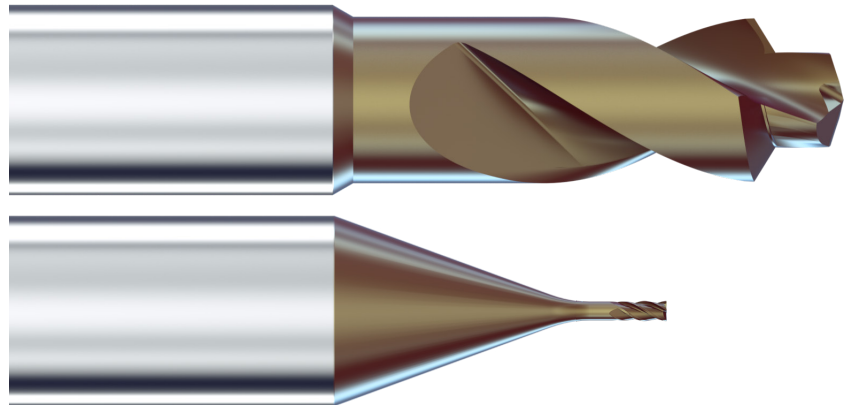


**MIKRON TOOL**



**crazy about**

**hexalobe**

THE NEW MACHINING  
CONCEPT



crazy about new concept

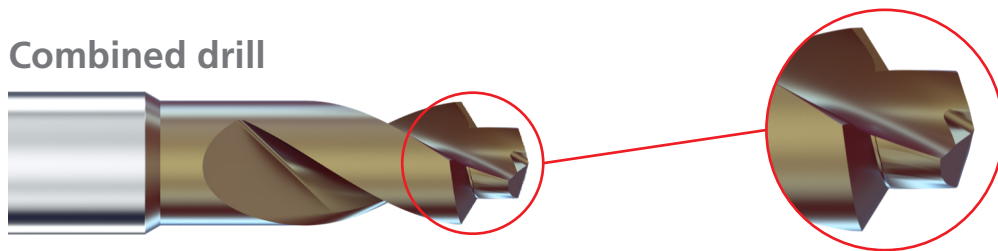


## THE NEW CONCEPT FOR MACHINING YOUR "TORX®" SOCKET

### New concept

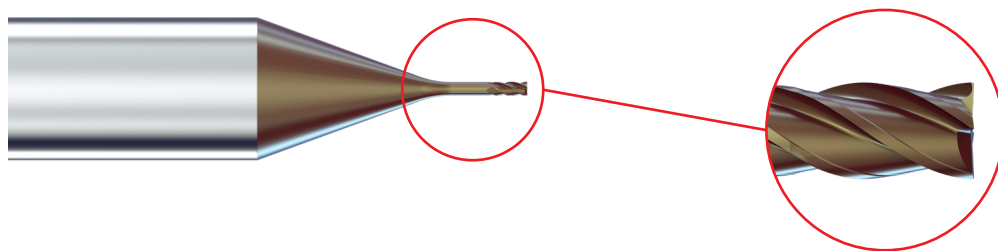
- Drilling - Chamfering - Milling - Deburring: Four operations in three steps with two tools.
- High efficient machining in shorter time for titanium and stainless steel.

### Combined drill



Drilling and chamfering in one step

### Micro endmill



Micro endmill with special micro-grain carbide for high stiffness and edge chipping resistance

### Performance features

- Highest stiffness
- New cutting geometry



### Your advantages

- Shorter milling process
- Highest profile precision
- Excellent surface quality
- Minimal burr



**NEW**

# Best performance machining hexalobular sockets

TURNKEY SOLUTION FOR TITANIUM AND STAINLESS STEEL



## Material

### ■ Titanium

S2

Ti Gr.5 ELI  
TiAl6V4 ELI  
3.7165

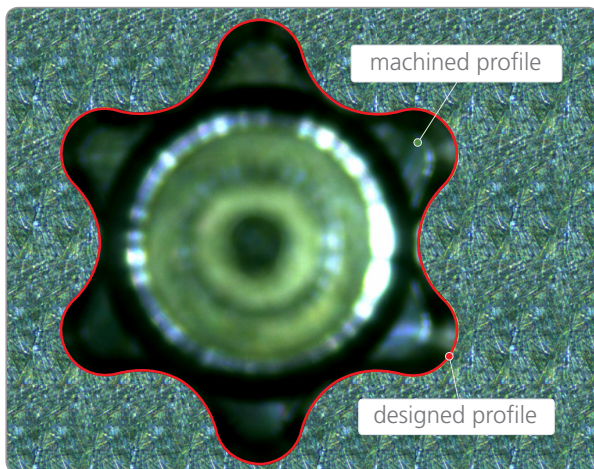
### ■ Stainless Steel

M

316 LM  
X2CrNiMo18-15-3  
1.4441

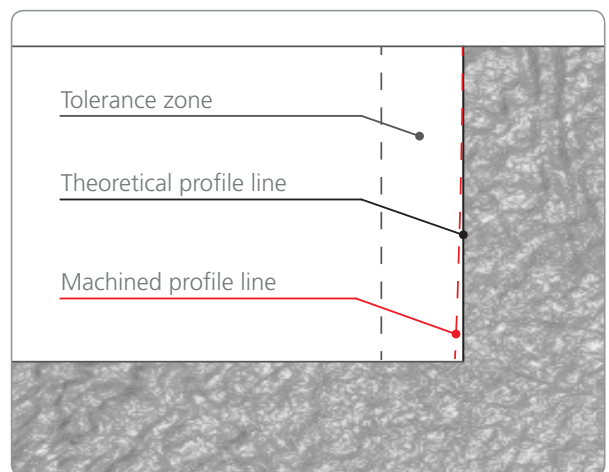
## Shape precision

### ■ Nearly perfect profile



Perfect profile matching.

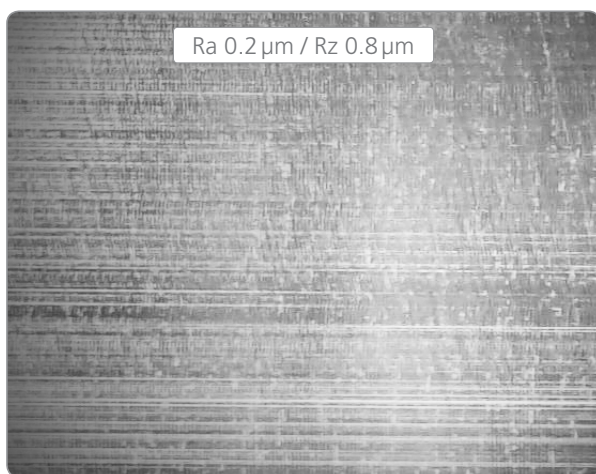
### ■ Perpendicularity



Guaranteed profile geometry.

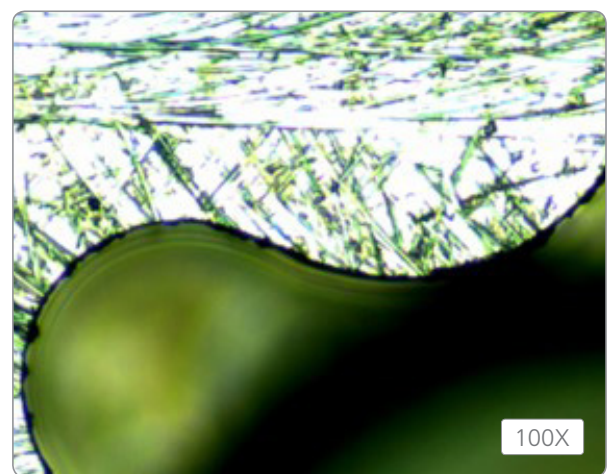
## Quality and performance

### ■ Surface quality



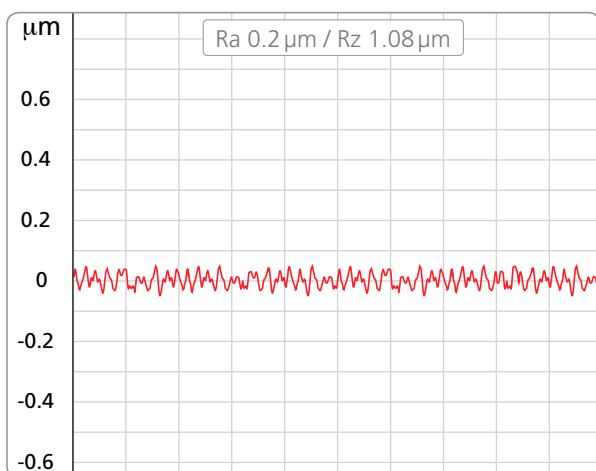
Excellent surface quality.\*<sup>1</sup>

### ■ Nearly burr free



Machining profile with minimal burrs.

### ■ Chamfer roughness



Lowest roughness on chamfer surface.\*<sup>1</sup>

### ■ Milling cycle time

Torx type	Time [s]
T6	27
T8	24
T10	22
T15	22
T20	21
T25	20

Machined on titanium with version 3.5 x d and p = 0.4 x d.\*<sup>1</sup>

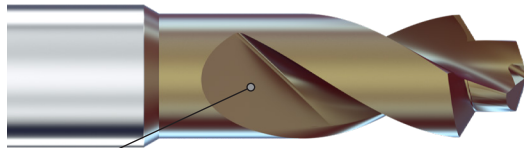
**Note \*1:** The quality and cycle time depends on cutting parameters and machine conditions.

**NEW**

# High efficient drilling hexalobular socket

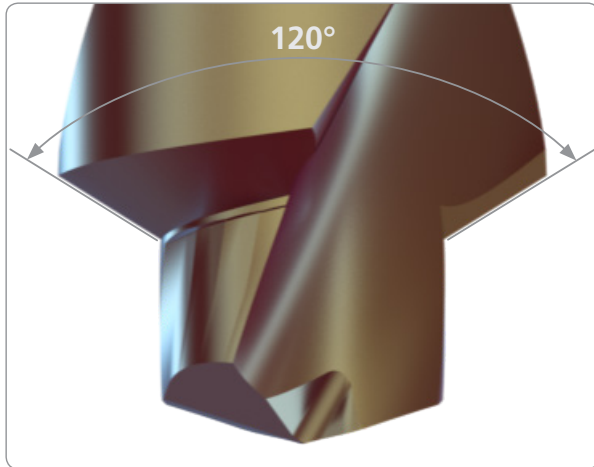
## CrazyDrill Hexalobe

The new combined drill for "Torx®" socket machining



### Features

#### ■ Two in one



The pre-hole and a 120° chamfer are combined in one single operation.

#### ■ Two cutting geometries

Two types of drills have been developed for best machining titanium and stainless steel.

#### ■ Diameter range

Standard diameters for pre-hole drilling "Torx®" socket from T4 to T30.

#### ■ On request

Special sizes available on request.

#### ■ Coating



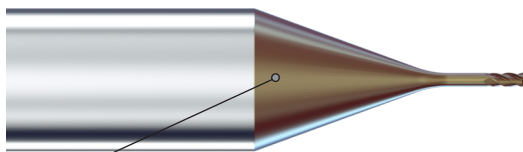
Chrome free coating to avoid cross contamination on medical parts.

# High efficient milling hexalobular socket

**NEW**

## CrazyMill Hexalobe

The new endmill for "Torx®" socket machining

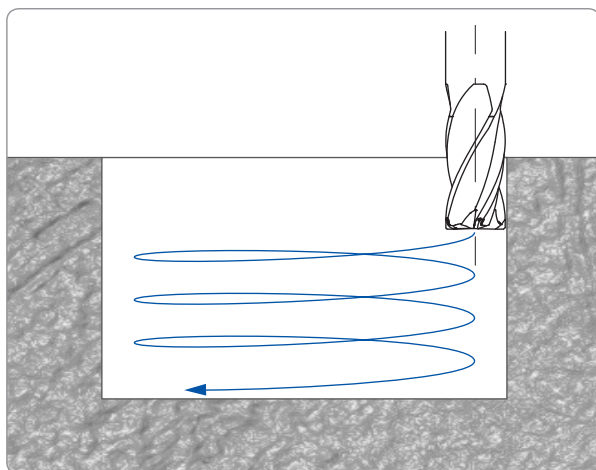


### Performance

#### ■ Real cutting conditions

Tested and approved cutting conditions for best process execution and tool life.

#### ■ Helical interpolation



Higher pitch up to  $0.8 \times d$ .

#### ■ New carbide

A special micro-grain carbide with high stiffness and edge chipping resistance has been developed to guarantee high profile precision.

#### ■ Two cutting geometries

Two types of endmills have been developed for vibration free machining in titanium and stainless steel.

#### ■ Coating



Chrome free coating to avoid cross contamination on medical parts.

**NEW**

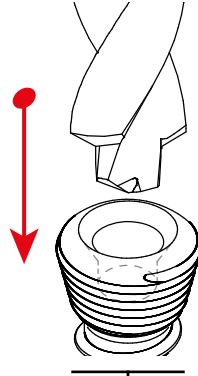
# Machining process

## HELICAL INTERPOLATION FOR TITANIUM



Step 1

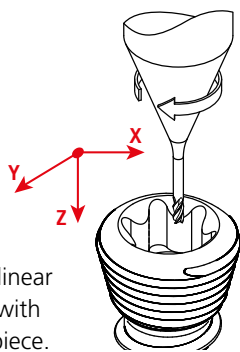
Pre-hole drilling with 120° chamfer



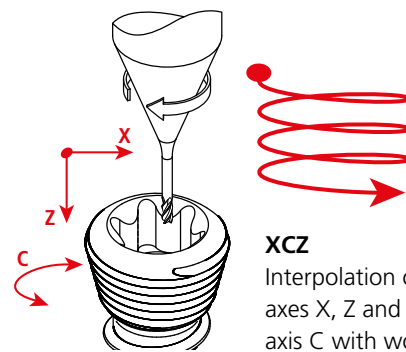
Step 2

Helical interpolation  
XYZ

Helical interpolation  
XCZ



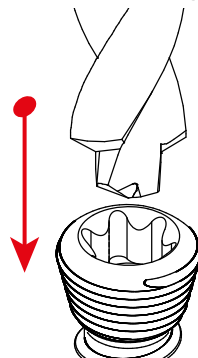
**XYZ**  
Interpolation of linear axes X, Y and Z with stationary workpiece.



**XCZ**  
Interpolation of linear axes X, Z and subspindle axis C with workpiece on rotation.

Step 3

Deburring

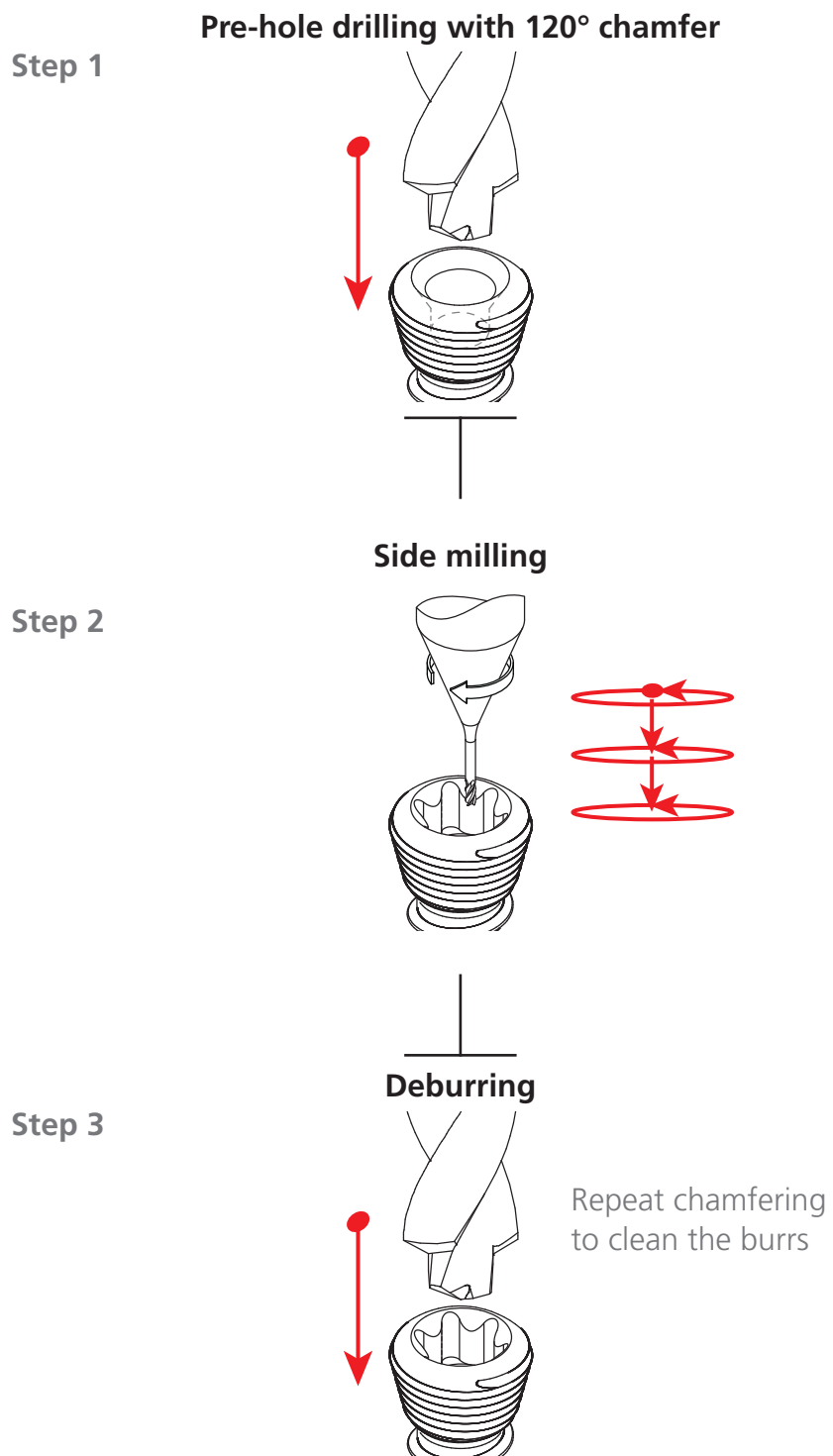


Repeat chamfering to clean the burrs

**Note:** Helical interpolation process is optimal for titanium, saving up to 20% of cycle time in comparison to side milling process.



## SIDE MILLING FOR TITANIUM AND STAINLESS STEEL



# CrazyDrill Hexalobe

**NEW**

**Titanium**

**SST-Inox**

**1 | SHANK**

The reinforced solid carbide shank guarantees stability, high degree of concentricity and hence maximum drilling precision.

**2 | CARBIDE**

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

**3 | NEW COATING**

The high-performance coating eXedur SNP is heat-resistant and super wear-resistant, prevents buildup edges and promotes uniform chip flushing. The result is long tool life.

**4 | 120° CHAMFER**

The pre-hole and a 120° chamfer are combined on one single operation.

**5 | CUTTING GEOMETRY**

Two specific geometries have been developed for the machining of:

- **Titanium**
- **Stainless steel**

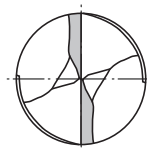
Good chip breaking and quick chip removal are guaranteed.

- Coated
- External cooling

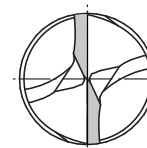
- Coated
- External cooling











Drill tip form



Drill tip form



# CrazyMill Hexalobe

Titanium		SST-Inox	
3.5 x d	5 x d	3.5 x d	5 x d
 Coated	 External cooling	 Coated	 External cooling
			

## NEW

### 1 | SHANK

The robust carbide shank guarantees stable and vibration free milling. A high degree of precision and excellent surface quality are achieved.

### 2 | NEW CARBIDE

Due to the high degree of toughness and low thermal conductivity of titanium and stainless steel, a specially micro-grain carbide with high stiffness and edge chipping resistance has been developed to perfectly meet all requirements in terms of mechanical properties.

### 3 | NEW COATING

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

### 4 | CUTTING GEOMETRY

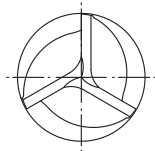
Two specific geometries have been developed for the machining of:

- Titanium
- Stainless steel

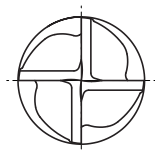
Vibration free cutting for machining with helical interpolation.

Diameter range  
Ø 0.2 - 0.3 mm

Mill tip form  
3 Flute



4 Flute

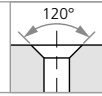


Ø 0.4 - 1.0 mm

**NEW**

# CrazyDrill Hexalobe

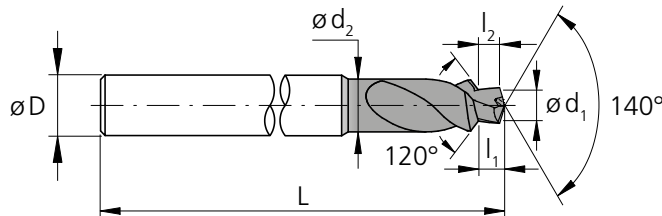
Carbide



Z2



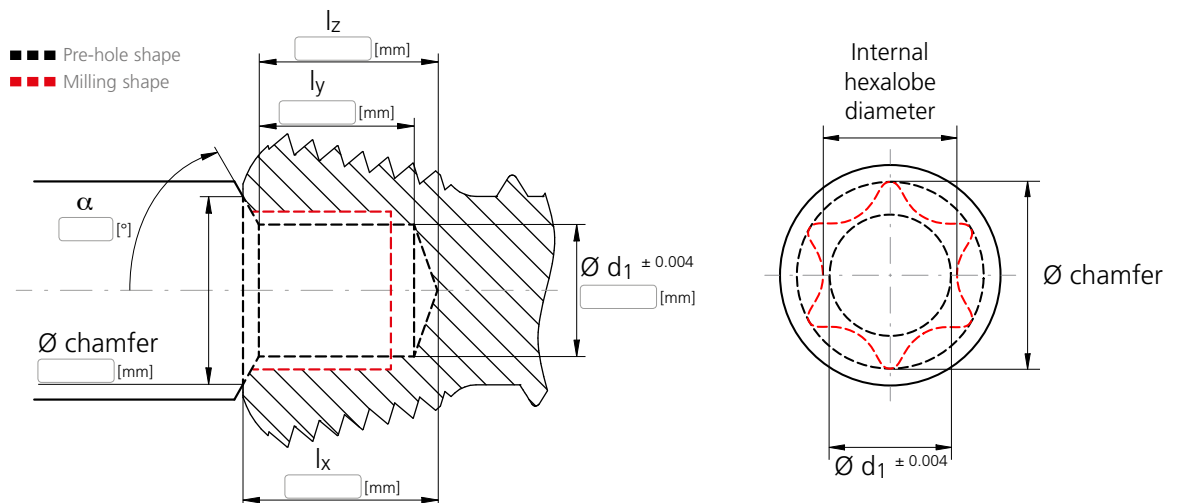
## Dimensions related to ISO 10664



Torx type	$d_1$ 0/-0.008 [mm]	$l_1$ [mm]	$d_2$ [mm]	$l_2$ [mm]	D (h6) [mm]	L [mm]	Item number	Titanium	SST-Inox	Availability
T4	0.9	0.70	1.7	0.56	3	40	2.CD.006090.120	.T	.I	■
T5	1.0	0.87	2.0	0.72	3	40	2.CD.007100.120	.T	.I	■
T5	1.0	0.75	2.0	0.59	3	40	2.CD.006100.120	.T	.I	■
T6	1.2	1.06	2.2	0.88	3	40	2.CD.007120.120	.T	.I	■
T6	1.2	0.86	2.2	0.67	3	40	2.CD.006120.120	.T	.I	■
T7	1.4	1.05	3.0	0.83	3	40	2.CD.006140.120	.T	.I	■
T7	1.4	1.01	3.0	0.79	3	40	2.CD.005140.120	.T	.I	■
T8	1.6	1.40	3.0	1.15	3	40	2.CD.007160.120	.T	.I	■
T8	1.6	1.05	3.0	0.81	3	40	2.CD.005160.120	.T	.I	■
T10	1.9	1.42	4.0	1.13	4	40	2.CD.005190.120	.T	.I	■
T15	2.3	1.78	4.0	1.42	4	50	2.CD.006230.120	.T	.I	■
T20	2.7	2.12	5.0	1.70	6	50	2.CD.006270.120	.T	.I	■
T25	3.1	2.84	6.0	2.36	6	50	2.CD.007310.120	.T	.I	■
T30	3.8	3.52	6.0	2.93	6	50	2.CD.008380.120	.T	.I	■
T30	3.8	3.04	6.0	2.45	6	50	2.CD.007380.120	.T	.I	■

■ Stock item

## Customized combined drill



Mikron Tool has an international team of cutting technology experts who are pleased to meet your specific needs and requirements.

You can: [contact us](mailto:mto@mikron.com)  
[mto@mikron.com](mailto:mto@mikron.com)

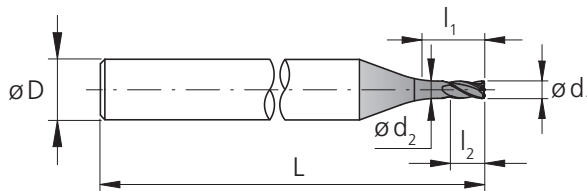
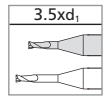
**Regrinding:** This product is not suitable for regrinding.

# CrazyMill Hexalobe

**NEW**



## Short version

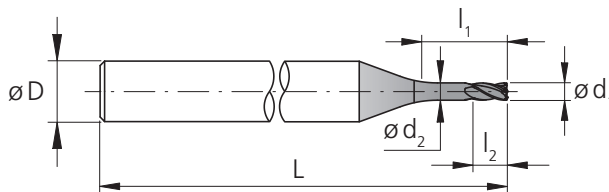
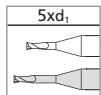


$l_1$  = Effective length  
 $l_2$  = Cutting length

Torx type	$d_1$ 0/-0.01 [mm]	$l_1$ [mm]	$l_2$ [mm]	$d_2$ [mm]	D (h6) [mm]	L [mm]	Z [Teeth]	Item number Titanium	Item number SST-Inox	Availability
T4	0.20	0.70	0.30	0.19	4	40	3	2.CMT35.B1Z3.020.1	2.CMI35.B1Z3.020.1	■
T5	0.25	0.875	0.40	0.23	4	40	3	2.CMT35.B1Z3.025.1	2.CMI35.B1Z3.025.1	■
T6 / T7	0.30	1.05	0.45	0.28	4	40	3	2.CMT35.B1Z3.030.1	2.CMI35.B1Z3.030.1	■
T8 / T10	0.40	1.40	0.60	0.38	4	40	4	2.CMT35.B1Z4.040.1	2.CMI35.B1Z4.040.1	■
T10 / T15	0.50	1.75	0.75	0.47	4	40	4	2.CMT35.B1Z4.050.1	2.CMI35.B1Z4.050.1	■
T20	0.60	2.10	0.90	0.56	4	40	4	2.CMT35.B1Z4.060.1	2.CMI35.B1Z4.060.1	■
T25	0.80	2.80	1.20	0.75	4	40	4	2.CMT35.B1Z4.080.1	2.CMI35.B1Z4.080.1	■
T30	1.00	3.50	1.50	0.94	4	40	4	2.CMT35.B1Z4.100.1	2.CMI35.B1Z4.100.1	■

■ Stock item

## Long version



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

Torx type	$d_1$ 0/-0.01 [mm]	$l_1$ [mm]	$l_2$ [mm]	$d_2$ [mm]	D (h6) [mm]	L [mm]	Z [Teeth]	Item number Titanium	Item number SST-Inox	Availability
T4	0.20	1.00	0.30	0.19	4	40	3	2.CMT35.C1Z3.020.1	2.CMI35.C1Z3.020.1	■
T5	0.25	1.25	0.40	0.23	4	40	3	2.CMT35.C1Z3.025.1	2.CMI35.C1Z3.025.1	■
T6 / T7	0.30	1.50	0.45	0.28	4	40	3	2.CMT35.C1Z3.030.1	2.CMI35.C1Z3.030.1	■
T8 / T10	0.40	2.00	0.60	0.38	4	40	4	2.CMT35.C1Z4.040.1	2.CMI35.C1Z4.040.1	■
T10 / T15	0.50	2.50	0.75	0.47	4	40	4	2.CMT35.C1Z4.050.1	2.CMI35.C1Z4.050.1	■
T20	0.60	3.00	0.90	0.56	4	40	4	2.CMT35.C1Z4.060.1	2.CMI35.C1Z4.060.1	■
T25	0.80	4.00	1.20	0.75	4	40	4	2.CMT35.C1Z4.080.1	2.CMI35.C1Z4.080.1	■
T30	1.00	5.00	1.50	0.94	4	40	4	2.CMT35.C1Z4.100.1	2.CMI35.C1Z4.100.1	■

■ Stock item

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



## Pre-hole drilling



Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	$v_c$ [m/min]	
					3.5 x d1	5 x d1
M	Stainless steel austenitic	1.4435	X2CrNiMo 18-14-3	AISI 316L	25 – 35	
		1.4441	X2CrNiMo 18-15-3	AISI 316LM		
S <sub>2</sub>	Titanium alloys	3.7165	TiAl6V4	ASTM B348 / F136	20 – 30	
		9.9367	TiAl6Nb7	ASTM F1295		

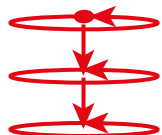
## Helical interpolation (XYZ / X CZ) - 3.5 x d / 5 x d



Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	p (pitch)	
					3.5 x d1	5 x d1
S <sub>2</sub>	Titanium alloys	3.7165	TiAl6V4	ASTM B348 / F136	0.2 - 0.8 x d1	0.1 - 0.4 x d1
		9.9367	TiAl6Nb7	ASTM F1295		

**Note:** In case of  $p = 0.8 \times d1$  decrease the feed  $f_z$  by 30% to increase tool life and profile precision.

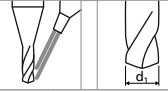
## Side milling - 3.5 x d / 5 x d



Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	$a_{p, max}$	$a_e$
					3.5 x d1	5 x d1
M	Stainless steel austenitic	1.4435	X2CrNiMo 18-14-3	AISI 316L	0.5 x d1	0.1 x d1
		1.4441	X2CrNiMo 18-15-3	AISI 316LM		
S <sub>2</sub>	Titanium alloys	3.7165	TiAl6V4	ASTM B348 / F136	0.5 x d1	variable
		9.9367	TiAl6Nb7	ASTM F1295		

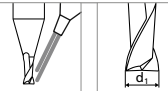
**General advise:** Cutting conditions have been tested and approved with  $n = 30'000 - 40'000$  rpm, different cutting speeds may affect tool life.

$V_c$  [m/min]  
 $f$  [mm/rev]



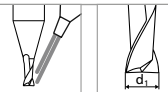
	<b>T4</b> Ød1 0.9mm $f$	<b>T5</b> Ød1 1.0mm $f$	<b>T6</b> Ød1 1.2mm $f$	<b>T7</b> Ød1 1.4mm $f$	<b>T8</b> Ød1 1.6mm $f$	<b>T10</b> Ød1 1.9mm $f$	<b>T15</b> Ød1 2.3mm $f$	<b>T20</b> Ød1 2.7mm $f$	<b>T25</b> Ød1 3.1mm $f$	<b>T30</b> Ød1 3.8mm $f$
	0.02 - 0.03	0.02 - 0.03	0.03 - 0.04	0.03 - 0.04	0.03 - 0.04	0.05 - 0.06	0.05 - 0.06	0.06 - 0.07	0.07 - 0.08	0.07 - 0.08
	0.010 - 0.015	0.010 - 0.015	0.012 - 0.018	0.014 - 0.020	0.015 - 0.025	0.020 - 0.030	0.025 - 0.035	0.025 - 0.040	0.030 - 0.045	0.045 - 0.070

$V_c$  [m/min]  
 $f_z$  [mm]  
 $p$  [mm]



	<b>T4</b> Ød1 0.20mm $v_c$ $f_z$		<b>T5</b> Ød1 0.25mm $v_c$ $f_z$		<b>T6 - T7</b> Ød1 0.30mm $v_c$ $f_z$		<b>T8 - T10</b> Ød1 0.40mm $v_c$ $f_z$		<b>T10 - T15</b> Ød1 0.50mm $v_c$ $f_z$		<b>T20</b> Ød1 0.60mm $v_c$ $f_z$		<b>T25</b> Ød1 0.80mm $v_c$ $f_z$		<b>T30</b> Ød1 1.00mm $v_c$ $f_z$	
	20 - 40	0.0010	25 - 50	0.0010	30 - 60	0.0010	40 - 75	0.0015	50 - 90	0.0020	60 - 100	0.0025	70 - 130	0.0030	80 - 140	0.0040

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



	<b>T4</b> Ød1 0.20mm $v_c$ $f_z$		<b>T5</b> Ød1 0.25mm $v_c$ $f_z$		<b>T6 - T7</b> Ød1 0.30mm $v_c$ $f_z$		<b>T8 - T10</b> Ød1 0.40mm $v_c$ $f_z$		<b>T10 - T15</b> Ød1 0.50mm $v_c$ $f_z$		<b>T20</b> Ød1 0.60mm $v_c$ $f_z$		<b>T25</b> Ød1 0.80mm $v_c$ $f_z$		<b>T30</b> Ød1 1.00mm $v_c$ $f_z$	
	20 - 40	0.0015	25 - 50	0.0025	30 - 60	0.0030	40 - 75	0.0045	50 - 90	0.0060	60 - 100	0.0065	70 - 130	0.0080	80 - 140	0.0100
	20 - 40	0.0015	25 - 50	0.0025	30 - 60	0.0030	40 - 75	0.0045	50 - 90	0.0060	60 - 100	0.0065	70 - 130	0.0080	80 - 140	0.0100

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