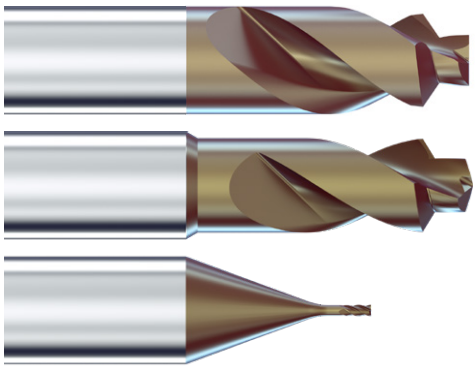
MIKRON TOOL

More than tools



crazy about hexalobe

THE NEW MACHINING CONCEPT

NEW

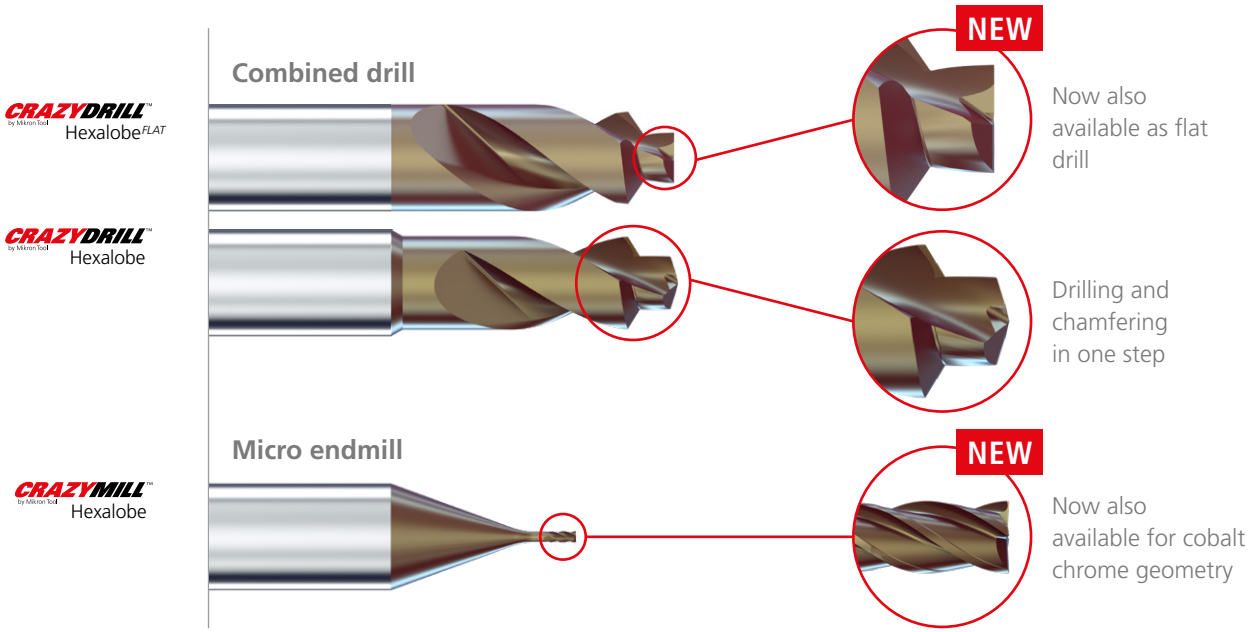
English - USA

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, stainless steel and cobalt chrome.



Performance features

- Highest stiffness
- New cutting geometry

Your advantages

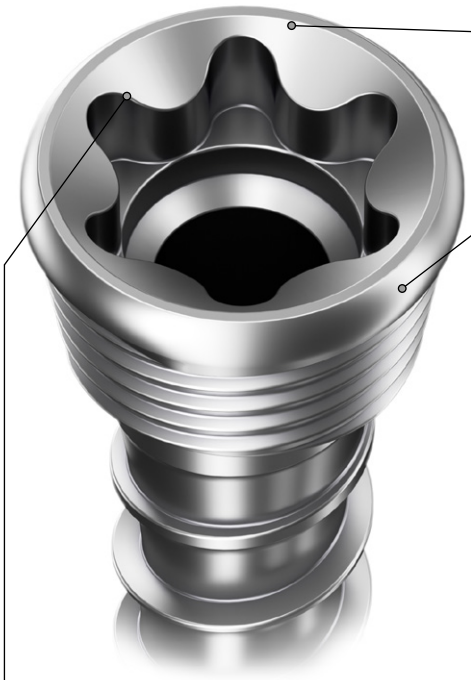
- Shorter milling process
- Highest profile precision
- Excellent surface quality
- Minimal burr

Regrinding: These products are not suitable for regrinding.

Please note: You couldn't find your suitable version of the CrazyDrill Hexalobe / CrazyMill Hexalobe (diameter, length, cutting direction…)? Ask us about our customized versions!

NEW Best performance on hexalobular sockets

TURNKEY SOLUTION FOR TITANIUM, STAINLESS STEEL AND COBALT CHROME

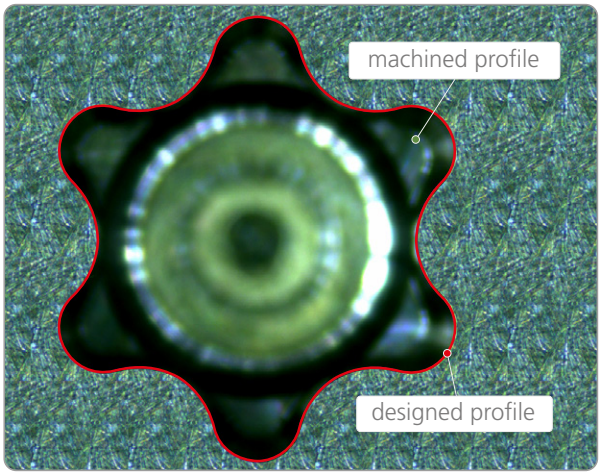


Material

■ Titanium	■ Stainless Steel	■ Cobalt chrome
S2	M	S3
Ti Gr.5 ELI TiAl6V4 ELI 3.7165	316 LM X2CrNiMo18-15-3 1.4441	ASTM F1537 CrCoMo28 ISO 5832-12

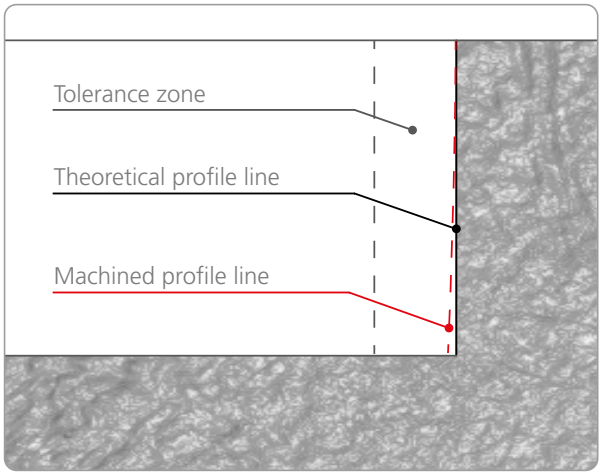
Shape precision

■ Nearly perfect profile



Perfect profile matching.

■ Perpendicularity

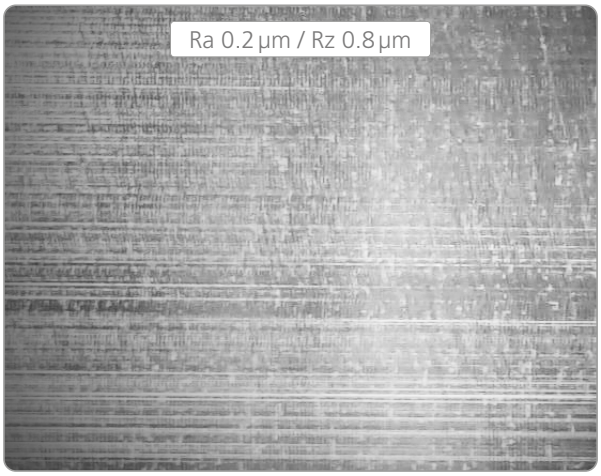


Guaranteed profile geometry.

NEW

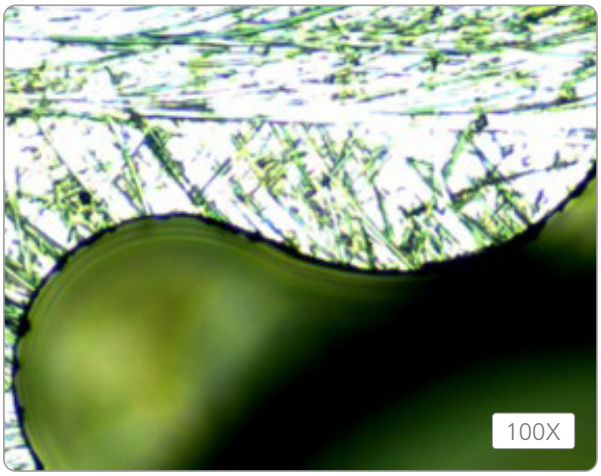
Quality and performance

Surface quality



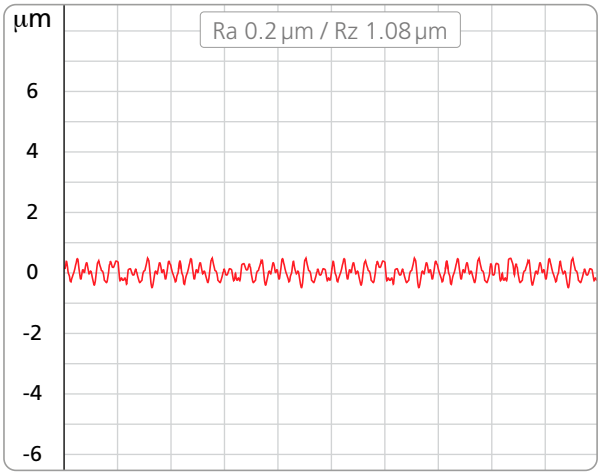
Excellent surface quality.*

Nearly burr free



Machining profile with minimal burrs.

Chamfer roughness



Lowest roughness on chamfer surface.*

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.*

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

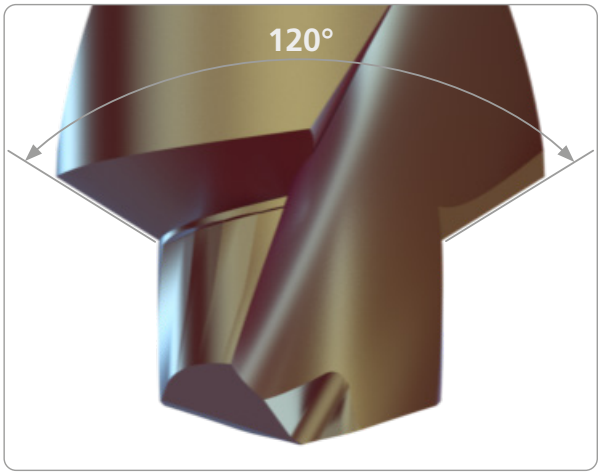
NEW High efficient drilling hexalobular socket

CrazyDrill Hexalobe & CrazyDrill Hexalobe Flat

The new combined drill for TORX® socket machining

Features

■ **Two in one**



The pre-hole (with tip angle of 140° or 180°) and a 120° chamfer are combined in one single operation.

■ **Two cutting geometries**

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

■ **Diameter range**

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

■ **On request**

Special sizes available on request.

■ **Coating**

Cr

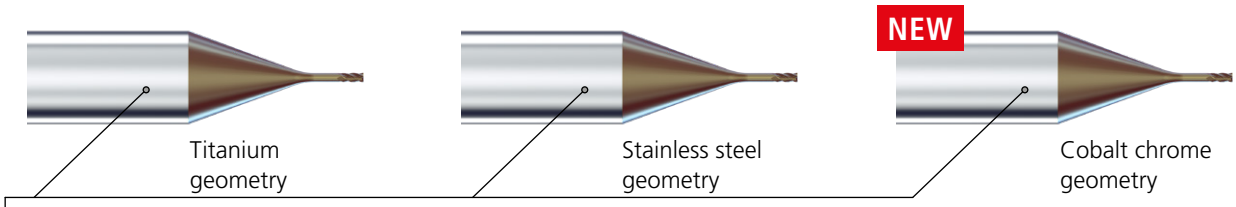
Chrome free coating to avoid cross contamination on medical parts.

High efficient milling hexalobular socket

NEW

CrazyMill Hexalobe

The new endmill for TORX® socket machining



Performance

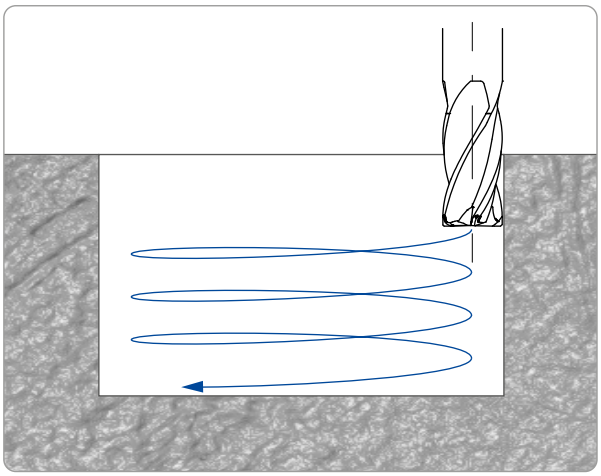
■ Real cutting conditions

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

■ New carbide

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

■ Helical interpolation



Higher pitch up to 0.8 x d.

■ Three cutting geometries

Three types of endmills have been developed for vibration free machining in titanium, stainless steel and cobalt chrome.

■ Coating

Cr

Chrome free coating to avoid cross contamination on medical parts.

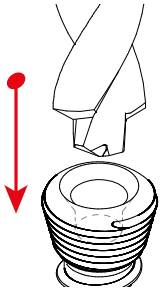
NEW Machining process

HELICAL INTERPOLATION FOR TITANIUM

Ti
S2

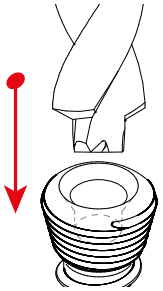
Step 1

Pre-hole drilling with 120° chamfer



140° tip angle

or

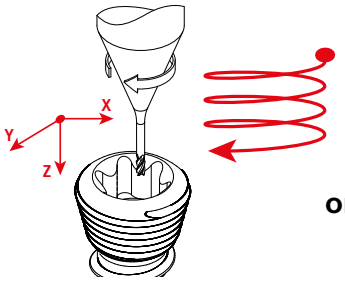


180° tip angle

Step 2

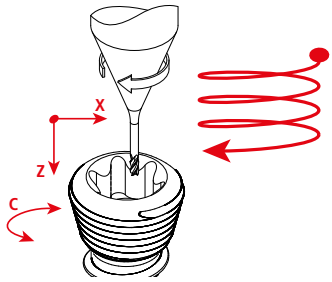
Helical interpolation XYZ

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



or

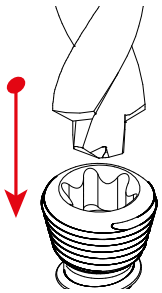
Helical interpolation XCZ



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

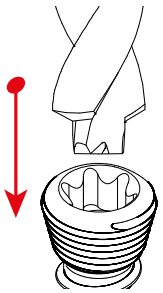
Step 3

Deburring



140° tip angle

or



180° tip angle

Repeat chamfering to clean the burrs.

Titanium: Helical interpolation is the optimum process, saving up to 20% of cycle time in comparison to side milling process (see page 10).

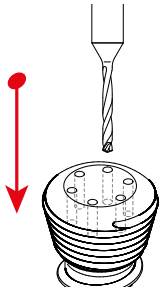
NEW

LOBE DRILLING AND HELICAL INTERPOLATION FOR STAINLESS STEEL AND COBALT CHROME

Step 1

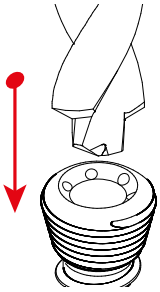
Lobe drilling

SST M | CoCr S3



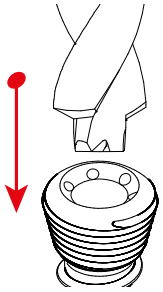
Step 2

Pre-hole drilling with 120° chamfer



140° tip angle

or

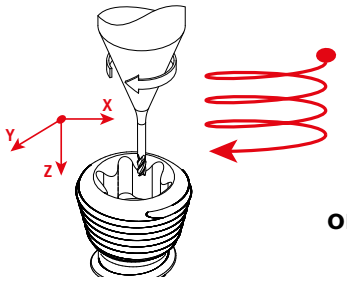


180° tip angle

Step 3

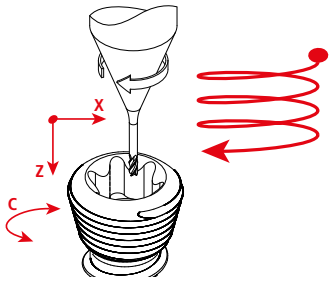
Helical interpolation XYZ

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



or

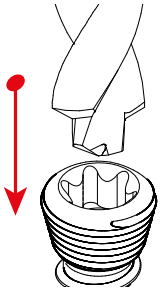
Helical interpolation XCZ



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

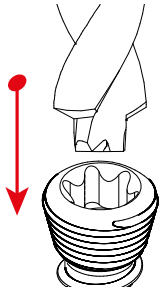
Step 4

Deburring



140° tip angle

or



180° tip angle

Repeat chamfering to clean the burrs.

Stainless steel: With helical interpolation, drilling of the lobes is required. Result: longer tool life, better dimensional control of the TORX® shape and a more stable process in comparison to side milling process (see page 10).

Cobalt Chrome: Helical interpolation is the optimum process, saving up to 20% of cycle time in comparison to side milling process (see page 11).

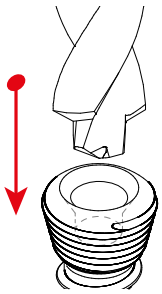
NEW Machining process

SIDE MILLING FOR TITANIUM AND STAINLESS STEEL

Ti S2 | SST M

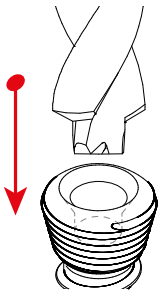
Step 1

Pre-hole drilling with 120° chamfer



140° tip angle

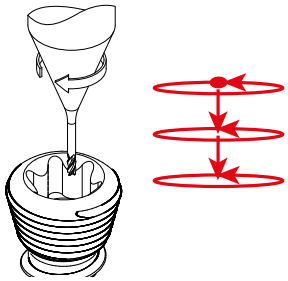
or



180° tip angle

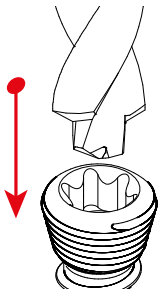
Step 2

Side milling



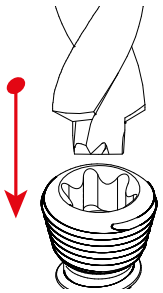
Step 3

Deburring



140° tip angle

or



180° tip angle

Repeat chamfering to clean the burrs.

Titanium: Helical interpolation is the optimum process (see page 8), saving up to 20% of cycle time in comparison to side milling process.

Stainless steel: With helical interpolation, drilling of the lobes is required (see page 9). Result: longer tool life, better dimensional control of the TORX® shape and a more stable process in comparison to side milling process.

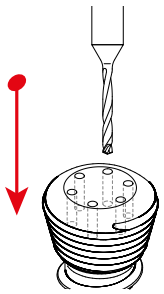
NEW

LOBE DRILLING AND SIDE MILLING FOR COBALT CHROME

CoCr
S3

Step 1

Lobe drilling

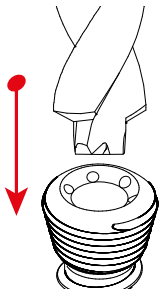


Step 2

Pre-hole drilling with 120° chamfer

140° tip angle

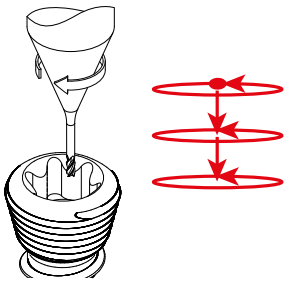
or



180° tip angle

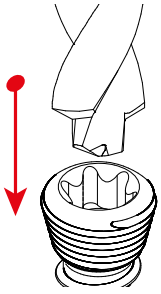
Step 3

Side milling



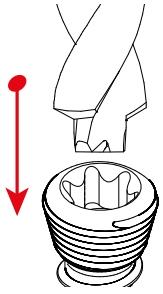
Step 4

Deburring



140° tip angle

or



180° tip angle

Repeat chamfering to clean the burrs.

Cobalt chrome: Helical interpolation is the optimum process (see page 9), saving up to 20% of cycle time in comparison to side milling process.

CRAZYDRILL by Mikron Tool Hexalobe

CrazyDrill Hexalobe

NEW

Tip 140°

Ti

SST / CoCr

Flat 180°

Ti / SST / CoCr

■ Coated
■ External cooling

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.

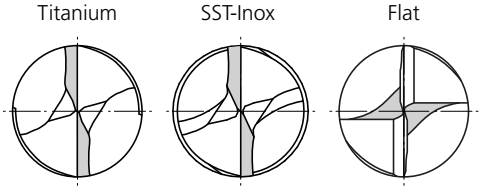
3 | NEW COATING
The high-performance coating eXedur SNP is heat-resistant and super wear-resistant, prevents buildup edges and promotes uniform chip flushing. The result is long tool life.

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 / Cobalt chrome**

Good chip breaking and quick chip removal are guaranteed.

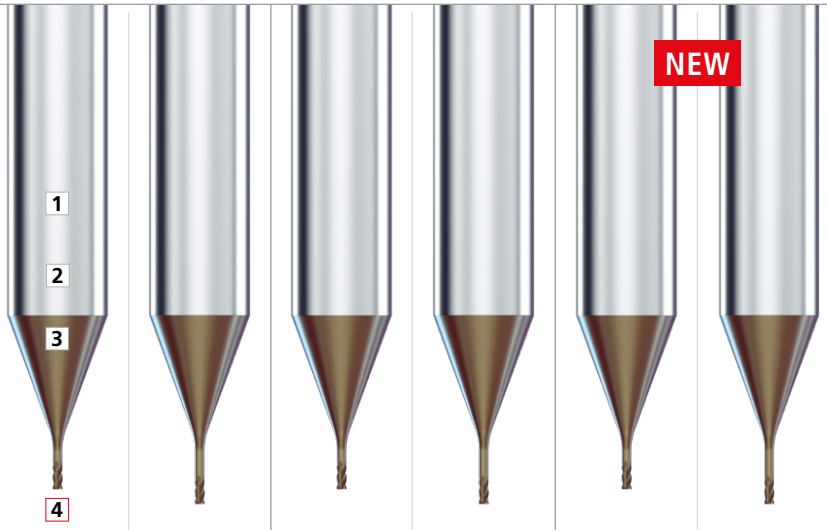
Drill tip



CrazyMill Hexalobe

3.5xd	5xd	3.5xd	5xd	3.5xd	5xd
Ti		SST-Inox		CoCr	

■ 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, stainless steel and cobalt chrom, a specially micro-grain carbide with high stiffnessand edge chipping resistence 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.

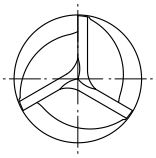
4 | CUTTING GEOMETRY
Three specific geometries have been developed for the machining of:

- **Titanium**
- **Stainless steel**
- **Cobalt chrome**

Vibration free cutting for machining with helical interpolation.

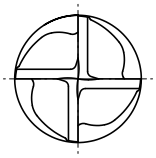
Mill tip form

3 Flutes



Diameter range
Ø .008" - .012"
Ø 0.2 - 0.3 mm

4 Flutes



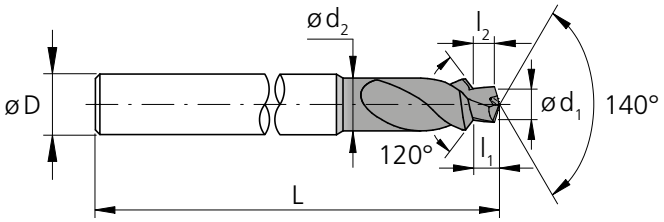
Diameter range
Ø .016" - .039"
Ø 0.4 - 1.0 mm

CrazyDrill Hexalobe - Tip 140°

Carbide | 120° | 140° | Z2 | eXedur SNP

Ø d_1	**.035" - .150"** (0.9 - 3.8 mm)	
Tolerance	**0 - .00031"**	0 - 0.008 mm

Dimensions related to ISO 10664

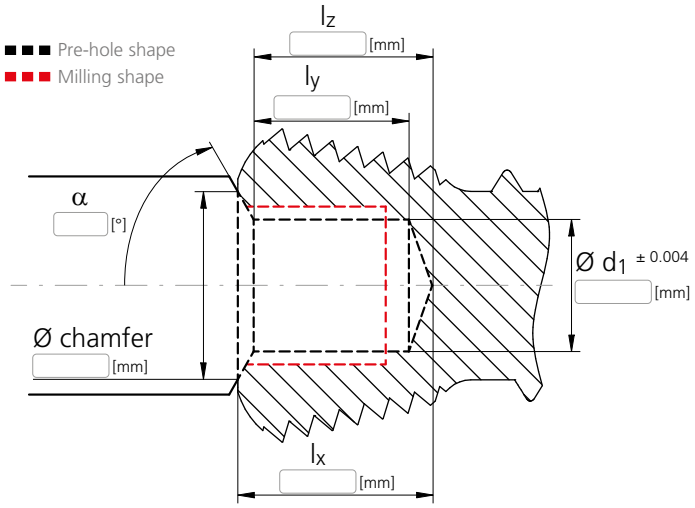


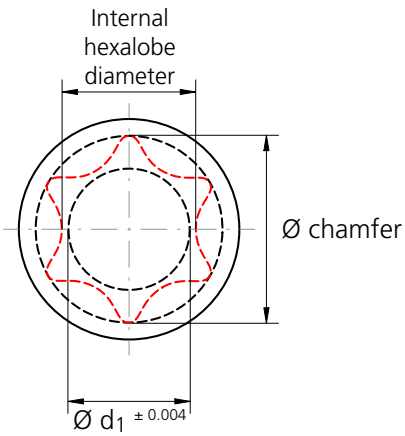
SST M | Ti S2 | CoCr S3

TORX® type	d_1 0/-.00031 [inch]	d_1 0/-0.008 [mm]	l_1 [inch]	l_1 [mm]	d_2 [mm]	l_2 [mm]	D (h6) [mm]	L [inch]	L [mm]	Item number	Titanium	SST-Inox / CoCr	Availability
T4	**.035**	0.9	**.028**	0.70	1.7	0.56	3	**1.57**	40	2.CD.006090.120	.T	.I	■
T5	**.039**	1.0	**.034**	0.87	2.0	0.72	3	**1.57**	40	2.CD.007100.120	.T	.I	■
T5	**.039**	1.0	**.030**	0.75	2.0	0.59	3	**1.57**	40	2.CD.006100.120	.T	.I	■
T6	**.047**	1.2	**.042**	1.06	2.2	0.88	3	**1.57**	40	2.CD.007120.120	.T	.I	■
T6	**.047**	1.2	**.034**	0.86	2.2	0.67	3	**1.57**	40	2.CD.006120.120	.T	.I	■
T7	**.055**	1.4	**.041**	1.05	3.0	0.83	3	**1.57**	40	2.CD.006140.120	.T	.I	■
T7	**.055**	1.4	**.040**	1.01	3.0	0.79	3	**1.57**	40	2.CD.005140.120	.T	.I	■
T8	**.063**	1.6	**.055**	1.40	3.0	1.15	3	**1.57**	40	2.CD.007160.120	.T	.I	■
T8	**.063**	1.6	**.041**	1.05	3.0	0.81	3	**1.57**	40	2.CD.005160.120	.T	.I	■
T10	**.075**	1.9	**.056**	1.42	4.0	1.13	4	**1.57**	40	2.CD.005190.120	.T	.I	■
T15	**.091**	2.3	**.070**	1.78	4.0	1.42	4	**1.97**	50	2.CD.006230.120	.T	.I	■
T20	**.106**	2.7	**.083**	2.12	5.0	1.70	6	**1.97**	50	2.CD.006270.120	.T	.I	■
T25	**.122**	3.1	**.112**	2.84	6.0	2.36	6	**1.97**	50	2.CD.007310.120	.T	.I	■
T30	**.150**	3.8	**.139**	3.52	6.0	2.93	6	**1.97**	50	2.CD.008380.120	.T	.I	■
T30	**.150**	3.8	**.120**	3.04	6.0	2.45	6	**1.97**	50	2.CD.007380.120	.T	.I	■

■ Stock item

Customized combined drill





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CrazyDrill Hexalobe Flat

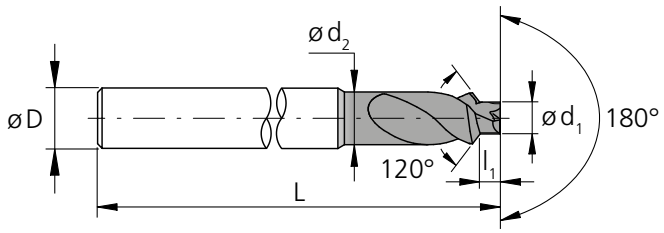
NEW

Carbide	120°	180°	Z2		eXedur SNP

Ø d_1	**.035" - .150"** (0.9 - 3.8 mm)	
Tolerance	**0 - .00031"**	0 - 0.008 mm

NEW

Dimensions related to ISO 10664

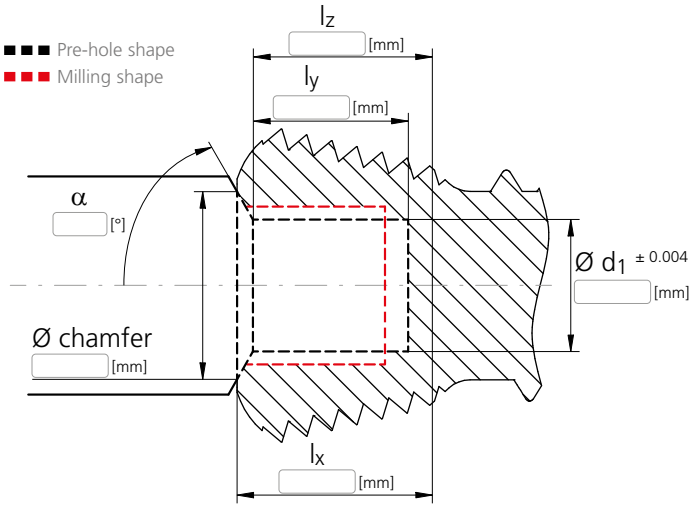


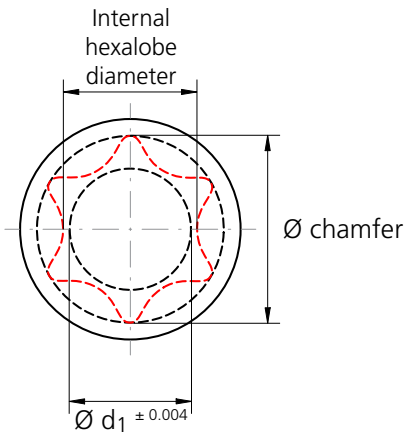
SST	Ti	CoCr
M	S2	S3

TORX® type	d_1 0/-.00031 [inch]	d_1 0/-0.008 [mm]	l_1 [inch]	l_1 [mm]	d_2 [mm]	D (h6) [mm]	L [inch]	L [mm]	Item number	Availability
T4	**.035**	0.9	**.022**	0.56	1.7	3	**1.57**	40	2.CDF.006090.120	■
T5	**.039**	1.0	**.028**	0.72	2.0	3	**1.57**	40	2.CDF.007100.120	■
T5	**.039**	1.0	**.023**	0.59	2.0	3	**1.57**	40	2.CDF.006100.120	■
T6	**.047**	1.2	**.035**	0.88	2.2	3	**1.57**	40	2.CDF.007120.120	■
T6	**.047**	1.2	**.026**	0.67	2.2	3	**1.57**	40	2.CDF.006120.120	■
T7	**.055**	1.4	**.033**	0.83	3.0	3	**1.57**	40	2.CDF.006140.120	■
T7	**.055**	1.4	**.031**	0.79	3.0	3	**1.57**	40	2.CDF.005140.120	■
T8	**.063**	1.6	**.045**	1.15	3.0	3	**1.57**	40	2.CDF.007160.120	■
T8	**.063**	1.6	**.032**	0.81	3.0	3	**1.57**	40	2.CDF.005160.120	■
T10	**.075**	1.9	**.044**	1.13	4.0	4	**1.57**	40	2.CDF.005190.120	■
T15	**.091**	2.3	**.056**	1.42	4.0	4	**1.97**	50	2.CDF.006230.120	■
T20	**.106**	2.7	**.067**	1.70	5.0	6	**1.97**	50	2.CDF.006270.120	■
T25	**.122**	3.1	**.093**	2.36	6.0	6	**1.97**	50	2.CDF.007310.120	■
T30	**.150**	3.8	**.115**	2.93	6.0	6	**1.97**	50	2.CDF.008380.120	■
T30	**.150**	3.8	**.096**	2.45	6.0	6	**1.97**	50	2.CDF.007380.120	■

■ Stock item

Customized combined drill





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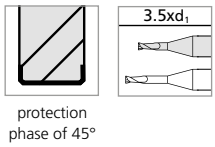
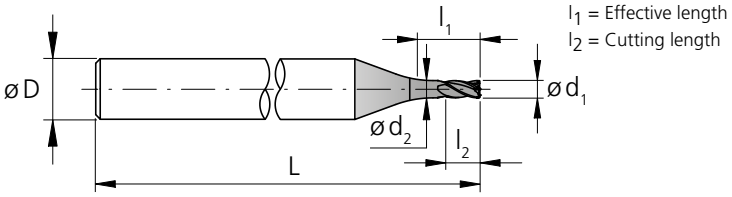
NEW CrazyMill Hexalobe

MILLING WITH EXTERNAL COOLING

Short version





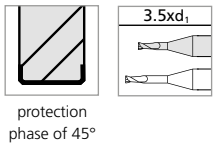
l_1 = Effective length
l_2 = Cutting length

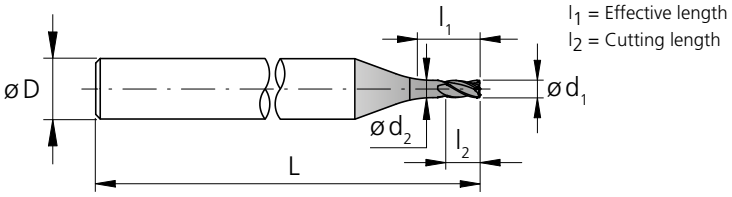
SST M | Ti S2

TORX® type	d_1 0/-.0004 [inch]	d_1 0/-0.01 [mm]	l_1 [inch]	l_1 [mm]	l_2 [mm]	d_2 [mm]	D (h6) [mm]	L [inch]	L [mm]	Z [Teeth]	Item number **Titanium**	Item number **SST-Inox**	Availability
T4	**.008**	0.20	**.028**	0.70	0.30	0.19	4	**1.57**	40	3	2.CMT35.B1Z3.020.1	2.CMI35.B1Z3.020.1	■
T5	**.010**	0.25	**.034**	0.875	0.40	0.23	4	**1.57**	40	3	2.CMT35.B1Z3.025.1	2.CMI35.B1Z3.025.1	■
T6 / T7	**.012**	0.30	**.041**	1.05	0.45	0.28	4	**1.57**	40	3	2.CMT35.B1Z3.030.1	2.CMI35.B1Z3.030.1	■
T8 / T10	**.016**	0.40	**.055**	1.40	0.60	0.38	4	**1.57**	40	4	2.CMT35.B1Z4.040.1	2.CMI35.B1Z4.040.1	■
T10 / T15	**.020**	0.50	**.069**	1.75	0.75	0.47	4	**1.57**	40	4	2.CMT35.B1Z4.050.1	2.CMI35.B1Z4.050.1	■
T20	**.024**	0.60	**.083**	2.10	0.90	0.56	4	**1.57**	40	4	2.CMT35.B1Z4.060.1	2.CMI35.B1Z4.060.1	■
T25	**.031**	0.80	**.110**	2.80	1.20	0.75	4	**1.57**	40	4	2.CMT35.B1Z4.080.1	2.CMI35.B1Z4.080.1	■
T30	**.039**	1.00	**.138**	3.50	1.50	0.94	4	**1.57**	40	4	2.CMT35.B1Z4.100.1	2.CMI35.B1Z4.100.1	■

■ Stock item

NEW Short version





l_1 = Effective length
l_2 = Cutting length

CoCr S3

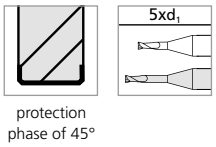
TORX® type	d_1 0/-.0004 [inch]	d_1 0/-0.01 [mm]	l_1 [inch]	l_1 [mm]	l_2 [mm]	d_2 [mm]	D (h6) [mm]	L [inch]	L [mm]	Z [Teeth]	Item number **Cobalt - Chrome**	Availability
T4	**.008**	0.20	**.028**	0.70	0.30	0.19	4	**1.57**	40	3	2.CMR35.B1Z3.020.1	■
T5	**.010**	0.25	**.034**	0.875	0.40	0.23	4	**1.57**	40	3	2.CMR35.B1Z3.025.1	■
T6 / T7	**.012**	0.30	**.041**	1.05	0.45	0.28	4	**1.57**	40	3	2.CMR35.B1Z3.030.1	■
T8 / T10	**.016**	0.40	**.055**	1.40	0.60	0.38	4	**1.57**	40	4	2.CMR35.B1Z4.040.1	■
T10 / T15	**.020**	0.50	**.069**	1.75	0.75	0.47	4	**1.57**	40	4	2.CMR35.B1Z4.050.1	■
T20	**.024**	0.60	**.083**	2.10	0.90	0.56	4	**1.57**	40	4	2.CMR35.B1Z4.060.1	■
T25	**.031**	0.80	**.110**	2.80	1.20	0.75	4	**1.57**	40	4	2.CMR35.B1Z4.080.1	■
T30	**.039**	1.00	**.138**	3.50	1.50	0.94	4	**1.57**	40	4	2.CMR35.B1Z4.100.1	■

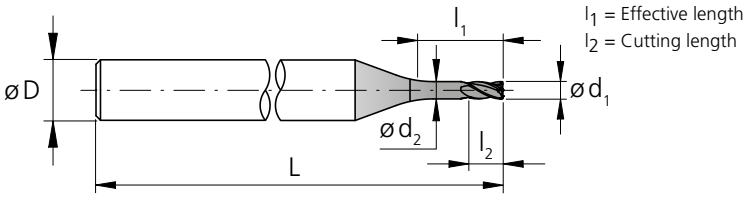
■ Stock item

Carbide	Z 3-4	35°	eXedur SNP	NEW

Ø d_1	**.008" - .039"** (0.2 - 1.0 mm)	
Tolerance	**0 - .0004"**	0 - 0.01 mm

Long version





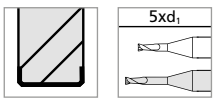
l_1 = Effective length
l_2 = Cutting length

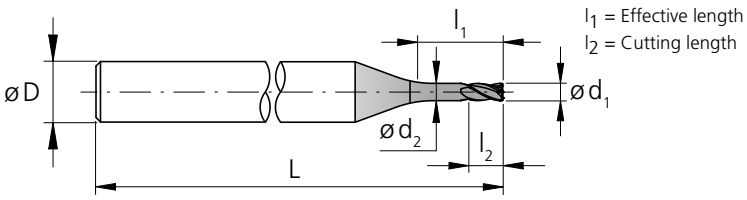
SST M | Ti S2

TORX® type	d_1 0/-.0004 [inch]	d_1 0/-0.01 [mm]	l_1 [inch]	l_1 [mm]	l_2 [mm]	d_2 [mm]	D (h6) [mm]	L [inch]	L [mm]	Z [Teeth]	Item number **Titanium**	Item number **SST-Inox**	Availability
T4	**.008**	0.20	**.039**	1.00	0.30	0.19	4	**1.57**	40	3	2.CMT35.C1Z3.020.1	2.CMI35.C1Z3.020.1	■
T5	**.010**	0.25	**.049**	1.25	0.40	0.23	4	**1.57**	40	3	2.CMT35.C1Z3.025.1	2.CMI35.C1Z3.025.1	■
T6 / T7	**.012**	0.30	**.059**	1.50	0.45	0.28	4	**1.57**	40	3	2.CMT35.C1Z3.030.1	2.CMI35.C1Z3.030.1	■
T8 / T10	**.016**	0.40	**.079**	2.00	0.60	0.38	4	**1.57**	40	4	2.CMT35.C1Z4.040.1	2.CMI35.C1Z4.040.1	■
T10 / T15	**.020**	0.50	**.098**	2.50	0.75	0.47	4	**1.57**	40	4	2.CMT35.C1Z4.050.1	2.CMI35.C1Z4.050.1	■
T20	**.024**	0.60	**.118**	3.00	0.90	0.56	4	**1.57**	40	4	2.CMT35.C1Z4.060.1	2.CMI35.C1Z4.060.1	■
T25	**.031**	0.80	**.157**	4.00	1.20	0.75	4	**1.57**	40	4	2.CMT35.C1Z4.080.1	2.CMI35.C1Z4.080.1	■
T30	**.039**	1.00	**.197**	5.00	1.50	0.94	4	**1.57**	40	4	2.CMT35.C1Z4.100.1	2.CMI35.C1Z4.100.1	■

■ Stock item

NEW Long version





l_1 = Effective length
l_2 = Cutting length

CoCr S3

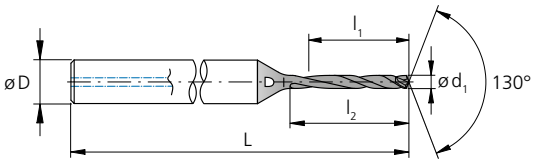
TORX® type	d_1 0/-.0004 [inch]	d_1 0/-0.01 [mm]	l_1 [inch]	l_1 [mm]	l_2 [mm]	d_2 [mm]	D (h6) [mm]	L [inch]	L [mm]	Z [Teeth]	Item number **Cobalt - Chrome**	Availability
T4	**.008**	0.20	**.039**	1.00	0.30	0.19	4	**1.57**	40	3	2.CMR35.C1Z3.020.1	■
T5	**.010**	0.25	**.049**	1.25	0.40	0.23	4	**1.57**	40	3	2.CMR35.C1Z3.025.1	■
T6 / T7	**.012**	0.30	**.059**	1.50	0.45	0.28	4	**1.57**	40	3	2.CMR35.C1Z3.030.1	■
T8 / T10	**.016**	0.40	**.079**	2.00	0.60	0.38	4	**1.57**	40	4	2.CMR35.C1Z4.040.1	■
T10 / T15	**.020**	0.50	**.098**	2.50	0.75	0.47	4	**1.57**	40	4	2.CMR35.C1Z4.050.1	■
T20	**.024**	0.60	**.118**	3.00	0.90	0.56	4	**1.57**	40	4	2.CMR35.C1Z4.060.1	■
T25	**.031**	0.80	**.157**	4.00	1.20	0.75	4	**1.57**	40	4	2.CMR35.C1Z4.080.1	■
T30	**.039**	1.00	**.197**	5.00	1.50	0.94	4	**1.57**	40	4	2.CMR35.C1Z4.100.1	■

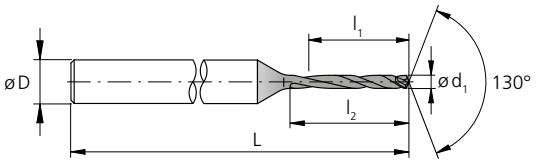
■ Stock item

CrazyDrill SST-Inox - Type IK / IN

Carbide | 8xd1 | 130° | Z2 | eXedur RIP

Ø d_1	**.004" - .118"** (0.1 - 3.0 mm)	
Tolerance	**+ .00016"** **0**	+ 0.004 mm 0





SST M | CoCr S3

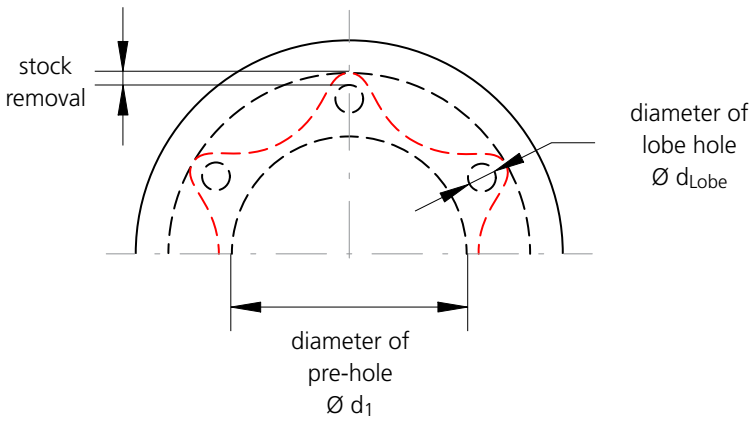
TORX® type	d_1 [inch]	d_1 [mm]	l_1 [inch]	l_1 [mm]	l_2 [mm]	D (h6) [mm]	L [inch]	L [mm]	Item number **Integrated cooling**	Item number **External cooling**	Availability
T4 - T5	**.010**	0.25	**.079**	2.0	2.5	3	**1.50**	38	2.CD.080025.IK	2.CD.080025.IN	■
T6	**.012**	0.30	**.094**	2.4	2.9	3	**1.50**	38	2.CD.080030.IK	2.CD.080030.IN	■
T7	**.014**	0.35	**.110**	2.8	3.4	3	**1.50**	38	2.CD.080035.IK	2.CD.080035.IN	■
T8	**.016**	0.40	**.126**	3.2	3.9	3	**1.50**	38	2.CD.080040.IK	2.CD.080040.IN	■
T10	**.020**	0.50	**.157**	4.0	4.9	3	**1.65**	42	2.CD.080050.IK	2.CD.080050.IN	■
T15	**.024**	0.60	**.189**	4.8	5.9	3	**1.65**	42	2.CD.080060.IK	2.CD.080060.IN	■
T20	**.028**	0.70	**.220**	5.6	6.9	3	**1.77**	45	2.CD.080070.IK	2.CD.080070.IN	■
T25	**.031**	0.80	**.252**	6.4	7.8	3	**1.77**	45	2.CD.080080.IK	2.CD.080080.IN	■
T30	**.039**	1.00	**.315**	8.0	9.8	3	**1.89**	48	2.CD.080100.IK	2.CD.080100.IN	■

■ Stock item

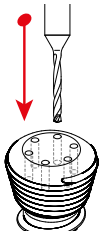
Cutting tool recommendation

Only for process with lobe drilling in stainless steel or chrome cobalt

TORX® type	d_{Lobe} [inch]	d_{Lobe} [mm]	Stock removal [inch]	Stock removal [mm]	Lobe drilling		Pre-hole drilling	Socket milling	
					Integrated cooling	External cooling		Stainless steel	Chrome cobalt
T4	**.010**	0.25	**.0008**	0.02	2.CD.080025.IK	2.CD.080025.IN	2.CD.006090.120.I	2.CMI35.B1Z3.020.1 2.CMI35.C1Z3.020.1	2.CMR35.B1Z3.020.1 2.CMR35.C1Z3.020.1
T5	**.010**	0.25	**.0020**	0.05	2.CD.080025.IK	2.CD.080025.IN	2.CD.007100.120.I	2.CMI35.B1Z3.020.1 2.CMI35.C1Z3.020.1	2.CMR35.B1Z3.020.1 2.CMR35.C1Z3.020.1
T5	**.010**	0.25	**.0020**	0.05	2.CD.080025.IK	2.CD.080025.IN	2.CD.006100.120.I	2.CMI35.B1Z3.020.1 2.CMI35.C1Z3.020.1	2.CMR35.B1Z3.020.1 2.CMR35.C1Z3.020.1
T6	**.012**	0.30	**.0020**	0.05	2.CD.080030.IK	2.CD.080030.IN	2.CD.007120.120.I	2.CMI35.B1Z3.030.1 2.CMI35.C1Z3.030.1	2.CMR35.B1Z3.030.1 2.CMR35.C1Z3.030.1
T6	**.012**	0.30	**.0020**	0.05	2.CD.080030.IK	2.CD.080030.IN	2.CD.006120.120.I	2.CMI35.B1Z3.030.1 2.CMI35.C1Z3.030.1	2.CMR35.B1Z3.030.1 2.CMR35.C1Z3.030.1
T7	**.014**	0.35	**.0028**	0.07	2.CD.080035.IK	2.CD.080035.IN	2.CD.006140.120.I	2.CMI35.B1Z3.030.1 2.CMI35.C1Z3.030.1	2.CMR35.B1Z3.030.1 2.CMR35.C1Z3.030.1
T7	**.014**	0.35	**.0028**	0.07	2.CD.080035.IK	2.CD.080035.IN	2.CD.005140.120.I	2.CMI35.B1Z3.030.1 2.CMI35.C1Z3.030.1	2.CMR35.B1Z3.030.1 2.CMR35.C1Z3.030.1
T8	**.016**	0.40	**.0031**	0.08	2.CD.080040.IK	2.CD.080040.IN	2.CD.007160.120.I	2.CMI35.B1Z4.040.1 2.CMI35.C1Z4.040.1	2.CMR35.B1Z4.040.1 2.CMR35.C1Z4.040.1
T8	**.016**	0.40	**.0031**	0.08	2.CD.080040.IK	2.CD.080040.IN	2.CD.005160.120.I	2.CMI35.B1Z4.040.1 2.CMI35.C1Z4.040.1	2.CMR35.B1Z4.040.1 2.CMR35.C1Z4.040.1
T10	**.020**	0.50	**.0024**	0.06	2.CD.080050.IK	2.CD.080050.IN	2.CD.005190.120.I	2.CMI35.B1Z4.040.1 2.CMI35.C1Z4.040.1 2.CMI35.B1Z4.050.1 2.CMI35.C1Z4.050.1	2.CMR35.B1Z4.040.1 2.CMR35.C1Z4.040.1 2.CMR35.B1Z4.050.1 2.CMR35.C1Z4.050.1
T15	**.024**	0.60	**.0028**	0.07	2.CD.080060.IK	2.CD.080060.IN	2.CD.006230.120.I	2.CMI35.B1Z4.050.1 2.CMI35.C1Z4.050.1	2.CMR35.B1Z4.050.1 2.CMR35.C1Z4.050.1
T20	**.028**	0.70	**.0035**	0.09	2.CD.080070.IK	2.CD.080070.IN	2.CD.006270.120.I	2.CMI35.B1Z4.060.1 2.CMI35.C1Z4.060.1	2.CMR35.B1Z4.060.1 2.CMR35.C1Z4.060.1
T25	**.031**	0.80	**.0039**	0.10	2.CD.080080.IK	2.CD.080080.IN	2.CD.007310.120.I	2.CMI35.B1Z4.080.1 2.CMI35.C1Z4.080.1	2.CMR35.B1Z4.080.1 2.CMR35.C1Z4.080.1
T30	**.039**	1.00	**.0047**	0.12	2.CD.080100.IK	2.CD.080100.IN	2.CD.008380.120.I	2.CMI35.B1Z4.100.1 2.CMI35.C1Z4.100.1	2.CMR35.B1Z4.100.1 2.CMR35.C1Z4.100.1
T30	**.039**	1.00	**.0047**	0.12	2.CD.080100.IK	2.CD.080100.IN	2.CD.007380.120.I	2.CMI35.B1Z4.100.1 2.CMI35.C1Z4.100.1	2.CMR35.B1Z4.100.1 2.CMR35.C1Z4.100.1



Lobe drilling

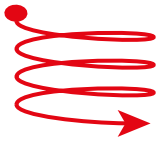


Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	v_c [SFM] | [m/min]	Q_1	Q_x
M	Stainless steel austenitic	1.4435	X2CrNiMo 18-14-3	AISI 316L	**98 – 148** 30 – 45	1 - 4 x d1	1 - 2 x d1
		1.4441	X2CrNiMo 18-15-3	AISI 316LM			
S_3	CrCo alloys	2.4964	CoCr20W15Ni	Haynes 25	**131 – 164** 40 – 50	1 - 3 x d1	1 - 2 x d1
			CrCoMo28	ASTM F1537			
M	Stainless steel austenitic	1.4435	X2CrNiMo 18-14-3	AISI 316L	**98 – 148** 30 – 45	1 - 4 x d1	1 - 2 x d1
		1.4441	X2CrNiMo 18-15-3	AISI 316LM			
S_3	CrCo alloys	2.4964	CoCr20W15Ni	Haynes 25	**131 – 164** 40 – 50	1 - 3 x d1	1 - 2 x d1
			CrCoMo28	ASTM F1537			

Pre-hole drilling

Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	v_c [SFM] | [m/min]
M	Stainless steel austenitic	1.4435	X2CrNiMo 18-14-3	AISI 316L	**82 – 115** 25 – 35
		1.4441	X2CrNiMo 18-15-3	AISI 316LM	
S_2	Titanium alloys	3.7165	TiAl6V4	ASTM B348 / F136	**66 – 98** 20 – 30
		9.9367	TiAl6Nb7	ASTM F1295	
S_3	CrCo alloys	2.4964	CoCr20W15Ni	Haynes 25	**82 – 115** 25 – 35
			CrCoMo28	ASTM F1537	

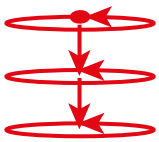
Helical interpolation (XYZ / XCZ) - 3.5 x d / 5 x d



Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	p (pitch) 3.5 x d1	p (pitch) 5 x d1
M	Stainless steel austenitic	1.4435	X2CrNiMo 18-14-3	AISI 316L	0.2 - 0.8 x d1	0.1 - 0.4 x d1
		1.4441	X2CrNiMo 18-15-3	AISI 316LM		
S_2	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		
S_3	CrCo alloys	2.4964	CoCr20W15Ni	Haynes 25	0.2 - 0.8 x d1	0.1 - 0.4 x d1
			CrCoMo28	ASTM F1537		

Note: In case of p = 0.8 x d1 decrease the feed fz by 30% to increase tool life and profile precision.

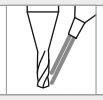
Side milling - 3.5 x d / 5 x d



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		
S_2	Titanium alloys	3.7165	TiAl6V4	ASTM B348 / F136	0.5 x d1	variable
		9.9367	TiAl6Nb7	ASTM F1295		
S_3	CrCo alloys	2.4964	CoCr20W15Ni	Haynes 25	0.5 x d1	0.1 x d1
			CrCoMo28	ASTM F1537		

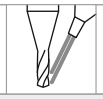
General advise: Cutting conditions have been tested and approved with n = 30'000 - 40'000 rpm, different cutting speeds may affect tool life.

v_c [SFM] | [m/min]
f [IPR] | [mm/rev]



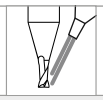
T4 Ød1 .0098" | 0.25 mm	T5 Ød1 .0118" | 0.30 mm	T6 Ød1 .0138" | 0.30 mm	T7 Ød1 .0138" | 0.30 mm	T8 Ød1 .0157" | 0.40 mm	T10 Ød1 .0197" | 0.50 mm	T15 Ød1 .0236" | 0.60 mm	T20 Ød1 .0276" | 0.70 mm	T25 Ød1 .0315" | 0.80 mm	T30 Ød1 .0394" | 1.00 mm
f	f	f	f	f	f	f	f	f	f
.0004 - .0008 0.01 - 0.02	.0004 - .0008 0.01 - 0.02	.0004 - .0008 0.01 - 0.02	.0004 - .0008 0.01 - 0.02	.0004 - .0008 0.01 - 0.02	.0004 - .0008 0.01 - 0.02	.0006 - .0010 0.015 - 0.025	.0006 - .0010 0.015 - 0.025	.0006 - .0010 0.015 - 0.025	.0010 - .0014 0.025 - 0.035
.0008 - .0012 0.02 - 0.03	.0008 - .0012 0.02 - 0.03	.0008 - .0012 0.02 - 0.03	.0008 - .0012 0.02 - 0.03	.0008 - .0012 0.02 - 0.03	.0008 - .0012 0.02 - 0.03	.0006 - .0008 0.015 - 0.020	.0006 - .0008 0.015 - 0.020	.0006 - .0008 0.015 - 0.020	.0020 - .0024 0.05 - 0.06
.0004 - .0006 0.010 - 0.015	.0004 - .0006 0.010 - 0.015	.0004 - .0006 0.010 - 0.015	.0004 - .0006 0.010 - 0.015	.0004 - .0006 0.010 - 0.015	.0004 - .0006 0.010 - 0.015	.0006 - .0010 0.015 - 0.020	.0006 - .0010 0.015 - 0.020	.0006 - .0008 0.015 - 0.025	.0008 - .0012 0.02 - 0.03
.0006 - .0010 0.015 - 0.025	.0006 - .0010 0.015 - 0.025	.0006 - .0010 0.015 - 0.025	.0006 - .0010 0.015 - 0.025	.0006 - .0010 0.015 - 0.025	.0006 - .0010 0.015 - 0.025	.0010 - .0014 0.025 - 0.035	.0010 - .0014 0.025 - 0.035	.0006 - .0008 0.015 - 0.020	.0016 - .0020 0.04 - 0.05

v_c [SFM] | [m/min]
f [IPR] | [mm/rev]



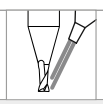
T4 Ød1 .039" | 0.9 mm	T5 Ød1 .039" | 1.0 mm	T6 Ød1 .047" | 1.2 mm	T7 Ød1 .055" | 1.4 mm	T8 Ød1 .063" | 1.6 mm	T10 Ød1 .075" | 1.9 mm	T15 Ød1 .091" | 2.3 mm	T20 Ød1 .106" | 2.7 mm	T25 Ød1 .122" | 3.1 mm	T30 Ød1 .150" | 3.8 mm
f	f	f	f	f	f	f	f	f	f
.0008 - .0012 0.02 - 0.03	.0008 - .0012 0.02 - 0.03	.0012 - .0016 0.03 - 0.04	.0012 - .0016 0.03 - 0.04	.0012 - .0016 0.03 - 0.04	.0020 - .0024 0.05 - 0.06	.0020 - .0024 0.05 - 0.06	.0024 - .0028 0.06 - 0.07	.0028 - .0032 0.07 - 0.08	.0028 - .0032 0.07 - 0.08
.00039 - .00059 0.010 - 0.015	.00039 - .00059 0.010 - 0.015	.00047 - .00071 0.012 - 0.018	.00055 - .00079 0.014 - 0.020	.00059 - .00098 0.015 - 0.025	.00079 - .00118 0.020 - 0.030	.00098 - .00138 0.025 - 0.035	.00098 - .00157 0.025 - 0.040	.00118 - .00177 0.030 - 0.045	.00177 - .00276 0.045 - 0.070
.00020 - .00059 0.005 - 0.015	.00020 - .00059 0.005 - 0.015	.00024 - .00071 0.006 - 0.018	.00028 - .00079 0.007 - 0.020	.00031 - .00098 0.008 - 0.025	.00039 - .00118 0.010 - 0.030	.00047 - .00138 0.012 - 0.035	.00055 - .00157 0.014 - 0.040	.00063 - .00197 0.016 - 0.050	.00079 - .00217 0.020 - 0.055

v_c [SFM] | [m/min]
f_z [IPT] | [mm]
p [inch] | [mm]



T4 Ød1 .0079" | 0.20 mm		T5 Ød1 .0098" | 0.25 mm		T6 - T7 Ød1 .0118" | 0.30 mm		T8 - T10 Ød1 .0157" | 0.40 mm		T10 - T15 Ød1 .0197" | 0.50 mm		T20 Ød1 .0236" | 0.60 mm		T25 Ød1 .0315" | 0.80 mm		T30 Ød1 .0394" | 1.00 mm	
v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z
66 – 131 20 - 40	.00004 0.0010	82 – 164 25 - 50	.00004 0.0010	98 – 197 30 - 60	.00004 0.0010	131 – 246 40 - 75	.00006 0.0015	164 – 295 50 - 90	.00008 0.0020	197 – 328 60 - 100	.00010 0.0025	230 – 427 70 - 130	.00012 0.0030	263 – 459 80 - 140	.00016 0.0040
66 – 131 20 - 40	.00004 0.0010	82 – 164 25 - 50	.00004 0.0010	98 – 197 30 - 60	.00004 0.0010	131 – 246 40 - 75	.00006 0.0015	164 – 295 50 - 90	.00008 0.0020	197 – 328 60 - 100	.00010 0.0025	230 – 427 70 - 130	.00012 0.0030	263 – 459 80 - 140	.00016 0.0040
66 – 131 20 - 40	.00003 0.0008	82 – 164 25 - 50	.00003 0.0008	98 – 197 30 - 60	.00003 0.0008	131 – 246 40 - 75	.00005 0.0012	164 – 295 50 - 90	.00006 0.0015	197 – 328 60 - 100	.00008 0.0020	230 – 427 70 - 130	.00010 0.0025	263 – 459 80 - 140	.00012 0.0030

v_c [SFM] | [m/min]
f_z [IPT] | [mm]
a_p [inch] | [mm]
a_e [inch] | [mm]



T4 Ød1 .0079" | 0.20 mm		T5 Ød1 .0098" | 0.25 mm		T6 - T7 Ød1 .0118" | 0.30 mm		T8 - T10 Ød1 .0157" | 0.40 mm		T10 - T15 Ød1 .0197" | 0.50 mm		T20 Ød1 .0236" | 0.60 mm		T25 Ød1 .0315" | 0.80 mm		T30 Ød1 .0394" | 1.00 mm	
v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z	v_c	f_z
66 – 131 20 - 40	.00006 0.0015	82 – 164 25 - 50	.00010 0.0025	98 – 197 30 - 60	.00012 0.0030	131 – 246 40 - 75	.00018 0.0045	164 – 295 50 - 90	.00024 0.0060	197 – 328 60 - 100	.00026 0.0065	230 – 427 70 - 130	.00032 0.0080	263 – 459 80 - 140	.00039 0.0100
66 – 131 20 - 40	.00006 0.0015	82 – 164 25 - 50	.00010 0.0025	98 – 197 30 - 60	.00012 0.0030	131 – 246 40 - 75	.00018 0.0045	164 – 295 50 - 90	.00024 0.0060	197 – 328 60 - 100	.00026 0.0065	230 – 427 70 - 130	.00032 0.0080	263 – 459 80 - 140	.00039 0.0100
66 – 131 20 - 40	.00005 0.0012	82 – 164 25 - 50	.00008 0.0020	98 – 197 30 - 60	.00010 0.0025	131 – 246 40 - 75	.00014 0.0035	164 – 295 50 - 90	.00018 0.0045	197 – 328 60 - 100	.00020 0.0050	230 – 427 70 - 130	.00024 0.0060	263 – 459 80 - 140	.00030 0.0075

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