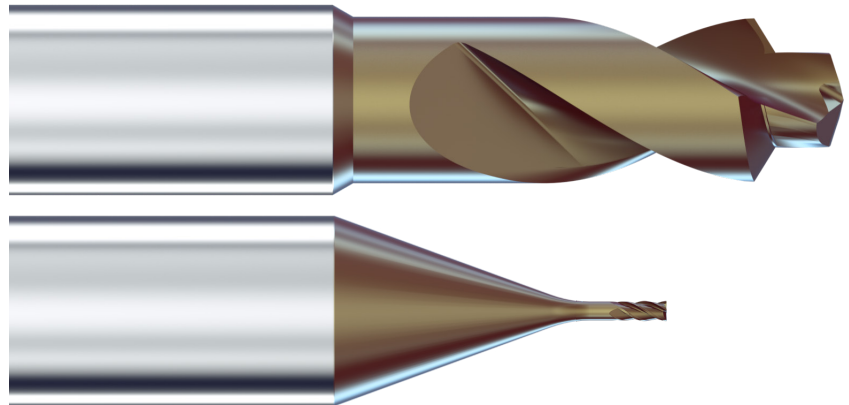


MIKRON TOOL



crazy about

hexalobe

THE NEW MACHINING
CONCEPT



crazy about

new concept

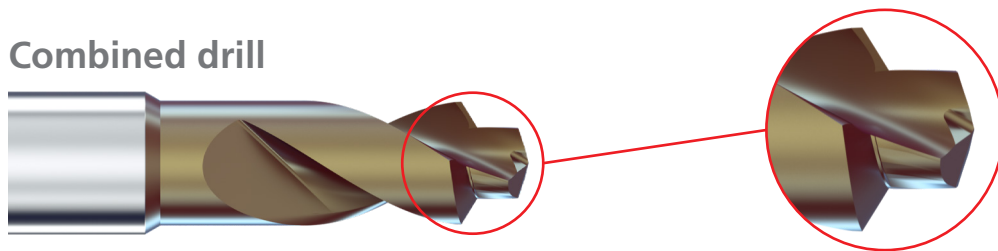


THE NEW CONCEPT FOR MACHINING YOUR "TORX®" SOCKET

New concept

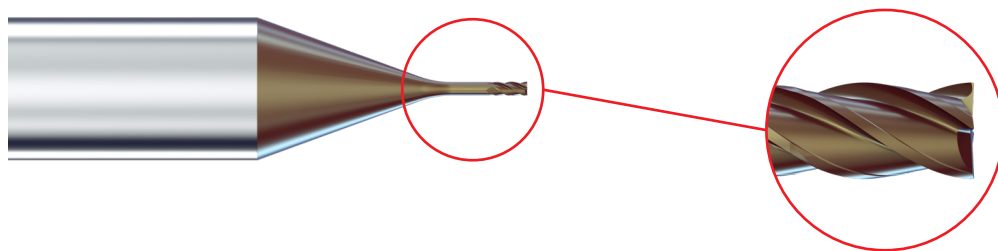
- Drilling - Chamfering - Milling - Deburring: Four operations in three steps with two tools.
- High efficient machining in shorter time for titanium and stainless steel.

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



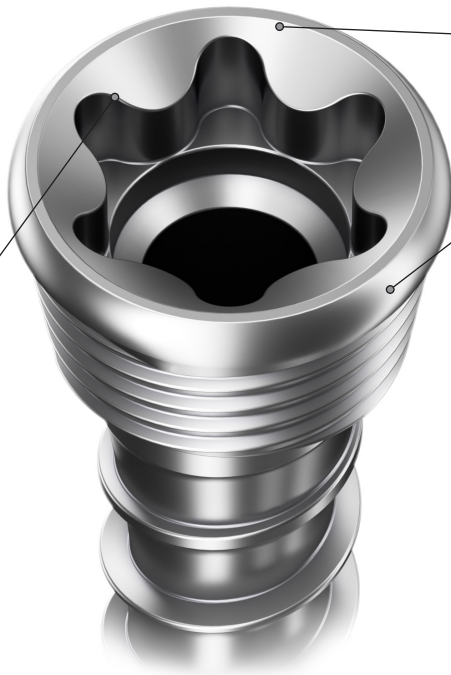
Your advantages

- 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

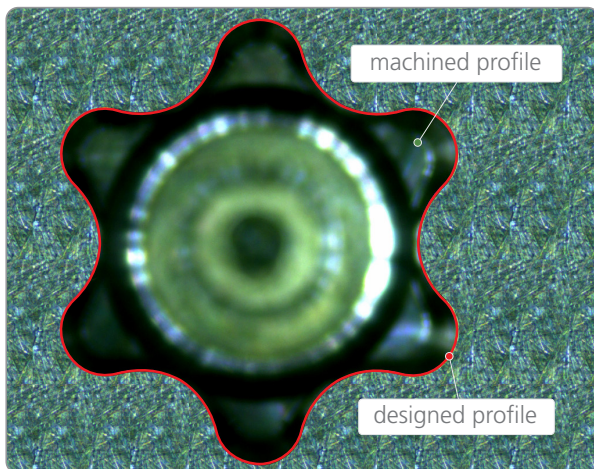
■ Stainless Steel

M

316 LM
X2CrNiMo18-15-3
1.4441

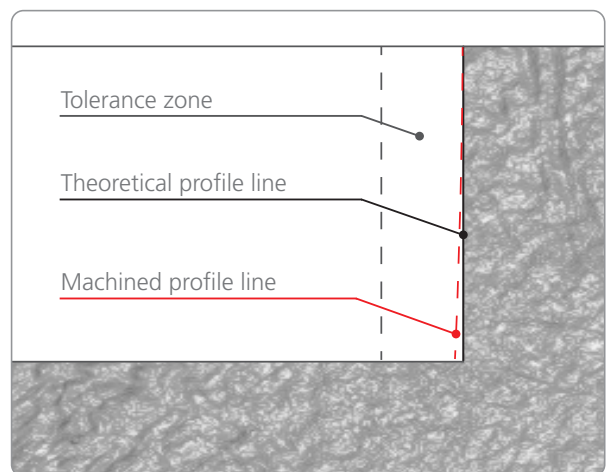
Shape precision

■ Nearly perfect profile



Perfect profile matching.

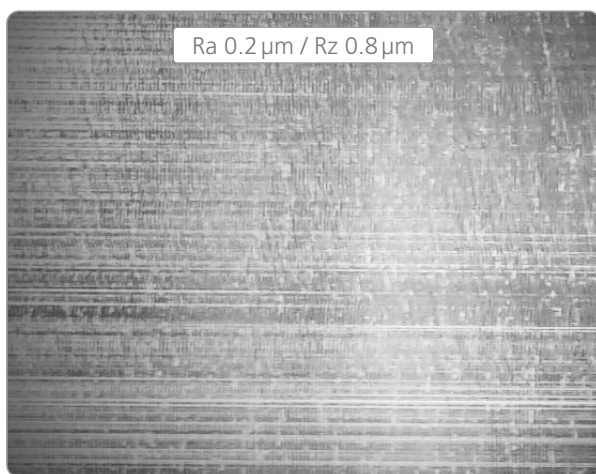
■ Perpendicularity



Guaranteed profile geometry.

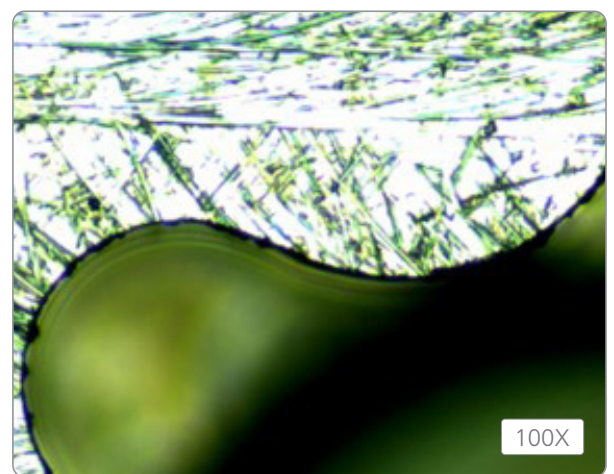
Quality and performance

■ Surface quality



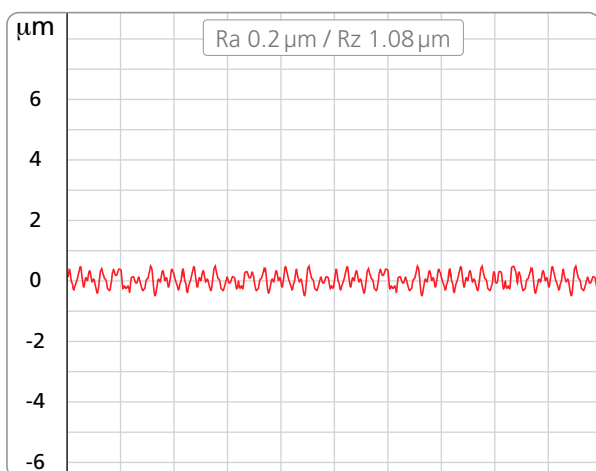
Excellent surface quality.*¹

■ Nearly burr free



Machining profile with minimal burrs.

■ Chamfer roughness



Lowest roughness on chamfer surface.*¹

■ 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 $p = 0.4 \times d$.*¹

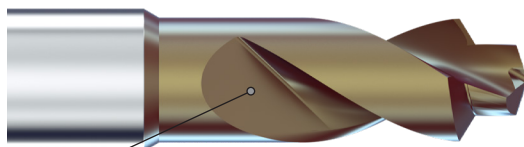
Note *1: The quality and cycle time depends on cutting parameters and machine conditions.

NEW

High efficient drilling hexalobular socket

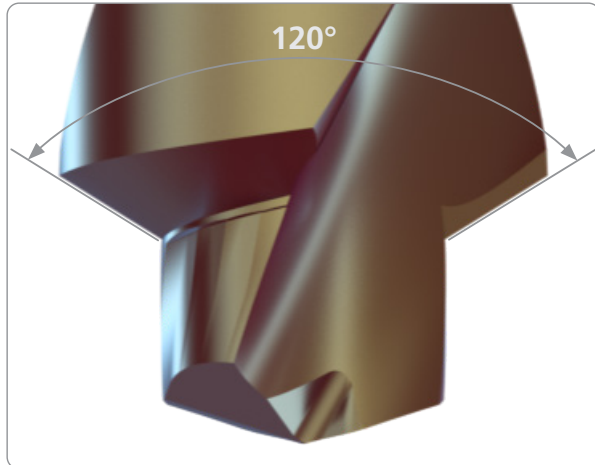
CrazyDrill Hexalobe

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



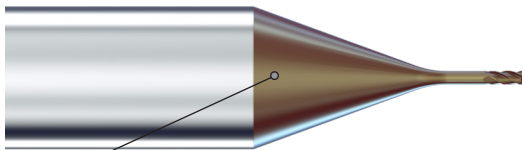
Chrome free coating to avoid cross contamination on medical parts.

High efficient milling hexalobular socket

NEW

CrazyMill Hexalobe

The new endmill for "Torx®" socket machining

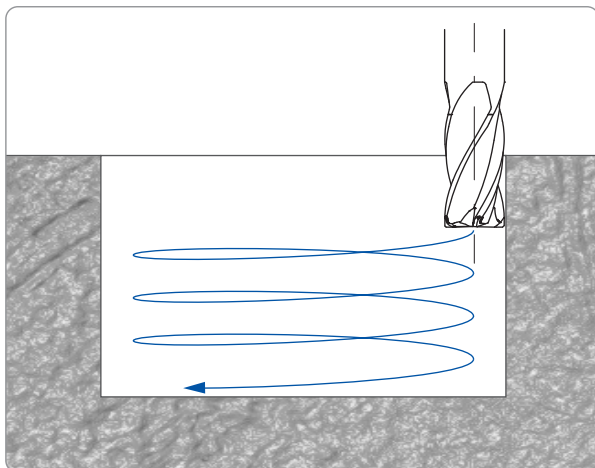


Performance

■ 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

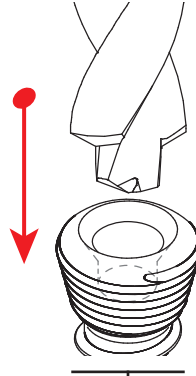
Machining process

HELICAL INTERPOLATION FOR TITANIUM



Step 1

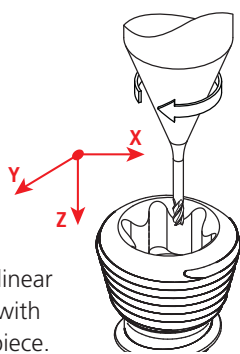
Pre-hole drilling with 120° chamfer



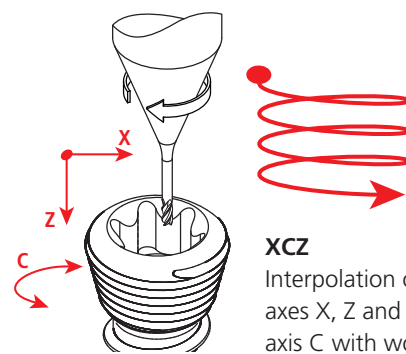
Step 2

Helical interpolation
XYZ

Helical interpolation
XCZ



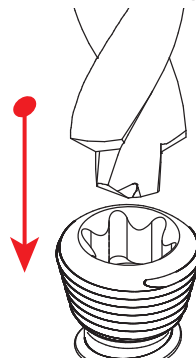
XYZ
Interpolation of linear axes X, Y and Z with stationary workpiece.



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

Step 3

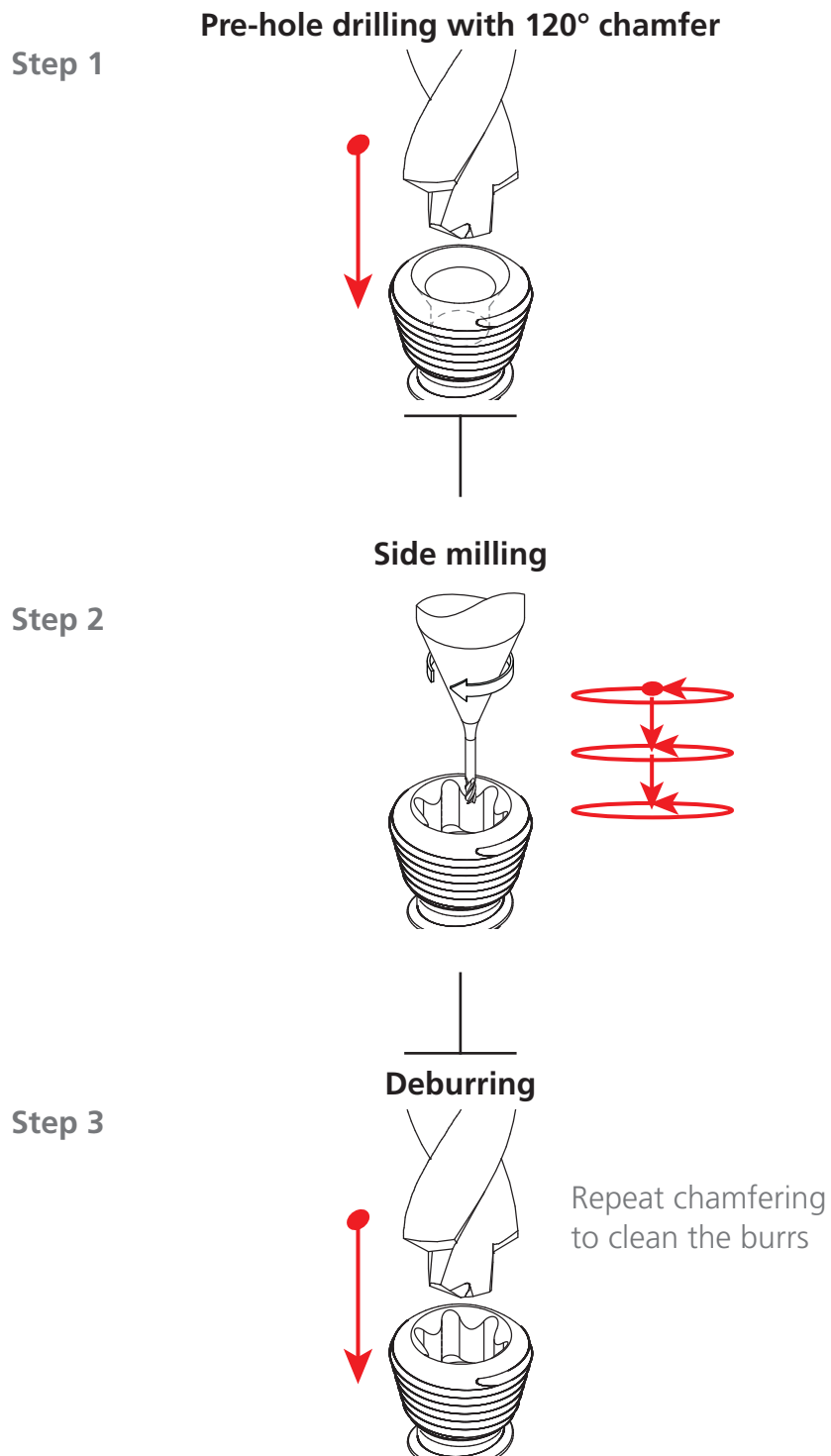
Deburring



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**

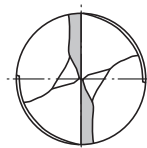
Good chip breaking and quick chip removal are guaranteed.

- Coated
- External cooling

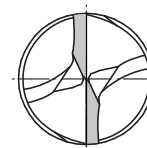
- Coated
- External cooling











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

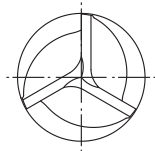
Two specific geometries have been developed for the machining of:

- Titanium
- Stainless steel

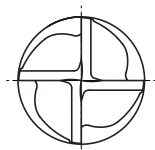
Vibration free cutting for machining with helical interpolation.

Diameter range
Ø 0.2 - 0.3 mm

Mill tip form
3 Flute



4 Flute



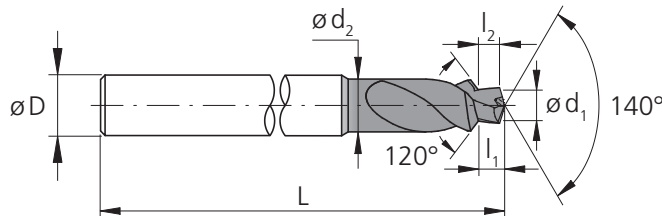
Ø 0.4 - 1.0 mm

NEW

CrazyDrill Hexalobe



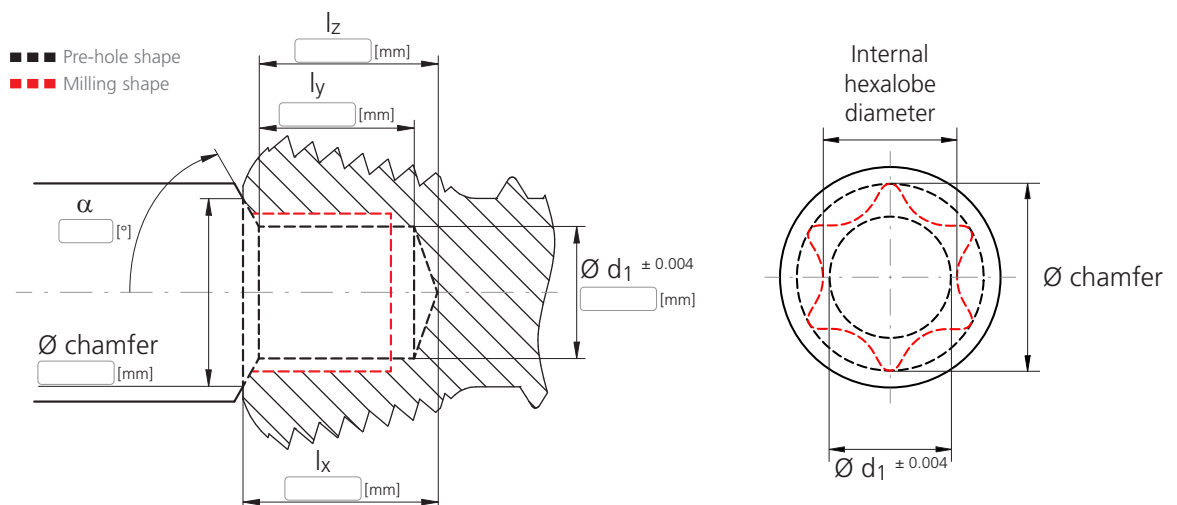
Dimensions related to ISO 10664



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

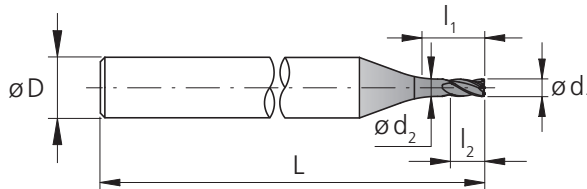
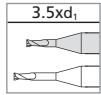
Regrinding: This product is not suitable for regrinding.

CrazyMill Hexalobe

NEW



Short version

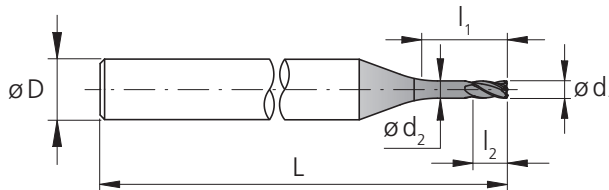
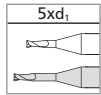


l_1 = Effective length
 l_2 = Cutting length

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]
M	Stainless steel austenitic	1.4435	X2CrNiMo 18-14-3	AISI 316L	25 – 35
		1.4441	X2CrNiMo 18-15-3	AISI 316LM	
S₂	Titanium alloys	3.7165	TiAl6V4	ASTM B348 / F136	20 – 30
		9.9367	TiAl6Nb7	ASTM F1295	

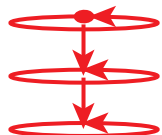
Helical interpolation (XYZ / X CZ) - 3.5 x d / 5 x d



Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	p (pitch)	
					3.5 x d1	5 x d1
S₂	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.

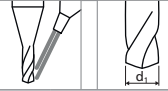
Side milling - 3.5 x d / 5 x d



Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	$a_{p, max}$	a_e
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		
S₂	Titanium alloys	3.7165	TiAl6V4	ASTM B348 / F136	0.5 x d1	variable
		9.9367	TiAl6Nb7	ASTM F1295		

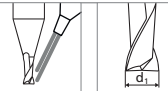
General advise: Cutting conditions have been tested and approved with $n = 30'000 - 40'000$ rpm, different cutting speeds may affect tool life.

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



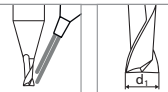
	T4 Ød1 0.9mm f	T5 Ød1 1.0mm f	T6 Ød1 1.2mm f	T7 Ød1 1.4mm f	T8 Ød1 1.6mm f	T10 Ød1 1.9mm f	T15 Ød1 2.3mm f	T20 Ød1 2.7mm f	T25 Ød1 3.1mm f	T30 Ød1 3.8mm f
	0.02 - 0.03	0.02 - 0.03	0.03 - 0.04	0.03 - 0.04	0.03 - 0.04	0.05 - 0.06	0.05 - 0.06	0.06 - 0.07	0.07 - 0.08	0.07 - 0.08
	0.010 - 0.015	0.010 - 0.015	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]



	T4 Ød1 0.20mm		T5 Ød1 0.25mm		T6 - T7 Ød1 0.30mm		T8 - T10 Ød1 0.40mm		T10 - T15 Ød1 0.50mm		T20 Ød1 0.60mm		T25 Ød1 0.80mm		T30 Ød1 1.00mm	
	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z
	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]



	T4 Ød1 0.20mm		T5 Ød1 0.25mm		T6 - T7 Ød1 0.30mm		T8 - T10 Ød1 0.40mm		T10 - T15 Ød1 0.50mm		T20 Ød1 0.60mm		T25 Ød1 0.80mm		T30 Ød1 1.00mm	
	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z
	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

Headquarter and Production

MIKRON SWITZERLAND AG, AGNO

Division Tool

Via Campagna 1

6982 Agno

Switzerland

Phone +41 91 610 40 00

Fax. +41 91 610 40 10

mto@mikron.com

Production and Re grinding

MIKRON GMBH ROTTWEIL

Abteilung Werkzeuge

Berner Feld 71

78628 Rottweil

Germany

Phone +49 741 5380 450

Fax. +49 741 5380 480

info.mtr@mikron.com

North and South America Sales

MIKRON CORP. MONROE

200 Main Street

Monroe, CT 06468

USA

Phone +1 203 261 3100

Fax. +1 203 268 4752

mmo@mikron.com

China Sales

MIKRON TOOL SHANGHAI LTD.

Room A209, Building 3,

No. 526, 3rd East Fute Road,

Shanghai, 200131

P. R. China

Phone +86 21 2076 5671

Fax. +86 21 2076 5562

mtc@mikron.com

地址: 中国 (上海) 自由贸易试验区

中国上海市富特东三路526号3号楼第二层

A209室

邮编: 200131

www.mikrontool.com

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