | 150            | 0.026 | 150    | 0.035 |
|  | 120             | 0.010 | 130             | 0.014 | 130            | 0.020 | 140                                | 0.022 | 140                     | 0.024 | 150            | 0.026 | 150    | 0.035 |
|  | 120             | 0.005 | 130             | 0.005 | 130            | 0.008 | 140                                | 0.010 | 140                     | 0.011 | 150            | 0.012 | 150    | 0.021 |
|  |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |       |
|  |                 |       |                 |       |                |       |                                    |       |                         |       |                |       |        |       |

**NEW**

## Process

### 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.

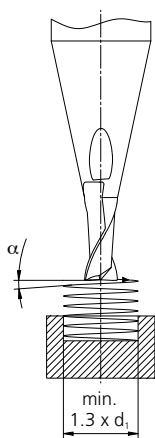
**Coolant pressure:** at least 15 bar coolant pressure is required to achieve reliable milling. High pressure is generally better for the cooling and flushing effect.

| 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.

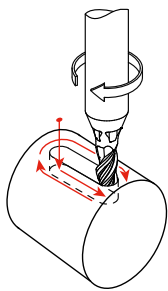
#### Maximum plunge angles in linear ramp or helical interpolation



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

## Milling process

### A. Milling of keyways - only for type A

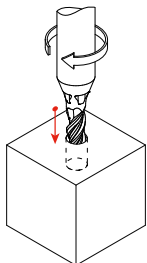


Mikron Tool recommends a machining process in 3 steps to guarantee the tolerance of the slot:

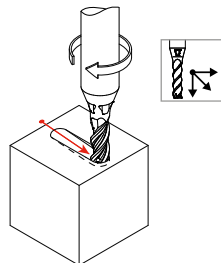
- 1. Plunge milling or plunging with a linear ramp
- 2. Slot milling
- 3. Side milling (finishing milling)

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

#### 1. Plunge milling or Linear ramp

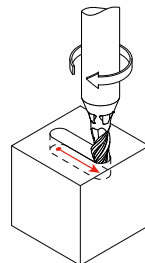


When plunge milling, an increase of the drilling diameter of approx. 0.05 mm respect to the tool diameter needs to be calculated. The maximum milling depth is  $2.5 \times d_1$  ( $a_{p,max} = 1 \times d_1$ ). For data regarding feed  $f_{z,p}$  refer to cutting data for plunge milling (page 16).



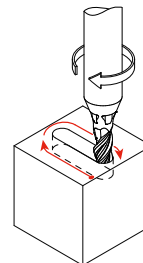
The maximum plunge angle  $\alpha$  depends on the material and cannot be overcut (see table on the left). For data regarding feed  $f_{z,s}$  refer to cutting data for keyway milling (page 16).

#### 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 16). For the corresponding selection of tool (diameter) refer to the table "Tool selection" (page 38).

#### 3. Side milling

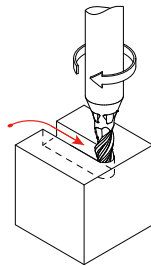


A finishing operation is necessary to reach the required tolerance and highest squareness.

**NEW**

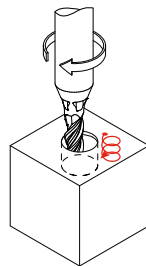
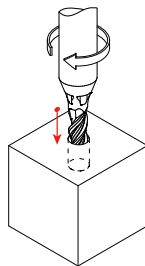
## Process

### B. Milling of through slots



When milling through slots, the maximum cutting parameters can be applied.  
Refer to the cutting data page 18 / page 28.

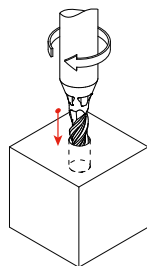
### C. Plunge milling



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

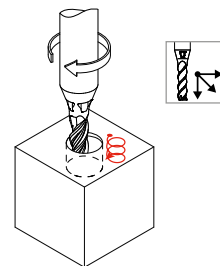
- 1. Direct plunge milling
- 2. Plunging with helical interpolation

#### 1. Direct plunge milling



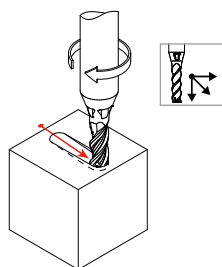
When plunge milling, an increase of the drilling diameter of approx. 0.05 mm respect to the tool diameter needs to be calculated. The maximum milling depth is  $2.5 \times d_1$  - type A /  $5 \times d_1$  - type C ( $a_{p,max} = 1 \times d_1$ ). For data regarding feed  $f_{z,p}$  refer to cutting data for plunge milling (page 16 / page 26).

#### 2. Plunging with helical interpolation



The maximum plunge angle  $\alpha$  depends on the material and cannot be overcut (see table page 34). For data regarding feed  $f_{z,s}$  refer to cutting data for keyway milling (page 16 / page 26). Attention: the minimum diameter of the hole is  $d_{hole} = 1.3 \times d_{tool}$

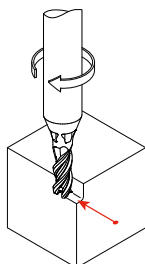
#### D. Linear ramp



The maximum plunge angle  $\alpha$  depends on the material and cannot be overcut (see table page 34). For data regarding feed  $f_{z,s}$  refer to cutting data for keyway milling (page 16 / page 26).

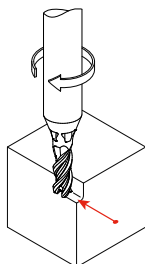
#### E. Side milling

##### Semi-finishing



Recommended cutting parameters:  
 $v_c$  and  $f_z$  = as specified in the cutting data table  
 $a_p = 1 - 2 \times d$   
 Type A:  $a_e = 0.2 \times d$   
 Type C:  $a_e = 0.1 \times d$

##### Finishing



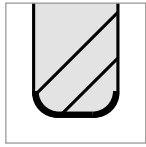
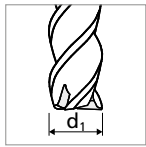
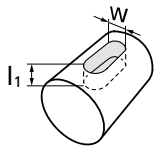
Recommended cutting parameters:  
 $v_c$  and  $f_z$  = as specified in the cutting data table  
 Type A:  $a_p = 2.5 \times d$ ;  $a_e = 0.05 - 0.10 \times d$  depending on required surface quality  
 Type C:  $a_p = 2 \times d$ ;  $a_e = 0.02 - 0.05 \times d$  depending on required surface quality

**NEW**

## Process CrazyMill Cool P&S - Type A

### THE RIGHT TOOL FOR KEYWAY SLOTTING

#### Tool selection



| w<br>Slot<br>[mm] | w<br>Slot<br>[inch] | d <sub>1</sub><br>Tool<br>[mm][inch] | l <sub>1, max</sub><br>[mm] | r<br>[mm][inch] | Item<br>number     |
|-------------------|---------------------|--------------------------------------|-----------------------------|-----------------|--------------------|
| 1.1               |                     | 1.0                                  | 2.50                        | 0.10            | 2.CMC42.A2Z3.100.1 |
|                   |                     | 1.0                                  | 2.50                        | 0.20            | 2.CMC42.A3Z3.100.1 |
| 1.2               |                     | 1.0                                  | 2.50                        | 0.10            | 2.CMC42.A2Z3.100.1 |
|                   |                     | 1.0                                  | 2.50                        | 0.20            | 2.CMC42.A3Z3.100.1 |
|                   |                     | 1.1                                  | 2.75                        | 0.10            | 2.CMC42.A2Z3.110.1 |
|                   |                     | 1.1                                  | 2.75                        | 0.20            | 2.CMC42.A3Z3.110.1 |
| 1.3               |                     | 1.1                                  | 2.75                        | 0.10            | 2.CMC42.A2Z3.110.1 |
|                   |                     | 1.1                                  | 2.75                        | 0.20            | 2.CMC42.A3Z3.110.1 |
|                   |                     | 1.2                                  | 3.00                        | 0.10            | 2.CMC42.A2Z3.120.1 |
|                   |                     | 1.2                                  | 3.00                        | 0.20            | 2.CMC42.A3Z3.120.1 |
| 1.4               |                     | 1.2                                  | 3.00                        | 0.10            | 2.CMC42.A2Z3.120.1 |
|                   |                     | 1.2                                  | 3.00                        | 0.20            | 2.CMC42.A3Z3.120.1 |
|                   |                     | 1.3                                  | 3.25                        | 0.10            | 2.CMC42.A2Z3.130.1 |
| 1.5               |                     | 1.3                                  | 3.25                        | 0.10            | 2.CMC42.A2Z3.130.1 |
|                   |                     | 1.3                                  | 3.25                        | 0.20            | 2.CMC42.A3Z3.130.1 |
|                   |                     | 1.4                                  | 3.50                        | 0.10            | 2.CMC42.A2Z3.140.1 |
|                   |                     | 1.4                                  | 3.50                        | 0.20            | 2.CMC42.A3Z3.140.1 |
| 1.587             | 1/16                | 1.4                                  | 3.50                        | 0.10            | 2.CMC42.A2Z3.140.1 |
|                   |                     | 1.4                                  | 3.50                        | 0.20            | 2.CMC42.A3Z3.140.1 |
|                   |                     | 1.5                                  | 3.75                        | 0.10            | 2.CMC42.A2Z3.150.1 |
| 1.6               |                     | 1.5                                  | 3.75                        | 0.30            | 2.CMC42.A3Z3.150.1 |
|                   |                     | 1.4                                  | 3.50                        | 0.10            | 2.CMC42.A2Z3.140.1 |
|                   |                     | 1.4                                  | 3.50                        | 0.20            | 2.CMC42.A3Z3.140.1 |
|                   |                     | 1.5                                  | 3.75                        | 0.10            | 2.CMC42.A2Z3.150.1 |
| 1.7               |                     | 1.5                                  | 3.75                        | 0.30            | 2.CMC42.A3Z3.150.1 |
|                   |                     | 1.5                                  | 3.75                        | 0.10            | 2.CMC42.A2Z3.150.1 |
|                   |                     | 1/16                                 | 3.97                        | 0.127           | 2.CMC.PSRA2Z3.F116 |
|                   |                     | 1/16                                 | 3.97                        | 0.254           | 2.CMC.PSRA3Z3.F116 |
| 1.8               |                     | 1.6                                  | 4.00                        | 0.10            | 2.CMC42.A2Z3.160.1 |
|                   |                     | 1.6                                  | 4.00                        | 0.30            | 2.CMC42.A3Z3.160.1 |
|                   |                     | 1.5                                  | 3.75                        | 0.10            | 2.CMC42.A2Z3.150.1 |
|                   |                     | 1.5                                  | 3.75                        | 0.30            | 2.CMC42.A3Z3.150.1 |
| 1.9               |                     | 1/16                                 | 3.97                        | 0.127           | 2.CMC.PSRA2Z3.F116 |
|                   |                     | 1/16                                 | 3.97                        | 0.254           | 2.CMC.PSRA3Z3.F116 |
|                   |                     | 1.6                                  | 4.00                        | 0.10            | 2.CMC42.A2Z3.160.1 |
|                   |                     | 1.6                                  | 4.00                        | 0.30            | 2.CMC42.A3Z3.160.1 |
| 2.0               |                     | 1.6                                  | 4.00                        | 0.10            | 2.CMC42.A2Z3.160.1 |
|                   |                     | 1.6                                  | 4.00                        | 0.30            | 2.CMC42.A3Z3.160.1 |
|                   |                     | 1.7                                  | 4.25                        | 0.10            | 2.CMC42.A2Z3.170.1 |
|                   |                     | 1.7                                  | 4.25                        | 0.30            | 2.CMC42.A3Z3.170.1 |
| 2.1               |                     | 1.7                                  | 4.25                        | 0.10            | 2.CMC42.A2Z3.170.1 |
|                   |                     | 1.7                                  | 4.25                        | 0.30            | 2.CMC42.A3Z3.170.1 |
|                   |                     | 1.8                                  | 4.50                        | 0.10            | 2.CMC42.A2Z3.180.1 |
|                   |                     | 1.8                                  | 4.50                        | 0.30            | 2.CMC42.A3Z3.180.1 |
| 2.2               |                     | 1.8                                  | 4.50                        | 0.10            | 2.CMC42.A2Z3.180.1 |
|                   |                     | 1.8                                  | 4.50                        | 0.30            | 2.CMC42.A3Z3.180.1 |
|                   |                     | 1.9                                  | 4.75                        | 0.10            | 2.CMC42.A2Z3.190.1 |
|                   |                     | 1.9                                  | 4.75                        | 0.30            | 2.CMC42.A3Z3.190.1 |
| 2.3               |                     | 1.9                                  | 4.75                        | 0.10            | 2.CMC42.A2Z3.190.1 |
|                   |                     | 1.9                                  | 4.75                        | 0.30            | 2.CMC42.A3Z3.190.1 |
|                   |                     | 2.0                                  | 5.00                        | 0.10            | 2.CMC42.A2Z3.200.1 |
|                   |                     | 2.0                                  | 5.00                        | 0.20            | 2.CMC42.A3Z3.200.1 |
| 2.381             | 3/32                | 2.0                                  | 5.00                        | 0.10            | 2.CMC42.A2Z3.200.1 |
|                   |                     | 2.0                                  | 5.00                        | 0.20            | 2.CMC42.A3Z3.200.1 |
|                   |                     | 2.0                                  | 5.00                        | 0.50            | 2.CMC42.A4Z3.200.1 |
|                   |                     | 2.1                                  | 5.25                        | 0.20            | 2.CMC42.A2Z3.210.1 |
| 2.4               |                     | 2.1                                  | 5.25                        | 0.50            | 2.CMC42.A3Z3.210.1 |
|                   |                     | 2.0                                  | 5.00                        | 0.10            | 2.CMC42.A2Z3.200.1 |
|                   |                     | 2.0                                  | 5.00                        | 0.20            | 2.CMC42.A3Z3.200.1 |
|                   |                     | 2.0                                  | 5.00                        | 0.50            | 2.CMC42.A4Z3.200.1 |
| 2.5               |                     | 2.1                                  | 5.25                        | 0.20            | 2.CMC42.A2Z3.210.1 |
|                   |                     | 2.1                                  | 5.25                        | 0.50            | 2.CMC42.A3Z3.210.1 |
|                   |                     | 2.2                                  | 5.50                        | 0.20            | 2.CMC42.A2Z3.220.1 |
|                   |                     | 2.2                                  | 5.50                        | 0.50            | 2.CMC42.A3Z3.220.1 |
| 2.6               |                     | 2.2                                  | 5.50                        | 0.50            | 2.CMC42.A4Z3.220.1 |
|                   |                     | 2.0                                  | 5.00                        | 0.10            | 2.CMC42.A2Z3.200.1 |
|                   |                     | 2.0                                  | 5.00                        | 0.20            | 2.CMC42.A3Z3.200.1 |
|                   |                     | 2.0                                  | 5.00                        | 0.50            | 2.CMC42.A4Z3.200.1 |
| 2.7               |                     | 2.1                                  | 5.25                        | 0.20            | 2.CMC42.A2Z3.210.1 |
|                   |                     | 2.1                                  | 5.25                        | 0.50            | 2.CMC42.A3Z3.210.1 |
|                   |                     | 2.2                                  | 5.50                        | 0.20            | 2.CMC42.A2Z3.220.1 |
|                   |                     | 2.2                                  | 5.50                        | 0.50            | 2.CMC42.A3Z3.220.1 |
| 2.8               |                     | 2.3                                  | 5.75                        | 0.20            | 2.CMC42.A2Z3.230.1 |
|                   |                     | 2.3                                  | 5.75                        | 0.50            | 2.CMC42.A3Z3.230.1 |
|                   |                     | 2.3                                  | 5.75                        | 0.10            | 2.CMC42.A2Z3.230.1 |
|                   |                     | 2.3                                  | 5.75                        | 0.20            | 2.CMC42.A3Z3.230.1 |
| 2.9               |                     | 2.3                                  | 5.75                        | 0.50            | 2.CMC42.A4Z3.230.1 |
|                   |                     | 2.4                                  | 6.00                        | 0.20            | 2.CMC42.A2Z3.240.1 |
|                   |                     | 2.4                                  | 6.00                        | 0.50            | 2.CMC42.A3Z3.240.1 |
|                   |                     | 2.4                                  | 6.00                        | 0.10            | 2.CMC42.A2Z3.240.1 |
| 3.0               |                     | 2.5                                  | 6.25                        | 0.20            | 2.CMC42.A2Z3.250.1 |
|                   |                     | 2.5                                  | 6.25                        | 0.50            | 2.CMC42.A3Z3.250.1 |
|                   |                     | 2.6                                  | 6.50                        | 0.20            | 2.CMC42.A2Z3.260.1 |
|                   |                     | 2.6                                  | 6.50                        | 0.50            | 2.CMC42.A3Z3.260.1 |
| 3.15              |                     | 2.5                                  | 6.25                        | 0.20            | 2.CMC42.A2Z3.250.1 |
|                   |                     | 2.5                                  | 6.25                        | 0.50            | 2.CMC42.A3Z3.250.1 |
|                   |                     | 2.6                                  | 6.50                        | 0.20            | 2.CMC42.A2Z3.260.1 |
|                   |                     | 2.6                                  | 6.50                        | 0.50            | 2.CMC42.A3Z3.260.1 |
| 3.3               |                     | 2.7                                  | 6.75                        | 0.20            | 2.CMC42.A2Z3.270.1 |
|                   |                     | 2.7                                  | 6.75                        | 0.50            | 2.CMC42.A3Z3.270.1 |
|                   |                     | 2.8                                  | 7.00                        | 0.20            | 2.CMC42.A2Z3.280.1 |
|                   |                     | 2.8                                  | 7.00                        | 0.50            | 2.CMC42.A3Z3.280.1 |

| w<br>Slot<br>[mm] | w<br>Slot<br>[inch] | d <sub>1</sub><br>Tool<br>[mm][inch] | l <sub>1, max</sub><br>[mm] | r<br>[mm][inch] | Item<br>number     |
|-------------------|---------------------|--------------------------------------|-----------------------------|-----------------|--------------------|
| 2.3               |                     | 2.0                                  | 5.00                        | 0.10            | 2.CMC42.A2Z3.200.1 |
|                   |                     | 2.0                                  | 5.00                        | 0.20            | 2.CMC42.A3Z3.200.1 |
|                   |                     | 2.0                                  | 5.00                        | 0.50            | 2.CMC42.A4Z3.200.1 |
|                   |                     | 2.1                                  | 5.25                        | 0.20            | 2.CMC42.A2Z3.210.1 |
| 2.381             | 3/32                | 2.1                                  | 5.25                        | 0.50            | 2.CMC42.A3Z3.210.1 |
|                   |                     | 2.0                                  | 5.00                        | 0.10            | 2.CMC42.A2Z3.200.1 |
|                   |                     | 2.0                                  | 5.00                        | 0.20            | 2.CMC42.A3Z3.200.1 |
|                   |                     | 2.0                                  | 5.00                        | 0.50            | 2.CMC42.A4Z3.200.1 |
| 2.4               |                     | 2.1                                  | 5.25                        | 0.20            | 2.CMC42.A2Z3.210.1 |
|                   |                     | 2.1                                  | 5.25                        | 0.50            | 2.CMC42.A3Z3.210.1 |
|                   |                     | 2.2                                  | 5.50                        | 0.20            | 2.CMC42.A2Z3.220.1 |
|                   |                     | 2.2                                  | 5.50                        | 0.50            | 2.CMC42.A3Z3.220.1 |
| 2.5               |                     | 2.2                                  | 5.50                        | 0.50            | 2.CMC42.A4Z3.220.1 |
|                   |                     | 2.0                                  | 5.00                        | 0.10            | 2.CMC42.A2Z3.200.1 |
|                   |                     | 2.0                                  | 5.00                        | 0.20            | 2.CMC42.A3Z3.200.1 |
|                   |                     | 2.0                                  | 5.00                        | 0.50            | 2.CMC42.A4Z3.200.1 |
| 2.6               |                     | 2.1                                  | 5.25                        | 0.20            | 2.CMC42.A2Z3.210.1 |
|                   |                     | 2.1                                  | 5.25                        | 0.50            | 2.CMC42.A3Z3.210.1 |
|                   |                     | 2.2                                  | 5.50                        | 0.20            | 2.CMC42.A2Z3.220.1 |
|                   |                     | 2.2                                  | 5.50                        | 0.50            | 2.CMC42.A3Z3.220.1 |
| 2.7               |                     | 2.3                                  | 5.75                        | 0.20            | 2.CMC42.A2Z3.230.1 |
|                   |                     | 2.3                                  | 5.75                        | 0.50            | 2.CMC42.A3Z3.230.1 |
|                   |                     | 2.3                                  | 5.75                        | 0.10            | 2.CMC42.A2Z3.230.1 |
|                   |                     | 2.3                                  | 5.75                        | 0.20            | 2.CMC42.A3Z3.230.1 |
| 2.8               |                     | 2.4                                  | 6.00                        | 0.20            | 2.CMC42.A2Z3.240.1 |
|                   |                     | 2.4                                  | 6.00                        | 0.50            | 2.CMC42.A3Z3.240.1 |
|                   |                     | 2.4                                  | 6.00                        | 0.10            | 2.CMC42.A2Z3.240.1 |
|                   |                     | 2.4                                  | 6.00                        | 0.50            | 2.CMC42.A3Z3.240.1 |
| 2.9               |                     | 2.5                                  | 6.25                        | 0.20            | 2.CMC42.A2Z3.250.1 |
|                   |                     | 2.5                                  | 6.25                        | 0.50            | 2.CMC42.A3Z3.250.1 |
|                   |                     | 2.6                                  | 6.50                        | 0.20            | 2.CMC42.A2Z3.260.1 |
|                   |                     | 2.6                                  | 6.50                        | 0.50            | 2.CMC42.A3Z3.260.1 |
| 3.0               |                     | 2.5                                  | 6.25                        | 0.20            | 2.CMC42.A2Z3.250.1 |
|                   |                     | 2.5                                  | 6.25                        | 0.50            | 2.CMC42.A3Z3.250.1 |
|                   |                     | 2.6                                  | 6.50                        | 0.20            | 2.CMC42.A2Z3.260.1 |
|                   |                     | 2.6                                  | 6.50                        | 0.50            | 2.CMC42.A3Z3.260.1 |
| 3.15              |                     | 2.7                                  | 6.75                        | 0.20            | 2.CMC42.A2Z3.270.1 |
|                   |                     | 2.7                                  | 6.75                        | 0.50            | 2.CMC42.A3Z3.270.1 |
|                   |                     | 2.8                                  | 7.00                        | 0.20            | 2.CMC42.A2Z3.280.1 |
|                   |                     | 2.8                                  | 7.00                        | 0.50            | 2.CMC42.A3Z3.280.1 |

| w<br>Slot<br>[mm] | w<br>Slot<br>[inch] | d <sub>1</sub><br>Tool<br>[mm]  [inch] | l <sub>1, max</sub><br>[mm] | r<br>[mm]  [inch] | Item<br>number     |
|-------------------|---------------------|----------------------------------------|-----------------------------|-------------------|--------------------|
| 3.0               |                     | 2.6                                    | 6.50                        | 0.20              | 2.CMC42.A2Z3.260.1 |
|                   |                     | 2.6                                    | 6.50                        | 0.50              | 2.CMC42.A3Z3.260.1 |
|                   |                     | 2.7                                    | 6.75                        | 0.20              | 2.CMC42.A2Z3.270.1 |
|                   |                     | 2.7                                    | 6.75                        | 0.50              | 2.CMC42.A3Z3.270.1 |
|                   |                     | 2.8                                    | 7.00                        | 0.20              | 2.CMC42.A2Z3.280.1 |
|                   |                     | 2.8                                    | 7.00                        | 0.50              | 2.CMC42.A3Z3.280.1 |
| 3.1               |                     | 2.6                                    | 6.50                        | 0.20              | 2.CMC42.A2Z3.260.1 |
|                   |                     | 2.6                                    | 6.50                        | 0.50              | 2.CMC42.A3Z3.260.1 |
|                   |                     | 2.7                                    | 6.75                        | 0.20              | 2.CMC42.A2Z3.270.1 |
|                   |                     | 2.7                                    | 6.75                        | 0.50              | 2.CMC42.A3Z3.270.1 |
|                   |                     | 2.8                                    | 7.00                        | 0.20              | 2.CMC42.A2Z3.280.1 |
|                   |                     | 2.8                                    | 7.00                        | 0.50              | 2.CMC42.A3Z3.280.1 |
| 3.175             | 1/8                 | 2.9                                    | 7.25                        | 0.20              | 2.CMC42.A2Z3.290.1 |
|                   |                     | 2.9                                    | 7.25                        | 0.50              | 2.CMC42.A3Z3.290.1 |
|                   |                     | 2.7                                    | 6.75                        | 0.20              | 2.CMC42.A2Z3.270.1 |
|                   |                     | 2.7                                    | 6.75                        | 0.50              | 2.CMC42.A3Z3.270.1 |
|                   |                     | 2.8                                    | 7.00                        | 0.20              | 2.CMC42.A2Z3.280.1 |
|                   |                     | 2.8                                    | 7.00                        | 0.50              | 2.CMC42.A3Z3.280.1 |
| 3.2               |                     | 2.9                                    | 7.25                        | 0.20              | 2.CMC42.A2Z3.290.1 |
|                   |                     | 2.9                                    | 7.25                        | 0.50              | 2.CMC42.A3Z3.290.1 |
|                   |                     | 3.0                                    | 7.50                        | 0.20              | 2.CMC42.A2Z3.300.1 |
|                   |                     | 3.0                                    | 7.50                        | 0.50              | 2.CMC42.A3Z3.300.1 |
|                   |                     | 2.8                                    | 7.00                        | 0.20              | 2.CMC42.A2Z3.280.1 |
|                   |                     | 2.8                                    | 7.00                        | 0.50              | 2.CMC42.A3Z3.280.1 |
| 3.3               |                     | 2.9                                    | 7.25                        | 0.20              | 2.CMC42.A2Z3.290.1 |
|                   |                     | 2.9                                    | 7.25                        | 0.50              | 2.CMC42.A3Z3.290.1 |
|                   |                     | 3.0                                    | 7.50                        | 0.20              | 2.CMC42.A2Z3.300.1 |
|                   |                     | 3.0                                    | 7.50                        | 0.50              | 2.CMC42.A3Z3.300.1 |
|                   |                     | 3.1                                    | 7.75                        | 0.20              | 2.CMC42.A2Z3.310.1 |
|                   |                     | 3.1                                    | 7.75                        | 0.50              | 2.CMC42.A3Z3.310.1 |
| 3.4               |                     | 2.9                                    | 7.25                        | 0.20              | 2.CMC42.A2Z3.290.1 |
|                   |                     | 2.9                                    | 7.25                        | 0.50              | 2.CMC42.A3Z3.290.1 |
|                   |                     | 3.0                                    | 7.50                        | 0.20              | 2.CMC42.A2Z3.300.1 |
|                   |                     | 3.0                                    | 7.50                        | 0.50              | 2.CMC42.A3Z3.300.1 |
|                   |                     | 3.1                                    | 7.75                        | 0.20              | 2.CMC42.A2Z3.310.1 |
|                   |                     | 3.1                                    | 7.75                        | 0.50              | 2.CMC42.A3Z3.310.1 |
| 3.5               |                     | 3.0                                    | 7.50                        | 0.20              | 2.CMC42.A2Z3.300.1 |
|                   |                     | 3.0                                    | 7.50                        | 0.50              | 2.CMC42.A3Z3.300.1 |
|                   |                     | 3.1                                    | 7.75                        | 0.20              | 2.CMC42.A2Z3.310.1 |
|                   |                     | 3.1                                    | 7.75                        | 0.50              | 2.CMC42.A3Z3.310.1 |
|                   |                     | 1/8                                    | 7.94                        | 0.254             | 2.CMC.PSRA2Z3.F18  |
|                   |                     | 1/8                                    | 7.94                        | 0.381             | 2.CMC.PSRA3Z3.F18  |
| 3.6               |                     | 3.3                                    | 8.25                        | 0.20              | 2.CMC42.A2Z3.330.1 |
|                   |                     | 3.3                                    | 8.25                        | 0.50              | 2.CMC42.A3Z3.330.1 |
|                   |                     | 3.0                                    | 7.50                        | 0.20              | 2.CMC42.A2Z3.300.1 |
|                   |                     | 3.0                                    | 7.50                        | 0.50              | 2.CMC42.A3Z3.300.1 |
|                   |                     | 3.1                                    | 7.75                        | 0.20              | 2.CMC42.A2Z3.310.1 |
|                   |                     | 3.1                                    | 7.75                        | 0.50              | 2.CMC42.A3Z3.310.1 |

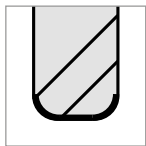
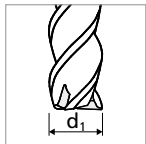
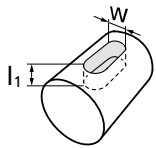
| w<br>Slot<br>[mm] | w<br>Slot<br>[inch] | d <sub>1</sub><br>Tool<br>[mm]  [inch] | l <sub>1, max</sub><br>[mm] | r<br>[mm]  [inch] | Item<br>number     |
|-------------------|---------------------|----------------------------------------|-----------------------------|-------------------|--------------------|
| 3.7               |                     | 3.1                                    | 7.75                        | 0.20              | 2.CMC42.A2Z3.310.1 |
|                   |                     | 3.1                                    | 7.75                        | 0.50              | 2.CMC42.A3Z3.310.1 |
|                   |                     | 1/8                                    | 7.94                        | 0.254             | 2.CMC.PSRA2Z3.F18  |
|                   |                     | 1/8                                    | 7.94                        | 0.381             | 2.CMC.PSRA3Z3.F18  |
|                   |                     | 3.3                                    | 8.25                        | 0.20              | 2.CMC42.A2Z3.330.1 |
|                   |                     | 3.3                                    | 8.25                        | 0.50              | 2.CMC42.A3Z3.330.1 |
| 3.8               |                     | 3.3                                    | 8.25                        | 0.20              | 2.CMC42.A2Z3.330.1 |
|                   |                     | 3.3                                    | 8.25                        | 0.50              | 2.CMC42.A3Z3.330.1 |
| 3.9               |                     | 3.3                                    | 8.25                        | 0.20              | 2.CMC42.A2Z3.330.1 |
|                   |                     | 3.3                                    | 8.25                        | 0.50              | 2.CMC42.A3Z3.330.1 |
|                   |                     | 3.7                                    | 9.25                        | 0.20              | 2.CMC42.A2Z3.370.1 |
|                   |                     | 3.7                                    | 9.25                        | 0.50              | 2.CMC42.A3Z3.370.1 |
| 3.968             | 5/32                | 3.3                                    | 8.25                        | 0.20              | 2.CMC42.A2Z3.330.1 |
|                   |                     | 3.3                                    | 8.25                        | 0.50              | 2.CMC42.A3Z3.330.1 |
|                   |                     | 3.7                                    | 9.25                        | 0.20              | 2.CMC42.A2Z3.370.1 |
|                   |                     | 3.7                                    | 9.25                        | 0.50              | 2.CMC42.A3Z3.370.1 |
| 4.0               |                     | 3.7                                    | 9.25                        | 0.20              | 2.CMC42.A2Z3.370.1 |
|                   |                     | 3.7                                    | 9.25                        | 0.50              | 2.CMC42.A3Z3.370.1 |
| 4.1               |                     | 3.7                                    | 9.25                        | 0.20              | 2.CMC42.A2Z3.370.1 |
|                   |                     | 3.7                                    | 9.25                        | 0.50              | 2.CMC42.A3Z3.370.1 |
| 4.2               |                     | 3.7                                    | 9.25                        | 0.20              | 2.CMC42.A2Z3.370.1 |
|                   |                     | 3.7                                    | 9.25                        | 0.50              | 2.CMC42.A3Z3.370.1 |
|                   |                     | 5/32                                   | 9.92                        | 0.254             | 2.CMC.PSRA2Z3.F532 |
|                   |                     | 5/32                                   | 9.92                        | 0.381             | 2.CMC.PSRA3Z3.F532 |
|                   |                     | 4.0                                    | 10.00                       | 0.20              | 2.CMC42.A2Z3.400.1 |
|                   |                     | 4.0                                    | 10.00                       | 0.50              | 2.CMC42.A3Z3.400.1 |
| 4.3               |                     | 3.7                                    | 9.25                        | 0.20              | 2.CMC42.A2Z3.370.1 |
|                   |                     | 3.7                                    | 9.25                        | 0.50              | 2.CMC42.A3Z3.370.1 |
|                   |                     | 5/32                                   | 9.92                        | 0.254             | 2.CMC.PSRA2Z3.F532 |
|                   |                     | 5/32                                   | 9.92                        | 0.381             | 2.CMC.PSRA3Z3.F532 |
|                   |                     | 4.0                                    | 10.00                       | 0.20              | 2.CMC42.A2Z3.400.1 |
|                   |                     | 4.0                                    | 10.00                       | 0.50              | 2.CMC42.A3Z3.400.1 |
| 4.4               |                     | 3.7                                    | 9.25                        | 0.20              | 2.CMC42.A2Z3.370.1 |
|                   |                     | 3.7                                    | 9.25                        | 0.50              | 2.CMC42.A3Z3.370.1 |
|                   |                     | 5/32                                   | 9.92                        | 0.254             | 2.CMC.PSRA2Z3.F532 |
|                   |                     | 5/32                                   | 9.92                        | 0.381             | 2.CMC.PSRA3Z3.F532 |
|                   |                     | 4.0                                    | 10.00                       | 0.20              | 2.CMC42.A2Z3.400.1 |
|                   |                     | 4.0                                    | 10.00                       | 0.50              | 2.CMC42.A3Z3.400.1 |
| 4.5               |                     | 4.0                                    | 10.00                       | 0.20              | 2.CMC42.A2Z3.400.1 |
|                   |                     | 4.0                                    | 10.00                       | 0.50              | 2.CMC42.A3Z3.400.1 |
|                   |                     | 4.3                                    | 10.75                       | 0.20              | 2.CMC42.A2Z3.430.1 |
|                   |                     | 4.3                                    | 10.75                       | 0.50              | 2.CMC42.A3Z3.430.1 |
|                   |                     | 4.0                                    | 10.00                       | 0.20              | 2.CMC42.A2Z3.400.1 |
|                   |                     | 4.0                                    | 10.00                       | 0.50              | 2.CMC42.A3Z3.400.1 |
| 4.6               |                     | 4.3                                    | 10.75                       | 0.20              | 2.CMC42.A2Z3.430.1 |
|                   |                     | 4.3                                    | 10.75                       | 0.50              | 2.CMC42.A3Z3.430.1 |
|                   |                     | 4.0                                    | 10.00                       | 0.20              | 2.CMC42.A2Z3.400.1 |
|                   |                     | 4.0                                    | 10.00                       | 0.50              | 2.CMC42.A3Z3.400.1 |
|                   |                     | 4.3                                    | 10.75                       | 0.20              | 2.CMC42.A2Z3.430.1 |
|                   |                     | 4.3                                    | 10.75                       | 0.50              | 2.CMC42.A3Z3.430.1 |
| 4.7               |                     | 4.0                                    | 10.00                       | 0.20              | 2.CMC42.A2Z3.400.1 |
|                   |                     | 4.0                                    | 10.00                       | 0.50              | 2.CMC42.A3Z3.400.1 |
|                   |                     | 4.3                                    | 10.75                       | 0.20              | 2.CMC42.A2Z3.430.1 |
|                   |                     | 4.3                                    | 10.75                       | 0.50              | 2.CMC42.A3Z3.430.1 |
|                   |                     | 4.0                                    | 10.00                       | 0.20              | 2.CMC42.A2Z3.400.1 |
|                   |                     | 4.0                                    | 10.00                       | 0.50              | 2.CMC42.A3Z3.400.1 |
| 4.762             | 3/16                | 4.3                                    | 10.75                       | 0.20              | 2.CMC42.A2Z3.430.1 |
|                   |                     | 4.3                                    | 10.75                       | 0.50              | 2.CMC42.A3Z3.430.1 |
|                   |                     | 4.0                                    | 10.00                       | 0.20              | 2.CMC42.A2Z3.400.1 |
|                   |                     | 4.0                                    | 10.00                       | 0.50              | 2.CMC42.A3Z3.400.1 |
| 4.8               |                     | 4.3                                    | 10.75                       | 0.20              | 2.CMC42.A2Z3.430.1 |
|                   |                     | 4.3                                    | 10.75                       | 0.50              | 2.CMC42.A3Z3.430.1 |

**NEW**

## Process CrazyMill Cool P&S - Type A

### THE RIGHT TOOL FOR KEYWAY SLOTTING

#### Tool selection



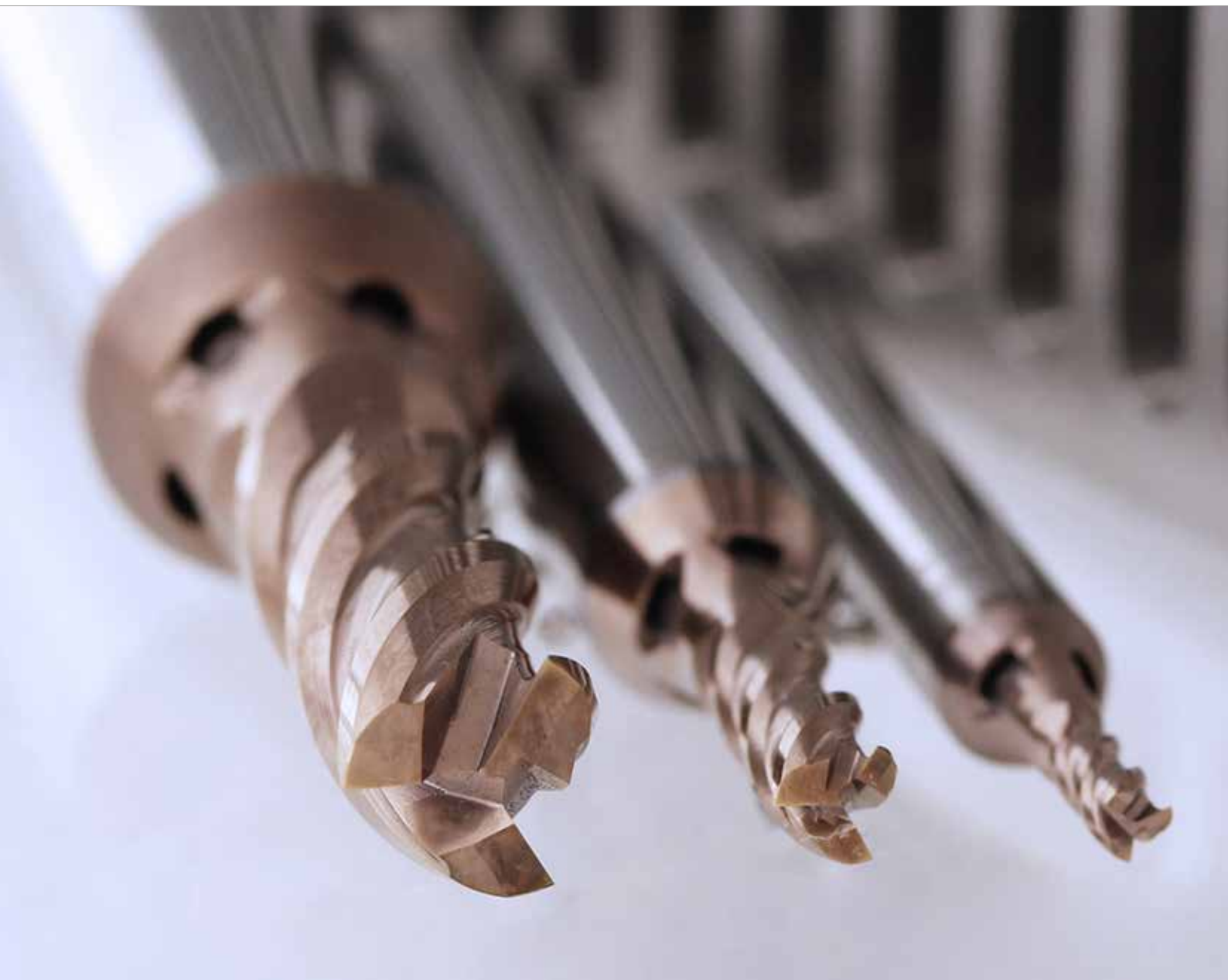
| w<br>Slot<br>[mm] | w<br>Slot<br>[inch] | d <sub>1</sub><br>Tool<br>[mm][inch] | l <sub>1, max</sub><br>[mm] | r<br>[mm][inch] | Item<br>number     |
|-------------------|---------------------|--------------------------------------|-----------------------------|-----------------|--------------------|
| 4.9               |                     | 4.3                                  | 10.75                       | 0.20            | 2.CMC42.A2Z3.430.1 |
|                   |                     | 4.3                                  | 10.75                       | 0.50            | 2.CMC42.A3Z3.430.1 |
|                   |                     | 4.7                                  | 11.75                       | 0.20            | 2.CMC42.A2Z3.470.1 |
|                   |                     | 4.7                                  | 11.75                       | 0.50            | 2.CMC42.A3Z3.470.1 |
| 5.0               |                     | 4.3                                  | 10.75                       | 0.20            | 2.CMC42.A2Z3.430.1 |
|                   |                     | 4.3                                  | 10.75                       | 0.50            | 2.CMC42.A3Z3.430.1 |
|                   |                     | 4.7                                  | 11.75                       | 0.20            | 2.CMC42.A2Z3.470.1 |
|                   |                     | 4.7                                  | 11.75                       | 0.50            | 2.CMC42.A3Z3.470.1 |
|                   |                     | <b>3/16</b>                          | 11.91                       | <b>0.254</b>    | 2.CMC.PSRA2Z3.F316 |
|                   |                     | <b>3/16</b>                          | 11.91                       | <b>0.381</b>    | 2.CMC.PSRA3Z3.F316 |
|                   |                     | 4.8                                  | 12.00                       | 0.20            | 2.CMC42.A2Z3.480.1 |
|                   |                     | 4.8                                  | 12.00                       | 0.50            | 2.CMC42.A3Z3.480.1 |
| 5.1               |                     | 4.3                                  | 10.75                       | 0.20            | 2.CMC42.A2Z3.430.1 |
|                   |                     | 4.3                                  | 10.75                       | 0.50            | 2.CMC42.A3Z3.430.1 |
|                   |                     | 4.7                                  | 11.75                       | 0.20            | 2.CMC42.A2Z3.470.1 |
|                   |                     | 4.7                                  | 11.75                       | 0.50            | 2.CMC42.A3Z3.470.1 |
|                   |                     | <b>3/16</b>                          | 11.91                       | <b>0.254</b>    | 2.CMC.PSRA2Z3.F316 |
|                   |                     | <b>3/16</b>                          | 11.91                       | <b>0.381</b>    | 2.CMC.PSRA3Z3.F316 |
|                   |                     | 4.8                                  | 12.00                       | 0.20            | 2.CMC42.A2Z3.480.1 |
|                   |                     | 4.8                                  | 12.00                       | 0.50            | 2.CMC42.A3Z3.480.1 |
| 5.2               |                     | 4.7                                  | 11.75                       | 0.20            | 2.CMC42.A2Z3.470.1 |
|                   |                     | 4.7                                  | 11.75                       | 0.50            | 2.CMC42.A3Z3.470.1 |
|                   |                     | <b>3/16</b>                          | 11.91                       | <b>0.254</b>    | 2.CMC.PSRA2Z3.F316 |
|                   |                     | <b>3/16</b>                          | 11.91                       | <b>0.381</b>    | 2.CMC.PSRA3Z3.F316 |
|                   |                     | 4.8                                  | 12.00                       | 0.20            | 2.CMC42.A2Z3.480.1 |
|                   |                     | 4.8                                  | 12.00                       | 0.50            | 2.CMC42.A3Z3.480.1 |
|                   |                     | 5.0                                  | 12.50                       | 0.20            | 2.CMC42.A2Z3.500.1 |
|                   |                     | 5.0                                  | 12.50                       | 0.50            | 2.CMC42.A3Z3.500.1 |
| 5.3               |                     | 4.7                                  | 11.75                       | 0.20            | 2.CMC42.A2Z3.470.1 |
|                   |                     | 4.7                                  | 11.75                       | 0.50            | 2.CMC42.A3Z3.470.1 |
|                   |                     | <b>3/16</b>                          | 11.91                       | <b>0.254</b>    | 2.CMC.PSRA2Z3.F316 |
|                   |                     | <b>3/16</b>                          | 11.91                       | <b>0.381</b>    | 2.CMC.PSRA3Z3.F316 |
|                   |                     | 4.8                                  | 12.00                       | 0.20            | 2.CMC42.A2Z3.480.1 |
|                   |                     | 4.8                                  | 12.00                       | 0.50            | 2.CMC42.A3Z3.480.1 |
|                   |                     | 5.0                                  | 12.50                       | 0.20            | 2.CMC42.A2Z3.500.1 |
|                   |                     | 5.0                                  | 12.50                       | 0.50            | 2.CMC42.A3Z3.500.1 |
| 5.4               |                     | 4.7                                  | 11.75                       | 0.20            | 2.CMC42.A2Z3.470.1 |
|                   |                     | 4.7                                  | 11.75                       | 0.50            | 2.CMC42.A3Z3.470.1 |
|                   |                     | <b>3/16</b>                          | 11.91                       | <b>0.254</b>    | 2.CMC.PSRA2Z3.F316 |
|                   |                     | <b>3/16</b>                          | 11.91                       | <b>0.381</b>    | 2.CMC.PSRA3Z3.F316 |
|                   |                     | 4.8                                  | 12.00                       | 0.20            | 2.CMC42.A2Z3.480.1 |
|                   |                     | 4.8                                  | 12.00                       | 0.50            | 2.CMC42.A3Z3.480.1 |
|                   |                     | 5.0                                  | 12.50                       | 0.20            | 2.CMC42.A2Z3.500.1 |
|                   |                     | 5.0                                  | 12.50                       | 0.50            | 2.CMC42.A3Z3.500.1 |
| 5.5               |                     | 4.7                                  | 11.75                       | 0.20            | 2.CMC42.A2Z3.470.1 |
|                   |                     | 4.7                                  | 11.75                       | 0.50            | 2.CMC42.A3Z3.470.1 |
|                   |                     | <b>3/16</b>                          | 11.91                       | <b>0.254</b>    | 2.CMC.PSRA2Z3.F316 |
|                   |                     | <b>3/16</b>                          | 11.91                       | <b>0.381</b>    | 2.CMC.PSRA3Z3.F316 |
|                   |                     | 4.8                                  | 12.00                       | 0.20            | 2.CMC42.A2Z3.480.1 |
|                   |                     | 4.8                                  | 12.00                       | 0.50            | 2.CMC42.A3Z3.480.1 |
|                   |                     | 5.0                                  | 12.50                       | 0.20            | 2.CMC42.A2Z3.500.1 |
|                   |                     | 5.0                                  | 12.50                       | 0.50            | 2.CMC42.A3Z3.500.1 |

| w<br>Slot<br>[mm] | w<br>Slot<br>[inch] | d <sub>1</sub><br>Tool<br>[mm][inch] | l <sub>1, max</sub><br>[mm] | r<br>[mm][inch] | Item<br>number     |
|-------------------|---------------------|--------------------------------------|-----------------------------|-----------------|--------------------|
| 5.560             | <b>7/32</b>         | 4.7                                  | 11.75                       | 0.20            | 2.CMC42.A2Z3.470.1 |
|                   |                     | 4.7                                  | 11.75                       | 0.50            | 2.CMC42.A3Z3.470.1 |
|                   |                     | <b>3/16</b>                          | 11.91                       | <b>0.254</b>    | 2.CMC.PSRA2Z3.F316 |
|                   |                     | <b>3/16</b>                          | 11.91                       | <b>0.381</b>    | 2.CMC.PSRA3Z3.F316 |
|                   |                     | 4.8                                  | 12.00                       | 0.20            | 2.CMC42.A2Z3.480.1 |
|                   |                     | 4.8                                  | 12.00                       | 0.50            | 2.CMC42.A3Z3.480.1 |
|                   |                     | 5.0                                  | 12.50                       | 0.20            | 2.CMC42.A2Z3.500.1 |
|                   |                     | 5.0                                  | 12.50                       | 0.50            | 2.CMC42.A3Z3.500.1 |
|                   |                     | 5.3                                  | 13.25                       | 0.20            | 2.CMC42.A2Z3.530.1 |
|                   |                     | 5.3                                  | 13.25                       | 0.50            | 2.CMC42.A3Z3.530.1 |
|                   |                     | 4.7                                  | 11.75                       | 0.20            | 2.CMC42.A2Z3.470.1 |
|                   |                     | 4.7                                  | 11.75                       | 0.50            | 2.CMC42.A3Z3.470.1 |
| 5.6               |                     | <b>3/16</b>                          | 11.91                       | <b>0.254</b>    | 2.CMC.PSRA2Z3.F316 |
|                   |                     | <b>3/16</b>                          | 11.91                       | <b>0.381</b>    | 2.CMC.PSRA3Z3.F316 |
|                   |                     | 4.8                                  | 12.00                       | 0.20            | 2.CMC42.A2Z3.480.1 |
|                   |                     | 4.8                                  | 12.00                       | 0.50            | 2.CMC42.A3Z3.480.1 |
|                   |                     | 5.0                                  | 12.50                       | 0.20            | 2.CMC42.A2Z3.500.1 |
|                   |                     | 5.0                                  | 12.50                       | 0.50            | 2.CMC42.A3Z3.500.1 |
|                   |                     | 5.3                                  | 13.25                       | 0.20            | 2.CMC42.A2Z3.530.1 |
|                   |                     | 5.3                                  | 13.25                       | 0.50            | 2.CMC42.A3Z3.530.1 |
|                   |                     | 4.8                                  | 12.00                       | 0.20            | 2.CMC42.A2Z3.480.1 |
|                   |                     | 4.8                                  | 12.00                       | 0.50            | 2.CMC42.A3Z3.480.1 |
|                   |                     | 5.0                                  | 12.50                       | 0.20            | 2.CMC42.A2Z3.500.1 |
|                   |                     | 5.0                                  | 12.50                       | 0.50            | 2.CMC42.A3Z3.500.1 |
| 5.7               |                     | 5.3                                  | 13.25                       | 0.20            | 2.CMC42.A2Z3.530.1 |
|                   |                     | 5.3                                  | 13.25                       | 0.50            | 2.CMC42.A3Z3.530.1 |
|                   |                     | 5.0                                  | 12.50                       | 0.20            | 2.CMC42.A2Z3.500.1 |
|                   |                     | 5.0                                  | 12.50                       | 0.50            | 2.CMC42.A3Z3.500.1 |
|                   |                     | 5.3                                  | 13.25                       | 0.20            | 2.CMC42.A2Z3.530.1 |
|                   |                     | 5.3                                  | 13.25                       | 0.50            | 2.CMC42.A3Z3.530.1 |
| 5.8               |                     | 5.0                                  | 12.50                       | 0.20            | 2.CMC42.A2Z3.500.1 |
|                   |                     | 5.0                                  | 12.50                       | 0.50            | 2.CMC42.A3Z3.500.1 |
|                   |                     | 5.3                                  | 13.25                       | 0.20            | 2.CMC42.A2Z3.530.1 |
|                   |                     | 5.3                                  | 13.25                       | 0.50            | 2.CMC42.A3Z3.530.1 |
| 5.9               |                     | 5.0                                  | 12.50                       | 0.20            | 2.CMC42.A2Z3.500.1 |
|                   |                     | 5.0                                  | 12.50                       | 0.50            | 2.CMC42.A3Z3.500.1 |
|                   |                     | 5.3                                  | 13.25                       | 0.20            | 2.CMC42.A2Z3.530.1 |
|                   |                     | 5.3                                  | 13.25                       | 0.50            | 2.CMC42.A3Z3.530.1 |
|                   |                     | <b>7/32</b>                          | 13.90                       | <b>0.381</b>    | 2.CMC.PSRA2Z3.F732 |
|                   |                     | <b>7/32</b>                          | 13.90                       | <b>0.762</b>    | 2.CMC.PSRA3Z3.F732 |
|                   |                     | 5.7                                  | 14.25                       | 0.20            | 2.CMC42.A2Z3.570.1 |
|                   |                     | 5.7                                  | 14.25                       | 0.50            | 2.CMC42.A3Z3.570.1 |
| 6.0               |                     | 5.0                                  | 12.50                       | 0.20            | 2.CMC42.A2Z3.500.1 |
|                   |                     | 5.0                                  | 12.50                       | 0.50            | 2.CMC42.A3Z3.500.1 |
|                   |                     | 5.3                                  | 13.25                       | 0.20            | 2.CMC42.A2Z3.530.1 |
|                   |                     | 5.3                                  | 13.25                       | 0.50            | 2.CMC42.A3Z3.530.1 |
|                   |                     | <b>7/32</b>                          | 13.90                       | <b>0.381</b>    | 2.CMC.PSRA2Z3.F732 |
|                   |                     | <b>7/32</b>                          | 13.90                       | <b>0.762</b>    | 2.CMC.PSRA3Z3.F732 |
|                   |                     | 5.7                                  | 14.25                       | 0.20            | 2.CMC42.A2Z3.570.1 |
|                   |                     | 5.7                                  | 14.25                       | 0.50            | 2.CMC42.A3Z3.570.1 |
| 6.1               |                     | 5.3                                  | 13.25                       | 0.20            | 2.CMC42.A2Z3.530.1 |
|                   |                     | 5.3                                  | 13.25                       | 0.50            | 2.CMC42.A3Z3.530.1 |
|                   |                     | <b>7/32</b>                          | 13.90                       | <b>0.381</b>    | 2.CMC.PSRA2Z3.F732 |
|                   |                     | <b>7/32</b>                          | 13.90                       | <b>0.762</b>    | 2.CMC.PSRA3Z3.F732 |
|                   |                     | 5.7                                  | 14.25                       | 0.20            | 2.CMC42.A2Z3.570.1 |
|                   |                     | 5.7                                  | 14.25                       | 0.50            | 2.CMC42.A3Z3.570.1 |
|                   |                     | 5.3                                  | 13.25                       | 0.20            | 2.CMC42.A2Z3.530.1 |
|                   |                     | 5.3                                  | 13.25                       | 0.50            | 2.CMC42.A3Z3.530.1 |

| w<br>Slot<br>[mm] | w<br>Slot<br>[inch] | d <sub>1</sub><br>Tool<br>[mm]  [inch] | l <sub>1, max</sub><br>[mm] | r<br>[mm]  [inch] | Item<br>number     |
|-------------------|---------------------|----------------------------------------|-----------------------------|-------------------|--------------------|
| 6.2               |                     | 5.3                                    | 13.25                       | 0.20              | 2.CMC42.A2Z3.530.1 |
|                   |                     | 5.3                                    | 13.25                       | 0.50              | 2.CMC42.A3Z3.530.1 |
|                   |                     | <b>7/32</b>                            | 13.90                       | <b>0.381</b>      | 2.CMC.PSRA2Z3.F732 |
|                   |                     | <b>7/32</b>                            | 13.90                       | <b>0.762</b>      | 2.CMC.PSRA3Z3.F732 |
|                   |                     | 5.7                                    | 14.25                       | 0.20              | 2.CMC42.A2Z3.570.1 |
|                   |                     | 5.7                                    | 14.25                       | 0.50              | 2.CMC42.A3Z3.570.1 |
|                   |                     | 6.0                                    | 15.00                       | 0.20              | 2.CMC42.A2Z3.600.1 |
|                   |                     | 6.0                                    | 15.00                       | 0.50              | 2.CMC42.A3Z3.600.1 |
| 6.3               |                     | 6.0                                    | 15.00                       | 1.00              | 2.CMC42.A4Z3.600.1 |
|                   |                     | 5.3                                    | 13.25                       | 0.20              | 2.CMC42.A2Z3.530.1 |
|                   |                     | 5.3                                    | 13.25                       | 0.50              | 2.CMC42.A3Z3.530.1 |
|                   |                     | <b>7/32</b>                            | 13.90                       | <b>0.381</b>      | 2.CMC.PSRA2Z3.F732 |
|                   |                     | <b>7/32</b>                            | 13.90                       | <b>0.762</b>      | 2.CMC.PSRA3Z3.F732 |
|                   |                     | 5.7                                    | 14.25                       | 0.20              | 2.CMC42.A2Z3.570.1 |
|                   |                     | 5.7                                    | 14.25                       | 0.50              | 2.CMC42.A3Z3.570.1 |
|                   |                     | 6.0                                    | 15.00                       | 0.20              | 2.CMC42.A2Z3.600.1 |
| 6.350             | <b>1/4</b>          | 6.0                                    | 15.00                       | 0.50              | 2.CMC42.A3Z3.600.1 |
|                   |                     | 6.0                                    | 15.00                       | 1.00              | 2.CMC42.A4Z3.600.1 |
|                   |                     | 5.3                                    | 13.25                       | 0.20              | 2.CMC42.A2Z3.530.1 |
|                   |                     | 5.3                                    | 13.25                       | 0.50              | 2.CMC42.A3Z3.530.1 |
|                   |                     | <b>7/32</b>                            | 13.90                       | <b>0.381</b>      | 2.CMC.PSRA2Z3.F732 |
|                   |                     | <b>7/32</b>                            | 13.90                       | <b>0.762</b>      | 2.CMC.PSRA3Z3.F732 |
|                   |                     | 5.7                                    | 14.25                       | 0.20              | 2.CMC42.A2Z3.570.1 |
|                   |                     | 5.7                                    | 14.25                       | 0.50              | 2.CMC42.A3Z3.570.1 |
| 6.4               |                     | 6.0                                    | 15.00                       | 0.20              | 2.CMC42.A2Z3.600.1 |
|                   |                     | 6.0                                    | 15.00                       | 0.50              | 2.CMC42.A3Z3.600.1 |
|                   |                     | 6.0                                    | 15.00                       | 1.00              | 2.CMC42.A4Z3.600.1 |
|                   |                     | 5.7                                    | 14.25                       | 0.20              | 2.CMC42.A2Z3.570.1 |
|                   |                     | 5.7                                    | 14.25                       | 0.50              | 2.CMC42.A3Z3.570.1 |
| 6.5               |                     | 6.0                                    | 15.00                       | 0.20              | 2.CMC42.A2Z3.600.1 |
|                   |                     | 6.0                                    | 15.00                       | 0.50              | 2.CMC42.A3Z3.600.1 |
|                   |                     | 6.0                                    | 15.00                       | 1.00              | 2.CMC42.A4Z3.600.1 |
|                   |                     | 5.7                                    | 14.25                       | 0.20              | 2.CMC42.A2Z3.570.1 |
|                   |                     | 5.7                                    | 14.25                       | 0.50              | 2.CMC42.A3Z3.570.1 |
| 6.6               |                     | 6.0                                    | 15.00                       | 0.20              | 2.CMC42.A2Z3.600.1 |
|                   |                     | 6.0                                    | 15.00                       | 0.50              | 2.CMC42.A3Z3.600.1 |
|                   |                     | 6.0                                    | 15.00                       | 1.00              | 2.CMC42.A4Z3.600.1 |
|                   |                     | <b>1/4</b>                             | 15.88                       | <b>0.381</b>      | 2.CMC.PSRA2Z3.F14  |
|                   |                     | <b>1/4</b>                             | 15.88                       | <b>0.762</b>      | 2.CMC.PSRA3Z3.F14  |
|                   |                     | <b>1/4</b>                             | 15.88                       | <b>1.524</b>      | 2.CMC.PSRA4Z3.F14  |
|                   |                     | 5.7                                    | 14.25                       | 0.20              | 2.CMC42.A2Z3.570.1 |
| 6.7               |                     | 5.7                                    | 14.25                       | 0.50              | 2.CMC42.A3Z3.570.1 |
|                   |                     | 6.0                                    | 15.00                       | 0.20              | 2.CMC42.A2Z3.600.1 |
|                   |                     | 6.0                                    | 15.00                       | 0.50              | 2.CMC42.A3Z3.600.1 |
|                   |                     | 6.0                                    | 15.00                       | 1.00              | 2.CMC42.A4Z3.600.1 |
|                   |                     | <b>1/4</b>                             | 15.88                       | <b>0.381</b>      | 2.CMC.PSRA2Z3.F14  |
|                   |                     | <b>1/4</b>                             | 15.88                       | <b>0.762</b>      | 2.CMC.PSRA3Z3.F14  |
|                   |                     | <b>1/4</b>                             | 15.88                       | <b>1.524</b>      | 2.CMC.PSRA4Z3.F14  |
|                   |                     | 5.7                                    | 14.25                       | 0.20              | 2.CMC42.A2Z3.570.1 |
|                   |                     | 5.7                                    | 14.25                       | 0.50              | 2.CMC42.A3Z3.570.1 |
|                   |                     | 6.0                                    | 15.00                       | 0.20              | 2.CMC42.A2Z3.600.1 |

| w<br>Slot<br>[mm] | w<br>Slot<br>[inch] | d <sub>1</sub><br>Tool<br>[mm]  [inch] | l <sub>1, max</sub><br>[mm] | r<br>[mm]  [inch] | Item<br>number     |
|-------------------|---------------------|----------------------------------------|-----------------------------|-------------------|--------------------|
| 6.8               |                     | 5.7                                    | 14.25                       | 0.20              | 2.CMC42.A2Z3.570.1 |
|                   |                     | 5.7                                    | 14.25                       | 0.50              | 2.CMC42.A3Z3.570.1 |
|                   |                     | 6.0                                    | 15.00                       | 0.20              | 2.CMC42.A2Z3.600.1 |
|                   |                     | 6.0                                    | 15.00                       | 0.50              | 2.CMC42.A3Z3.600.1 |
|                   |                     | 6.0                                    | 15.00                       | 1.00              | 2.CMC42.A4Z3.600.1 |
|                   |                     | <b>1/4</b>                             | 15.88                       | <b>0.381</b>      | 2.CMC.PSRA2Z3.F14  |
|                   |                     | <b>1/4</b>                             | 15.88                       | <b>0.762</b>      | 2.CMC.PSRA3Z3.F14  |
|                   |                     | <b>1/4</b>                             | 15.88                       | <b>1.524</b>      | 2.CMC.PSRA4Z3.F14  |
| 6.9               |                     | 6.0                                    | 15.00                       | 0.20              | 2.CMC42.A2Z3.600.1 |
|                   |                     | 6.0                                    | 15.00                       | 0.50              | 2.CMC42.A3Z3.600.1 |
|                   |                     | 6.0                                    | 15.00                       | 1.00              | 2.CMC42.A4Z3.600.1 |
|                   |                     | <b>1/4</b>                             | 15.88                       | <b>0.381</b>      | 2.CMC.PSRA2Z3.F14  |
|                   |                     | <b>1/4</b>                             | 15.88                       | <b>0.762</b>      | 2.CMC.PSRA3Z3.F14  |
| 7.0               |                     | <b>1/4</b>                             | 15.88                       | <b>1.524</b>      | 2.CMC.PSRA4Z3.F14  |
|                   |                     | 6.0                                    | 15.00                       | 0.20              | 2.CMC42.A2Z3.600.1 |
|                   |                     | 6.0                                    | 15.00                       | 0.50              | 2.CMC42.A3Z3.600.1 |
|                   |                     | 6.0                                    | 15.00                       | 1.00              | 2.CMC42.A4Z3.600.1 |
|                   |                     | <b>1/4</b>                             | 15.88                       | <b>0.381</b>      | 2.CMC.PSRA2Z3.F14  |
| 7.1               |                     | <b>1/4</b>                             | 15.88                       | <b>0.762</b>      | 2.CMC.PSRA3Z3.F14  |
|                   |                     | <b>1/4</b>                             | 15.88                       | <b>1.524</b>      | 2.CMC.PSRA4Z3.F14  |
|                   |                     | 6.0                                    | 15.00                       | 0.20              | 2.CMC42.A2Z3.600.1 |
|                   |                     | 6.0                                    | 15.00                       | 0.50              | 2.CMC42.A3Z3.600.1 |
|                   |                     | 6.0                                    | 15.00                       | 1.00              | 2.CMC42.A4Z3.600.1 |
| 7.2               |                     | <b>1/4</b>                             | 15.88                       | <b>0.381</b>      | 2.CMC.PSRA2Z3.F14  |
|                   |                     | <b>1/4</b>                             | 15.88                       | <b>0.762</b>      | 2.CMC.PSRA3Z3.F14  |
|                   |                     | <b>1/4</b>                             | 15.88                       | <b>1.524</b>      | 2.CMC.PSRA4Z3.F14  |
|                   |                     | <b>1/4</b>                             | 15.88                       | <b>0.381</b>      | 2.CMC.PSRA2Z3.F14  |
|                   |                     | <b>1/4</b>                             | 15.88                       | <b>0.762</b>      | 2.CMC.PSRA3Z3.F14  |
| 7.3               |                     | <b>1/4</b>                             | 15.88                       | <b>1.524</b>      | 2.CMC.PSRA4Z3.F14  |
|                   |                     | 6.0                                    | 15.00                       | 0.20              | 2.CMC42.A2Z3.600.1 |
|                   |                     | 6.0                                    | 15.00                       | 0.50              | 2.CMC42.A3Z3.600.1 |
|                   |                     | 6.0                                    | 15.00                       | 1.00              | 2.CMC42.A4Z3.600.1 |
|                   |                     | <b>1/4</b>                             | 15.88                       | <b>0.381</b>      | 2.CMC.PSRA2Z3.F14  |
| 7.4               |                     | <b>1/4</b>                             | 15.88                       | <b>0.762</b>      | 2.CMC.PSRA3Z3.F14  |
|                   |                     | <b>1/4</b>                             | 15.88                       | <b>1.524</b>      | 2.CMC.PSRA4Z3.F14  |
|                   |                     | <b>1/4</b>                             | 15.88                       | <b>0.381</b>      | 2.CMC.PSRA2Z3.F14  |
|                   |                     | <b>1/4</b>                             | 15.88                       | <b>0.762</b>      | 2.CMC.PSRA3Z3.F14  |
|                   |                     | <b>1/4</b>                             | 15.88                       | <b>1.524</b>      | 2.CMC.PSRA4Z3.F14  |
| 7.5               |                     | <b>1/4</b>                             | 15.88                       | <b>0.381</b>      | 2.CMC.PSRA2Z3.F14  |
|                   |                     | <b>1/4</b>                             | 15.88                       | <b>0.762</b>      | 2.CMC.PSRA3Z3.F14  |
|                   |                     | <b>1/4</b>                             | 15.88                       | <b>1.524</b>      | 2.CMC.PSRA4Z3.F14  |
|                   |                     | <b>1/4</b>                             | 15.88                       | <b>0.381</b>      | 2.CMC.PSRA2Z3.F14  |
|                   |                     | <b>1/4</b>                             | 15.88                       | <b>0.762</b>      | 2.CMC.PSRA3Z3.F14  |
| 7.6               |                     | <b>1/4</b>                             | 15.88                       | <b>1.524</b>      | 2.CMC.PSRA4Z3.F14  |
|                   |                     | 8.0                                    | 20.00                       | 0.20              | 2.CMC42.A2Z3.800.1 |
|                   |                     | 8.0                                    | 20.00                       | 0.50              | 2.CMC42.A3Z3.800.1 |
| 9.6               |                     | 8.0                                    | 20.00                       | 1.50              | 2.CMC42.A4Z3.800.1 |

## CrazyMill Cool P&S Square - Z3



## ALREADY AVAILABLE: SQUARE VERSION



This product is well established on the market. Due to its special features, great customer benefits are guaranteed specially for difficult-to-machine materials such as stainless steels, titanium, CoCr alloys and super alloys. The design of the cutting edges permits to machine with the same advantages as with the corner radius version. This endmill can plunge perpendicularly into the material and is well adapted for milling of slots, pockets and sides in minimal spaces.

### Advantages

- **SHORT MACHINING TIME** | Up to 5 times faster
- **LONG TOOL LIFE** | Up to 5 times longer
- **HIGH DEGREE OF PROCESS RELIABILITY** | Thanks to greater coolant flow
- **HIGH DEGREE OF PRECISION** | Thanks to specific cutting geometry

### Item table, machining process and cutting data

For the square version, please refer to ToolBook 2020 on page 540 as well as on our website [www.mikrontool.com](http://www.mikrontool.com) for all details on item table, machining process and cutting data.



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