

GUHRING

SPECIAL OFFER



NEW

Programming software

for thread milling cutters and drill thread milling cutters

CNC Gühro ThreadMill

- ▶ Thread milling cutters with and without chamfer
- ▶ Universal thread milling cutters
- ▶ Drill thread milling cutters
- ▶ Micro-thread milling cutters
- ▶ Thread milling cutters for hardened steels



Solid carbide thread milling cutters

GUHRING – YOUR WORLD-WIDE PARTNER

CNC Gühro



ThreadMill

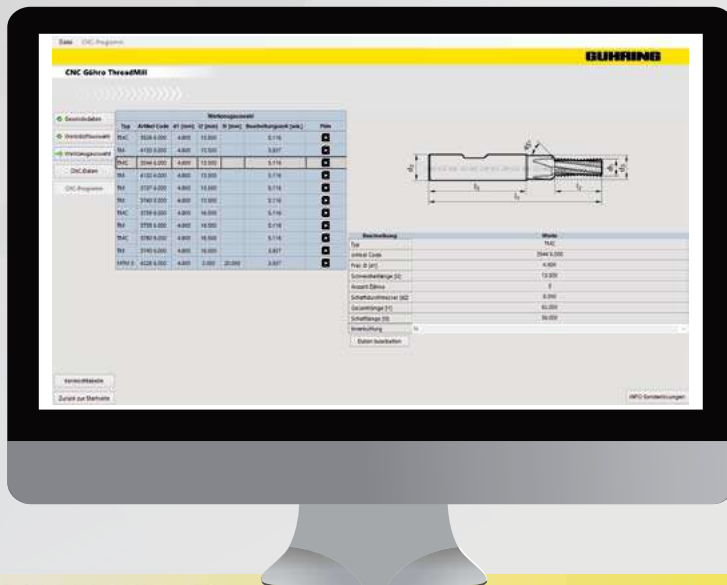
Free programming software

for thread milling cutters and drill thread milling cutters



In order to make the machining with Gühring thread milling cutters even more user friendly, we have developed the intuitive "CNC Gühro Thread Mill".

"CNC Gühro Thread Mill" is available free-of-charge. Simply download it from our homepage www.guehring.de.



To the optimal CNC programme in five steps

1. Specify the thread data
Select from all current thread standards
2. Select the material
You are always referred to the optimal parameters
3. Select the tool
Technical data, drawing, machining time and video simplify selection
4. Record CNC data
Enter required milling strategy and parameters
5. Receive CNC programme with code and data sheet
Programming data (Sinumerik, Haidenhain, Fanuc, Philips, Mazatrol or Hurco) are imported and automatically recognised



with HB clamping surface

TM SP – Thread milling cutters without chamfer

Simple option for thread milling one thread size

Thread types: M, MF, UNF, UNC, NPT, G

p. 8



with HB clamping surface

TMC SP – Thread milling cutters with 45° chamfer

High productivity thanks to countersinking and thread milling with one tool, high running smoothness and low lateral forces.

Thread types: M, MF, G

p. 18



with HB clamping surface

TMU SP – Universal thread milling cutter with recessed neck

For different thread sizes with equal pitch, i.e. thread M30x1.5, milling cutter Ø12xM1.5, Ø16xM1.5 or Ø20xM1.5

Thread types: M, MF, G, NPT, M/MF, for external threads, UN

p. 24



DTMC SP – Drill thread milling with 2 flutes and 45° chamfer

High productivity thanks to drilling, countersinking and thread milling one thread size with only one tool. Application only in aluminium, cast iron (GG-GGG), brass and plastics.

Thread types: M

p. 32

MTM SP – Micro-thread milling cutters

p. 36

MTM 3 SP

Thread size and pitch are predetermined



(3xD) M1.6 – M16, G1/8" - G2", UNC, UNF, UNJC, UNJF, MJ, sol. carb. TiCN

MTM 1 SP

Universal production of nominal thread diameters up to maximum pitch



(3xD) M1.4 – M10, solid carbide TiCN

MTMH 3 SP

Machining of hardened steels from 45 HRC – 65 HRC



(2xD – 3xD) M2 – M12, solid carbide TiAlN

TECHNICAL SECTION

p. 45

 	Thread depth	≤2xD				≤2.5xD		≤2xD	
	Tool material	Solid carbide							
	Type	TM SP	TM SP	TM SP	TM SP	TM SP	TM SP	TMC SP	TMC SP
	Surface								
	Coolant delivery			axial	axial	axial	axial	axial	axial
THROUGH HOLES AND BLIND HOLES	Shank form	HA	HB	HA	HB	HA	HB	HA	HB
	Spiral	27°	27°	27°	27°	27°	27°	10°	10°
									
	Thread type	Guhring no. / page							
	M	4132 11	4133 11	3737 10	3743 10	3735 12	3740 12	3526 20	3544 20
	MF			3737 10	3743 10			3528 21	3546 21
	UNC			4134 13	4135 13				
	UNF			4136 14	4137 14				
	G			3745 16	3748 16			3515 22	3533 22
	NPT			3753 15	3754 15				
	EG M	EG-threads can be produced with every thread milling cutter type and dimension							
	MJ								
	UNJC								
	UNJF								
	Suitable lubricant								

○ = Air

● = Neat oil

◐ = Soluble oil

□ = dry

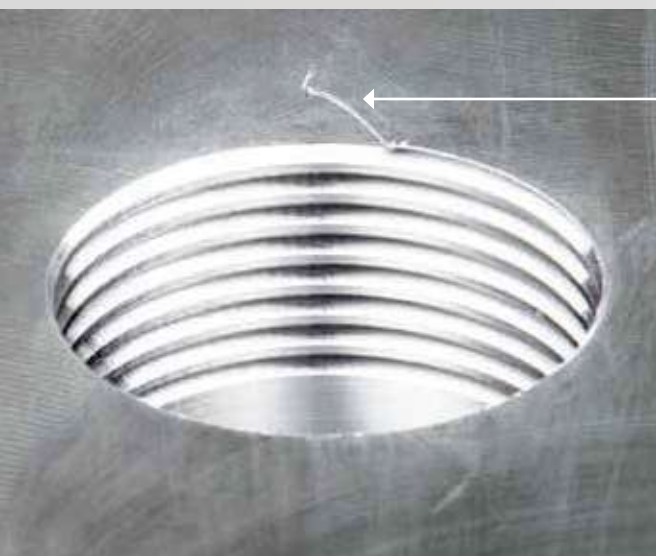
Detailed cutting values see p. 60



universal				≤3xD			≤2xD		≤2.5xD
Solid carbide									
TMU SP	TMU SP	TMU SP	TMU SP	MTM 3 SP	MTM 1 SP	MTMH3 SP	DTMC SP	DTMC SP	DTMC SP
									
axial	axial	axial	axial					radial	radial
HA	HB	HA	HB	HA	HA	HA	HA	HA	HA
15°	15°	15°	15°	15°	15°	15°	27°	27°	27°
		 for external threads	 for external threads		 universal	 hard machining			
Guhring no. / page									
3541 26	3556 26	4162 30	4163 30	4226 38	4225 39	4227 44	3778 34	3779 34	3783 35
3541 26	3556 26	4162 30	4163 30		4225 39				
3595 28	3596 28			4223 41					
3595 28	3596 28			4223 41					
3542 27	3557 27	3542 27	3557 27	4228 40					
3768 29	3769 29								
EG-threads can be produced with every thread milling cutter type and dimension							-		
				4214 43					
				4215 42					
				4215 42					
									

Burr-free thread machining at the thread intake

no problem for Guhring's thread milling cutters



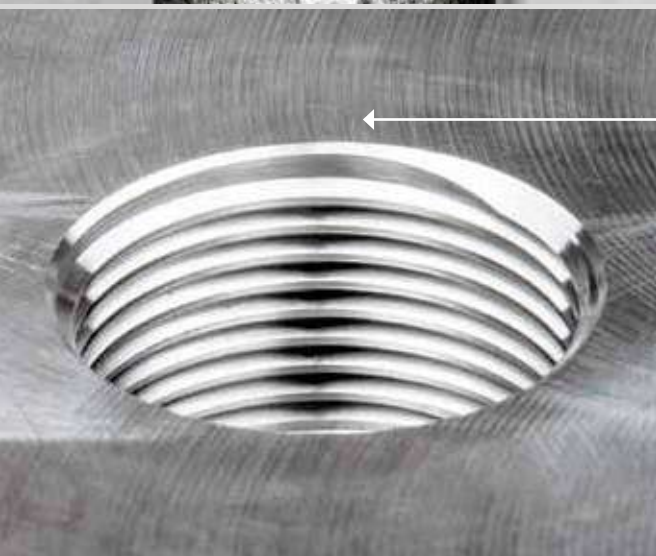
Problem:

Burr-formation at the thread entry
(Brittle burrs, bird's nest)



Solution:

Special tool
with relief-ground de-burring edge



Result:

Burr-free thread entry in one operating step



Please contact us to work out special solutions.

SPECIAL THREAD MILLING CUTTERS

Despite a broad standard range it does not include the correct tool?
Then we are more than happy to provide a tool optimally adapted
to your machining task as a special solution.
Please contact us!



TM SP – Thread milling cutters without chamfer

GÜHRING

CNC Data Sheet



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www.guehring.de

Date 15.2.2017

Machining Task		Material
Thread Dimension	M10	Structural- and free cutting steels, unalloyed tempered-/case hardened
Length	16.00 mm	
countersink ?= 90°	No	

Tool		Cutting Values			
Description	TM SP 2xD ohne Senkfase	Milling			
Milling cutter diameter	d1 = 7.95 mm	Vc	90 m/min	n	3604 1/min
Programmed Radius	3.94mm	fz	0.045 mm/tooth		
Order-No	3737_10.000	Vf	486 mm/min	Vm	100 mm/min

NC-Options		Cycle Time	
Machine Control	Sinumerik [DIN]	Total Time	7.05 sec.
Cutting Path	Center path, incremental		
Milling process	Conventional milling		
No. of passes	One cut		

Note CNC-program serves as a programming example and should be tested by simulation before use on component.

CNC-Code

```
; Tool= TM SP 2xD ohne Senkfase M10
; Material= P1
; Vc=90 m/min
; fz=0.045 mm/tooth
; Conventional milling
; One cut
; Thread Type= Internal Right-Hand Thread
N10 M6 T1
N20 G90 G54 G00 X0.000 Y0.000
N30 Z2.000 S3604 M3 M8
```

Attention, for controls that refer to outer path, values in brackets to be used!



CNC-Code

N40 Z-14.050

N50 G91

N60 G42 G01 X0.000 Y3.975 F50 (F243)

N70 G02 X0.000 Y-8.975 I0.000 J-4.488 Z-0.225

N80 G02 X0.000 Y0.000 I0.000 J5.000 Z-1.500 F100 (F486)

N90 G02 X0.000 Y8.975 I0.000 J4.488 Z-0.225

N100 G40 G01 X0.000 Y-3.975

N110 G90

N120 G00 Z2.000 M9

N130 M30

Attention, for controls that refer to outer path, values in brackets to be used!

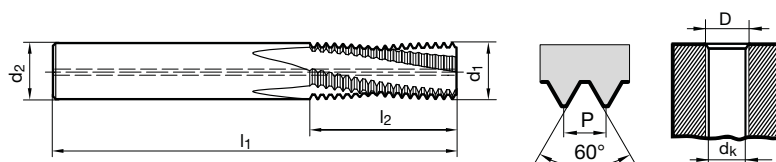
Thread milling cutters without chamfer for ISO metric threads



P	•	Cutting data page 60
M	○	
K	•	
N	•	
S	○	
H	≤ 55	without chamfer

Tool material	Solid carbide	
Surface		
Type	TM SP	TM SP
Internal cooling		
Shank form	HA	HB

NEW



Guhring standard

Guhring no.

3737

3743

D	P	d1	d2	dk	l1	l2	Z	Code no.	Availability	
mm	mm	mm	mm	mm	mm	mm				
M6	1.000	4.800	6.000	5.00	54.000	13.500	3	6.000	•	•
M8	1.250	6.400	8.000	6.80	62.000	18.100	3	8.000	•	•
M8 x 1	1.000	6.400	8.000	7.00	62.000	17.500	3	8.005	•	•
M10	1.500	7.950	10.000	8.50	74.000	21.800	3	10.000	•	•
M10 x 1	1.000	7.950	10.000	9.00	74.000	21.500	3	10.005	•	•
M10 x 1.25	1.250	7.950	10.000	8.80	74.000	21.900	3	10.006	•	•
M12	1.750	9.950	10.000	10.20	74.000	25.400	4	12.000	•	•
M12 x 1.5	1.500	9.950	10.000	10.50	74.000	26.300	4	12.007	•	•
M14	2.000	11.200	12.000	12.00	90.000	31.000	4	14.000	•	•
M14 x 1.5	1.500	11.200	12.000	12.50	90.000	30.800	4	14.007	•	•
M16	2.000	12.800	14.000	14.00	90.000	35.000	4	16.000	•	•
M16 x 1.5	1.500	12.800	14.000	14.50	90.000	33.800	4	16.007	•	•
M20	2.500	14.950	16.000	17.50	102.000	41.300	4	20.000	•	•
M20 x 1.5	1.500	14.950	16.000	18.50	102.000	42.800	4	20.007	•	•



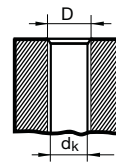
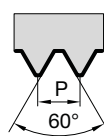
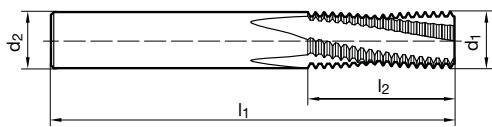
Thread milling cutters without chamfer for ISO metric threads



P	•	Cutting data page 60
M	○	
K	•	
N	•	
S	○	
H	≤ 55	without chamfer

Tool material	Solid carbide	
Surface		
Type	TM SP	TM SP
Internal cooling		
Shank form	HA	HB

NEW



Guhring standard

Guhring no.

4132

4133

D	P	d1	d2	dk	l1	l2	Z	Code no.
	mm	mm	mm	mm	mm	mm		
M6	1.000	4.800	6.000	5.00	54.000	13.500	3	6.000
M8	1.250	6.400	8.000	6.80	62.000	18.100	3	8.000
M10	1.500	7.950	10.000	8.50	74.000	21.800	3	10.000
M12	1.750	9.950	10.000	10.20	74.000	25.400	4	12.000
M14	2.000	11.200	12.000	12.00	90.000	31.000	4	14.000
M16	2.000	12.800	14.000	14.00	90.000	35.000	4	16.000
M20	2.500	14.950	16.000	17.50	102.000	41.300	4	20.000

Availability	
•	•
•	•
•	•
•	•
•	•
•	•
•	•

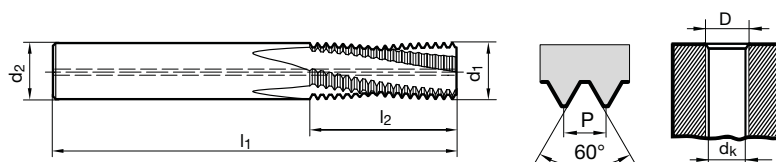
Thread milling cutters without chamfer for ISO metric threads



P	•	Cutting data page 60
M	○	
K	•	
N	•	
S	○	
H	≤ 55	without chamfer

Tool material	Solid carbide	
Surface		
Type	TM SP	TM SP
Internal cooling		
Shank form	HA	HB

NEW



Guhring standard

Guhring no.

3735

3740

D	P	d1	d2	dk	l1	l2	Z	Code no.	Availability	
	mm	mm	mm	mm	mm	mm				
M6	1.000	4.800	6.000	5.00	54.000	16.500	3	6.000	•	•
M8	1.250	6.400	8.000	6.80	62.000	21.900	3	8.000	•	•
M10	1.500	7.950	10.000	8.50	74.000	26.300	3	10.000	•	•
M12	1.750	9.950	10.000	10.20	74.000	32.400	4	12.000	•	•
M14	2.000	11.200	12.000	12.00	90.000	37.000	4	14.000	•	•
M16	2.000	12.800	14.000	14.00	90.000	43.000	4	16.000	•	•
M20	2.500	14.950	16.000	17.50	102.000	48.800	4	20.000	•	•



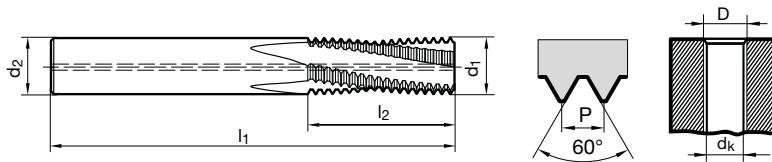
Thread milling cutters without chamfer for UNC-threads



P	•	Cutting data page 60
M	○	
K	•	
N	•	
S	○	
H	≤ 55	without chamfer

Tool material	Solid carbide	
Surface		
Type	TM SP	TM SP
Internal cooling		
Shank form	HA	HB

NEW



Guhring standard

Guhring no.

4134

4135

D	d1	d2	dk	l1	l2	Z	Code no.	Availability	
	mm	mm	mm	mm	mm				
10 - 24	3.400	6.000	3.90	54.000	11.100	3	4.826	•	•
12 - 24	4.100	6.000	4.50	54.000	12.200	3	5.486	•	•
1/4 - 20	4.700	6.000	5.10	54.000	14.600	3	6.350	•	•
5/16 - 18	6.100	8.000	6.60	64.000	17.600	3	7.938	•	•
3/8 - 16	7.600	8.000	8.00	64.000	21.400	3	9.525	•	•
7/16 - 14	9.000	10.000	9.40	74.000	24.500	3	11.113	•	•
1/2 - 13	9.950	10.000	10.80	74.000	28.300	4	12.700	•	•
9/16 - 12	11.400	12.000	12.20	90.000	30.700	4	14.288	•	•
5/8 - 11	12.700	14.000	13.50	90.000	35.800	4	15.875	•	•

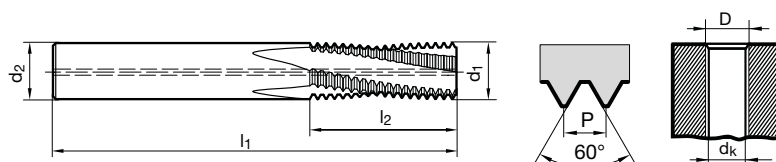
Thread milling cutters without chamfer for UNF-threads



P	•	Cutting data page 60
M	○	
K	•	
N	•	
S	○	
H	≤ 55	without chamfer

Tool material	Solid carbide	
Surface		
Type	TM SP	TM SP
Internal cooling		
Shank form	HA	HB

NEW



Guhring standard

Guhring no.

4136

4137

D	d1	d2	dk	l1	l2	Z	Code no.	Availability	
	mm	mm	mm	mm	mm				
10 - 32	3.800	6.000	4.10	54.000	11.500	3	4.826	•	•
12 - 28	4.300	6.000	4.60	54.000	12.200	3	5.486	•	•
1/4 - 28	5.100	6.000	5.50	54.000	14.100	3	6.350	•	•
5/16 - 24	6.300	8.000	6.90	64.000	17.500	3	7.938	•	•
3/8 - 24	7.800	8.000	8.50	64.000	20.600	3	9.525	•	•
7/16 - 20	9.400	10.000	9.90	74.000	24.800	3	11.113	•	•
1/2 - 20	9.950	10.000	11.50	74.000	27.300	4	12.700	•	•
9/16 - 18	11.400	12.000	12.90	90.000	30.300	4	14.288	•	•
5/8 - 18	12.700	14.000	14.50	90.000	33.200	4	15.875	•	•



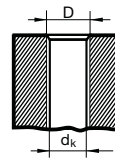
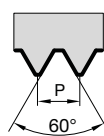
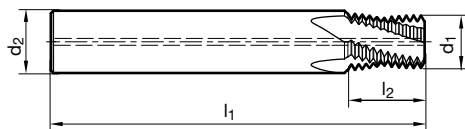
Thread milling cutters without chamfer for NPT-threads



P	•	Cutting data page 60
M	•	
K	•	
N	•	
S	•	
H	≤ 55	without chamfer

Tool material	Solid carbide	
Surface		
Type	TM SP	TM SP
Internal cooling		
Shank form	HA	HB

NEW



Guhring standard

Guhring no.

3753

3754

D	P	d1	d2	dk	l1	l2	Z	Code no.
	G/inch	mm	mm	mm	mm	mm		
1/16	27.000	5.900	8.000	6.15	54.000	9.900	3	8.190
1/8	27.000	7.300	8.000	8.40	64.000	9.900	3	10.620
1/4	18.000	9.950	12.000	11.10	72.000	19.000	4	14.140
3/8	18.000	12.500	14.000	14.30	80.000	14.800	4	17.570

Availability

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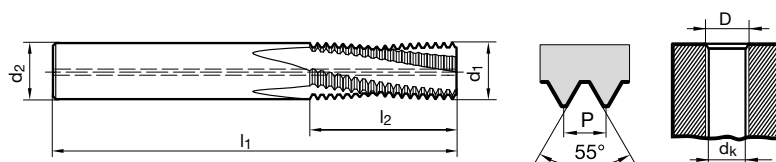
Thread milling cutters without chamfer for BSP-threads



P	•	Cutting data page 60
M	○	
K	•	
N	•	
S	○	
H	≤ 55	without chamfer

Tool material	Solid carbide	
Surface		
Type	TM SP	TM SP
Internal cooling		
Shank form	HA	HB

NEW



Guhring standard

Guhring no.

3745

3748

D	P	d1	d2	dk	l1	l2	Z	Code no.
	G/inch	mm	mm	mm	mm	mm		
G1/8	28.000	7.950	8.000	8.80	64.000	21.300	3	9.728
G1/4	19.000	10.500	12.000	11.80	90.000	28.700	4	13.157
G3/8	19.000	13.600	14.000	15.25	90.000	35.400	4	16.662

Availability

•	•
•	•
•	•

Thread milling cutters – our precision for your success

Put us to the test!



Quality from the manufacturer

- ▶ own R&D and machine construction division for uniform quality standards
- ▶ high process reliability with detailed documentation
- ▶ guaranteed repeatability and thread quality
- ▶ detailed inspection protocols on customer request

TMC SP – thread milling cutter with 45° chamfer

GÜHRING

CNC Data Sheet



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Date 15.2.2017

Machining Task		Material
Thread Dimension	M8	Corrosion- and acid-resistant steels, sulphured, austenitic
Length	13.00 mm	
countersink $\approx 90^\circ$	Yes	

Tool		Cutting Values			
Description	TMC SP 1.5xD mit Senkfase	Milling			
Milling cutter diameter	d1 = 6.40 mm	Vc	60 m/min	n	2984 1/min
Programmed Radius	3.17mm	fz	0.040 mm/tooth		
Order-No	3525_8.000	Vf	358 mm/min	Vm	72 mm/min

NC-Options		Cycle Time	
Machine Control	Sinumerik [DIN]	Total Time	15.16 sec.
Cutting Path	Center path, incremental		
Milling process	Conventional milling		
No. of passes	2 passes radial (2/3–1/3)		

Note CNC-program serves as a programming example and should be tested by simulation before use on component.

CNC-Code	
; Tool= TMC SP 1.5xD mit Senkfase M8	
; Material= M1	
; Vc=60 m/min	
; fz=0.040 mm/tooth	
; Conventional milling	
; 2 passes radial (2/3–1/3)	
; Thread Type= Internal Right-Hand Thread	
N10 M6 T1	
N20 G90 G54 G00 X0.000 Y0.000	
N30 Z2.000 S1492 M3 M8	



CNC-Code

```
N40 Z-13.100
N50 G01 Z-14.650 F179
N60 G00 Z-11.375 S2984
N70 G91
N80 G42 G01 X0.000 Y3.200 F36 (F179)
N90 G02 X0.000 Y-6.992 I0.000 J-3.496 Z-0.188
N100 G02 X0.000 Y0.000 I0.000 J3.792 Z-1.250 F72 (F358)
N110 G02 X0.000 Y6.992 I0.000 J3.496 Z-0.188
N120 G40 G01 X0.000 Y-3.200
N130 G90
N140 G00 Z-11.375
N150 G91
N160 G42 G01 X0.000 Y3.200 F36 (F179)
N170 G02 X0.000 Y-7.200 I0.000 J-3.600 Z-0.188
N180 G02 X0.000 Y0.000 I0.000 J4.000 Z-1.250 F72 (F358)
N190 G02 X0.000 Y7.200 I0.000 J3.600 Z-0.188
N200 G40 G01 X0.000 Y-3.200
N210 G90
N220 G00 Z2.000 M9
N230 M30
```

Attention, for controls that refer to outer path, values in brackets to be used!

Thread milling cutters with chamfer for ISO metric threads



P	•	Cutting data page 60
M	•	
K	•	
N	•	
S	•	
H	≤ 55	with chamfer

Tool material

Solid carbide

Surface

C

C

Type

TMC SP

TMC SP

Internal cooling

HA

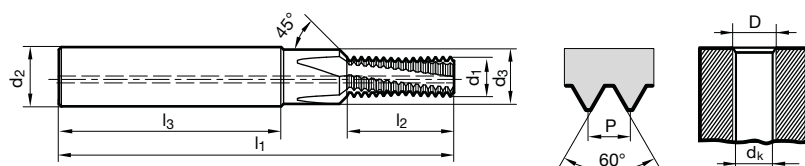
HB

Shank form

HA

HB

NEW



Guhring standard

Guhring no.

3526

3544

D	P	d1	d2	d3	dk	l1	l3	l2	Z	Code no.	Availability	
	mm	mm	mm	mm	mm	mm	mm	mm				
M3	0.500	2.300	6.000	3.400	2.50	48.000	36.000	6.800	3	3.000	•	•
M4	0.700	3.000	6.000	4.500	3.30	48.000	36.000	8.800	3	4.000	•	•
M5	0.800	4.000	6.000	5.500	4.20	54.000	36.000	10.800	3	5.000	•	•
M6	1.000	4.800	8.000	6.600	5.00	62.000	36.000	13.500	3	6.000	•	•
M8	1.250	6.400	10.000	9.000	6.80	74.000	40.000	18.100	3	8.000	•	•
M10	1.500	7.950	12.000	11.000	8.50	80.000	45.000	21.800	4	10.000	•	•
M12	1.750	9.950	14.000	13.500	10.20	90.000	45.000	25.400	4	12.000	•	•
M14	2.000	11.200	16.000	15.500	12.00	102.000	48.000	31.000	4	14.000	•	•
M16	2.000	12.800	18.000	17.500	14.00	102.000	48.000	35.000	4	16.000	•	•
M20	2.500	14.500	20.000	21.500	17.50	125.000	50.000	41.300	4	20.000	•	•



Thread milling cutters with chamfer for ISO metric fine threads



P	•	Cutting data page 60
M	•	
K	•	
N	•	
S	•	
H	≤ 55	with chamfer

Tool material

Solid carbide

Surface



Type

TMC SP

TMC SP

Internal cooling

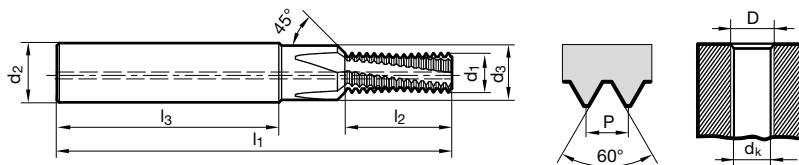


Shank form

HA

HB

NEW



Guhring standard

Guhring no.

3528

3546

D	P	d1	d2	d3	dk	l1	l3	l2	Z	Code no.	Availability	
	mm	mm	mm	mm	mm	mm	mm	mm				
M 4 X0.5	0.500	3.000	6.000	4.500	3.50	48.000	36.000	8.800	3	4.003	•	•
M 5 X0.5	0.500	4.000	6.000	5.500	4.50	54.000	36.000	10.800	3	5.003	•	•
M 6 X0.5	0.500	4.800	8.000	6.600	5.50	62.000	36.000	12.800	3	6.003	•	•
M 6 X0.75	0.750	4.800	8.000	6.600	5.20	62.000	36.000	13.100	3	6.004	•	•
M 8 X0.75	0.750	6.400	10.000	9.000	7.20	74.000	40.000	16.900	3	8.004	•	•
M 8 x 1	1.000	6.400	10.000	9.000	7.00	74.000	40.000	17.500	3	8.005	•	•
M10 x 1	1.000	7.950	12.000	11.000	9.00	80.000	45.000	21.500	4	10.005	•	•
M10 X1.25	1.250	7.950	12.000	11.000	8.80	80.000	45.000	21.900	4	10.006	•	•
M12 x 1	1.000	9.950	14.000	13.500	11.00	90.000	45.000	25.500	4	12.005	•	•
M12 X1.5	1.500	9.950	14.000	13.500	10.50	90.000	45.000	26.300	4	12.007	•	•
M14 X1.5	1.500	11.200	16.000	15.500	12.50	102.000	48.000	30.800	4	14.007	•	•
M16 X1.5	1.500	12.800	18.000	17.500	14.50	102.000	48.000	33.800	4	16.007	•	•

Thread milling cutters with chamfer for BSP-threads



P	•	Cutting data page 60
M	•	
K	•	
N	•	
S	•	
H	≤ 55	with chamfer

Tool material

Solid carbide

Surface

C

C

Type

TMC SP

TMC SP

Internal cooling

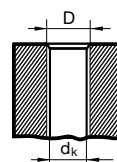
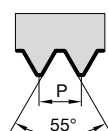
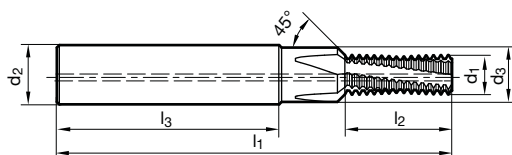


Shank form

HA

HB

NEW



Guhring standard

Guhring no.

3515

3533

D	P	d1	d2	d3	dk	l1	l3	l2	Z	Code no.
	G/inch	mm	mm	mm	mm	mm	mm	mm		
G1/8	28.000	7.950	12.000	11.000	8.80	80.000	45.000	21.300	4	9.728
G1/4	19.000	9.950	14.000	13.900	11.80	90.000	45.000	28.700	4	13.157
G3/8	19.000	13.600	18.000	17.500	15.25	102.000	48.000	35.400	4	16.662

Availability

•

•

•

•

•

•

HPC clamping chucks

Robust, compact and accurate –
the optimal clamping chuck for thread milling

Guhring also provides precision clamping chucks with maximum clamping force for thread milling operations. A special clamping sleeve is clamped via worm gear and optimally transfers an enormous clamping force to the clamped tool.



- High clamping force with maximum rigidity, vibration-free machining
- Concentricity accuracy $3\mu\text{m}$ with $2.5 \times D$
- Tool life increase of up to 40% contributes to considerable cost savings
- Flexible application with GUHROJET clamping sleeves, also available with peripheral cooling
- Very simple handling with maintenance-free technology



TMU SP – Universal thread milling cutters

GÜHRING

CNC Data Sheet



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www.guehring.de

Date 15.2.2017

Machining Task		Material
Thread Dimension	MF18x1.5 right	Cast aluminium alloys
Length	14.50 mm	
countersink ?= 90°	No	

Tool		Cutting Values			
Description	TMU Universalgewindefräser	Milling			
Milling cutter diameter	d1 = 11.95 mm	Vc	230 m/min	n	6126 1/min
Programmed Radius	5.94mm	fz	0.070 mm/tooth		
Order-No	3541_12.150	Vf	1715 mm/min	Vm	577 mm/min

NC-Options		Cycle Time	
Machine Control	Sinumerik [DIN]	Total Time	4.64 sec.
Cutting Path	Center path, incremental		
Milling process	Conventional milling		
No. of passes	One cut		

Note CNC-program serves as a programming example and should be tested by simulation before use on component.

CNC-Code

```
; Tool= TMU Universalgewindefräser MF18x1.5 right
; Material= N2
; Vc=230 m/min
; fz=0.070 mm/tooth
; Conventional milling
; One cut
; Thread Type= Internal Right-Hand Thread
N10 M6 T1
N20 G90 G54 G00 X0.000 Y0.000
N30 Z2.000 S6126 M3 M8
```

Attention, for controls that refer to outer path, values in brackets to be used!



CNC-Code

N40 Z-12.550

N50 G91

N60 G42 G01 X0.000 Y5.975 F288 (F858)

N70 G02 X0.000 Y-14.975 I0.000 J-7.488 Z-0.225

N80 G02 X0.000 Y0.000 I0.000 J9.000 Z-1.500 F577 (F1715)

N90 G02 X0.000 Y14.975 I0.000 J7.488 Z-0.225

N100 G40 G01 X0.000 Y-5.975

N110 G90

N120 G00 Z2.000 M9

N130 M30

Attention, for controls that refer to outer path, values in brackets to be used!

Universal thread milling cutters for ISO metric threads



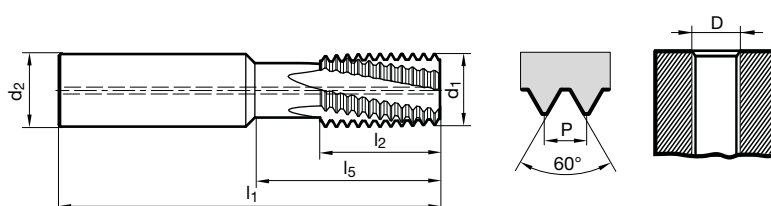
P	•
M	•
K	•
N	•
S	•
H	≤ 55

Cutting data page 60

universal thread milling cutters for internal threads M / MF

Tool material	Solid carbide	
Surface		
Type	TMU SP	TMU SP
Internal cooling		
Shank form	HA	HB

NEW



Company std.

Article no.

3541

3556

P	D	d1	d2	l1	l5	l2	Z	Code no.
mm		mm	mm	mm	mm	mm		
0.500	> 10	7.950	8.000	64.000		20.000	4	8.050
1.000	> 12	9.950	10.000	70.000	25.000	16.000	4	10.100
1.250	> 14	9.950	10.000	70.000	25.000	16.000	4	10.125
1.500	> 14	9.950	10.000	70.000	25.000	16.000	4	10.150
1.000	> 16	11.950	12.000	80.000	31.000	20.000	4	12.100
1.250	> 16	11.950	12.000	80.000	31.000	20.000	4	12.125
1.500	> 16	11.950	12.000	80.000	31.000	20.000	4	12.150
1.000	> 18	15.950	16.000	90.000	40.000	25.000	5	16.100
1.500	> 20	15.950	16.000	90.000	40.000	25.000	5	16.150
2.000	> 22	15.950	16.000	90.000	40.000	25.000	5	16.200
3.000	> 24	17.950	18.000	102.000	50.000	33.000	5	18.300
1.000	> 24	19.950	20.000	105.000	50.000	33.000	5	20.100
1.500	> 26	19.950	20.000	105.000	50.000	33.000	5	20.150
2.000	> 26	19.950	20.000	105.000	50.000	33.000	5	20.200
2.500	> 26	19.950	20.000	105.000	50.000	33.000	5	20.250
3.000	> 27	19.950	20.000	105.000	50.000	33.000	5	20.300
3.500	> 30	19.950	20.000	105.000	50.000	33.000	5	20.350

Availability

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•	•
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•	•



Universal thread milling cutters for BSP-threads



P

M

K

N

S

H

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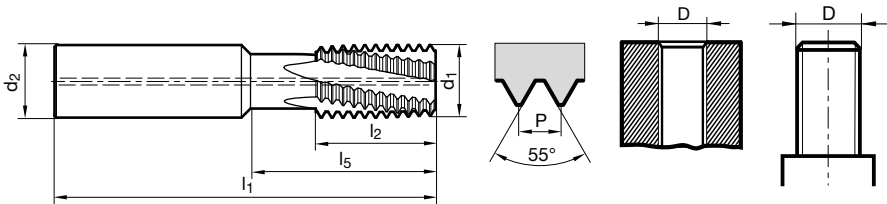
•

≤ 55

Cutting data page 60

Universal thread milling cutters for internal and external threads

Tool material	Solid carbide	
Surface		
Type	TMU SP	TMU SP
Internal cooling		
Shank form	HA	HB



Company std.	Article no.	3542	3557
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P	D	d1	d2	l1	l5	l2	Z	Code no.	Availability	
G/inch		mm	mm	mm	mm	mm				
19.000	> 1/4	9.950	10.000	70.000	25.000	16.000	4	10.190	•	•
14.000	> 1/2	15.950	16.000	90.000	40.000	25.000	5	16.140	•	•
11.000	> 1	19.950	20.000	105.000	50.000	33.000	5	20.110	•	•

Universal thread milling cutters for UN-threads



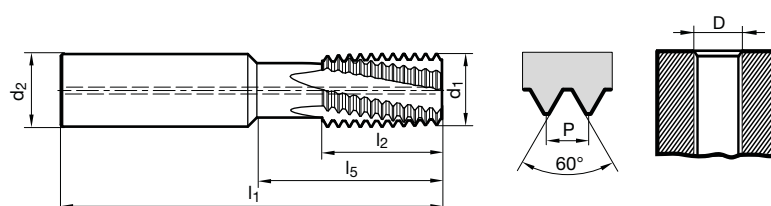
P	•
M	•
K	•
N	•
S	•
H	≤ 55

Cutting data page 60

Universal thread milling cutters for internal threads

Tool material	Solid carbide	
Surface		
Type	TMU SP	TMU SP
Internal cooling		
Shank form	HA	HB

NEW



Company std.

Article no.

3595

3596

P	D	d1	d2	l1	l5	l2	Z	Code no.	Availability	
G/inch		mm	mm	mm	mm	mm				
24.000	> 1/2	9.950	10.000	70.000	25.000	16.000	4	10.240	•	•
16.000	> 5/8	11.950	12.000	80.000	31.000	20.000	4	12.160	•	•
18.000	> 5/8	11.950	12.000	80.000	31.000	20.000	4	12.180	•	•
20.000	> 11/16	11.950	12.000	80.000	31.000	20.000	4	12.200	•	•
24.000	> 5/8	11.950	12.000	80.000	31.000	20.000	4	12.240	•	•
14.000	> 7/8	15.950	16.000	90.000	40.000	25.000	5	16.140	•	•
16.000	> 7/8	15.950	16.000	90.000	40.000	25.000	5	16.160	•	•
18.000	> 7/8	15.950	16.000	90.000	40.000	25.000	5	16.180	•	•
20.000	> 13/16	15.950	16.000	90.000	40.000	25.000	5	16.200	•	•
8.000	> 1	19.950	20.000	105.000	50.000	33.000	5	20.080	•	•
12.000	> 1	19.950	20.000	105.000	50.000	33.000	5	20.120	•	•
14.000	> 1	19.950	20.000	105.000	50.000	33.000	5	20.140	•	•
16.000	> 1	19.950	20.000	105.000	50.000	33.000	5	20.160	•	•



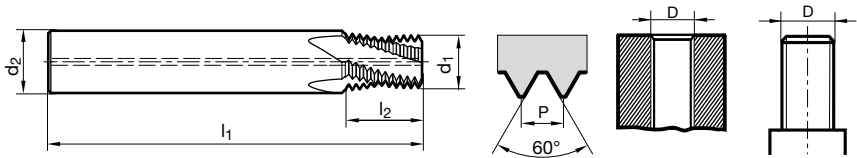
Universal thread milling cutters for NPT-threads



P	•	Cutting data page 60
M	•	
K	•	
N	•	
S	•	
H	≤ 55	Universal thread milling cutters for internal and external threads

Tool material	Solid carbide	
Surface		
Type	TMU SP	TMU SP
Internal cooling		
Shank form	HA	HB

NEW



Company std.	Article no.	3768	3769
--------------	-------------	------	------

P	D	d1	d2	l1	l2	Z	Code no.	Availability	
G/inch		mm	mm	mm	mm				
14.000	> 1/2	14.500	16.000	90.000	19.050	5	21.900	•	•
11.500	> 1	18.500	20.000	90.000	23.190	5	34.180	•	•

External thread milling cutters

P • Cutting data page 60

M •

K •

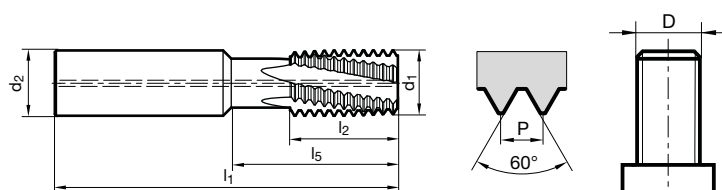
N •

S •

H ≤ 55 Universal thread milling cutters for external threads M / MF

Tool material	Solid carbide	
Surface		
Type	TMU SP	TMU SP
Internal cooling		
Shank form	HA	HB

NEW



Company std.

Article no.

4162

4163

P	D	d1	d2	l1	l5	l2	Z	Code no.	Availability	
mm		mm	mm	mm	mm	mm				
0.500	≥ 3	9.950	10.000	70.000	25.000	16.000	4	10.050	•	•
0.750	≥ 5	9.950	10.000	70.000	25.000	16.000	4	10.075	•	•
1.000	≥ 6	11.950	12.000	80.000	31.000	20.000	4	12.100	•	•
1.250	≥ 8	11.950	12.000	80.000	31.000	20.000	4	12.125	•	•
1.500	≥ 10	11.950	12.000	80.000	31.000	20.000	4	12.150	•	•
1.500	≥ 10	15.950	16.000	90.000	40.000	25.000	5	16.150	•	•
2.000	≥ 14	15.950	16.000	90.000	40.000	25.000	5	16.200	•	•
2.500	≥ 18	15.950	16.000	90.000	40.000	25.000	5	16.250	•	•
3.000	≥ 24	19.950	20.000	105.000	50.000	33.000	5	20.300	•	•

DTMC SP –

High-performance drill thread milling cutter
for aluminium, cast materials and plastics.



An overview of the advantages

- ▶ Drilling, countersinking and thread milling with only one tool – no tool change required
- ▶ Reduction of main and ancillary times
- ▶ Saving of tool positions
- ▶ for through holes and blind holes

DTMC SP – Drill thread milling cutters

GÜHRING

CNC Data Sheet



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Fax: +49 (0)7431 17 279
info@guehring.de
www.guehring.de

Date 15.2.2017

Machining Task		Material
Thread Dimension	MF12x1	Aluminium / Wrought Aluminium Alloys
Length	13.00 mm	
countersink ?= 90°	Yes	

Tool		Cutting Values			
Description	DTMC SP 1.5xD	Milling			
Milling cutter diameter	d1 = 9.95 mm	Vc	250 m/min	n	7998 1/min
Programmed Radius	4.95mm	fz	0.065 mm/tooth		
Order-No	3787_12.005	Vf	1040 mm/min	Vm	178 mm/min

Drilling					
Vc	250 m/min	n	7998 1/min		
fb	0.15 mm/U	Vb	1200 mm/min		

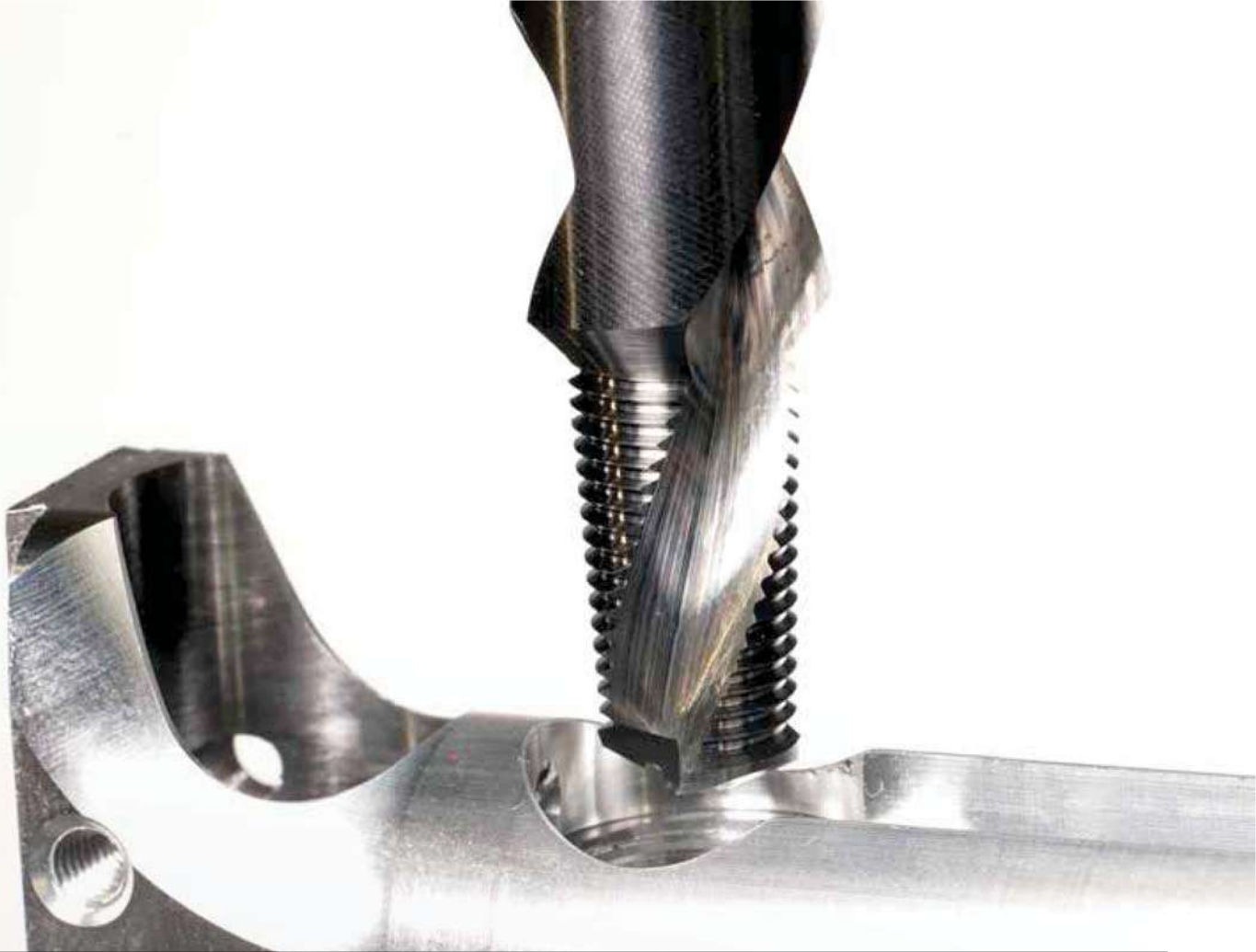
NC-Options		Cycle Time	
Machine Control	Sinumerik [DIN]	Milling Time t	3.98 sec.
Cutting Path	Center path, incremental	Drilling time t	1.17 sec.
Milling process	Conventional milling	Total Time	5.14 sec.
No. of passes	One cut		
Pecking	1 pass		

Note CNC-program serves as a programming example and should be tested by simulation before use on component.

CNC-Code

```
; Tool= DTMC SP 1.5xD MF12x1
; Material= N1
; Vc=250 m/min
; fb=0.15 mm/U
; fz=0.065 mm/tooth
; No. of peck= 1 pass
```

Attention, for controls that refer to outer path, values in brackets to be used!



CNC-Code

; Conventional milling

; One cut

; Thread Type= Internal Right-Hand Thre

N10 M6 T1

N20 G90 G54 G00 X0.000 Y0.000

N30 G00 Z2.000 S7998 M3 M8

N40 G01 Z-1.000 F600

N50 G01 Z-10.650 F1200

N60 G00 Z2.000

N70 G00 Z-9.650

N80 G01 Z-21.300 F1200

N90 G00 Z2.000 S7998

N100 G00 Z-13.680

N110 G91

N120 G42 G01 X0.000 Y4.975 F89 (F520)

N130 G02 X0.000 Y-10.975 I0.000 J-5.488 Z-0.150

N140 G02 X0.000 Y0.000 I0.000 J6.000 Z-1.000 F178 (F1040)

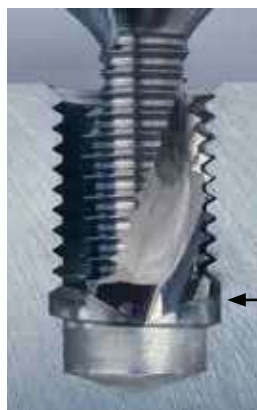
N150 G02 X0.000 Y10.975 I0.000 J5.488 Z-0.150

N160 G40 G01 X0.000 Y-4.975

N170 G90

N180 G00 Z2.000 M9

N190 M30



Thread cross-section produced by a drill thread milling cutter, the recess is typically generated by the circulation during the machining operation

Recess

Attention, for controls that refer to outer path, values in brackets to be used!

Drill thread milling cutters for ISO metric threads

2xD

P Cutting data page 60

P	
M	
K	○
N	●
S	
H	

Tool material

Solid carbide

Surface



Type

DTMC SP

DTMC SP

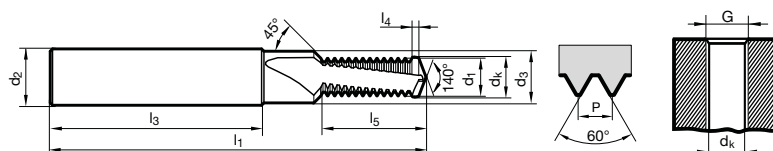
Internal cooling



Shank form

HA

HA



Guhring standard

Guhring no.

3778

3779

D	P	d1	d2	d3	dk	l1	l3	l4	l5	Z	Code no.	Availability	
	mm	mm	mm	mm	mm	mm	mm	mm	mm				
M3	0.500	2.400	6.000	3.400	2.50	48.000	36.000	0.500	7.000	2	3.000	●	
M4	0.700	3.200	6.000	4.500	3.30	48.000	36.000	0.700	9.000	2	4.000		●
M5	0.800	4.000	6.000	5.500	4.20	54.000	36.000	0.800	11.200	2	5.000		●
M6	1.000	4.750	8.000	6.600	5.00	62.000	36.000	1.000	13.900	2	6.000		●
M8	1.250	6.350	10.000	9.000	6.80	74.000	40.000	1.250	18.700	2	8.000		●
M10	1.500	7.950	12.000	11.000	8.50	80.000	45.000	1.500	22.500	2	10.000		●
M12	1.750	9.950	14.000	13.500	10.20	90.000	45.000	1.500	26.100	2	12.000		●
M14	2.000	11.200	16.000	15.500	12.00	102.000	48.000	1.500	31.700	2	14.000		●
M16	2.000	13.200	18.000	17.500	14.00	102.000	48.000	1.500	36.000	2	16.000		●



Drill thread milling cutters for ISO metric threads

2,5xD

P	
M	
K	○
N	●
S	
H	

Cutting data page 60

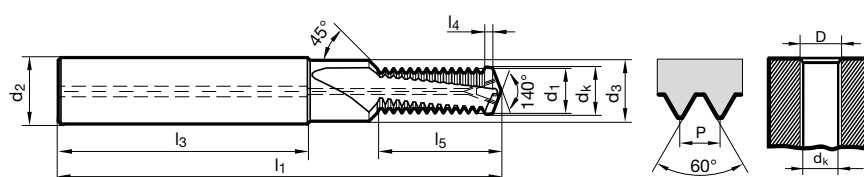
Tool material **Solid carbide**

Surface ○

Type DTMC SP

Internal cooling

Shank form HA



Guhring standard

Guhring no. **3783**

D	P	d1	d2	d3	dk	l1	l3	l4	l5	Z	Code no.	Availability
	mm	mm	mm	mm	mm	mm	mm	mm	mm			
M4	0.700	3.200	6.000	4.500	3.30	48.000	36.000	0.700	11.100	2	4.000	●
M5	0.800	4.000	6.000	5.500	4.20	54.000	36.000	0.800	13.600	2	5.000	●
M6	1.000	4.750	8.000	6.600	5.00	62.000	36.000	1.000	16.900	2	6.000	●
M8	1.250	6.350	10.000	9.000	6.80	74.000	40.000	1.250	22.500	2	8.000	●
M10	1.500	7.950	12.000	11.000	8.50	80.000	45.000	1.500	27.000	2	10.000	●
M12	1.750	9.950	14.000	13.500	10.20	90.000	45.000	1.500	31.400	2	12.000	●
M14	2.000	11.200	16.000	15.500	12.00	102.000	48.000	1.500	39.700	2	14.000	●
M16	2.000	13.200	18.000	17.500	14.00	102.000	48.000	1.500	46.000	2	16.000	●

MTM SP – Micro-thread milling cutters

GÜHRING

CNC Data Sheet



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www.guehring.de

Date 15.2.2017

Machining Task		Material
Thread Dimension	M3	Corrosion- and acid-resistant steels, sulphured, austenitic
Length	8.00 mm	
countersink ?= 90°	No	

Tool		Cutting Values			
Description	MTM3 SP Mikro-Gewindefräser	Milling			
Milling cutter diameter	d1 = 2.40 mm	Vc	60 m/min	n	7958 1/min
Programmed Radius	1.17mm	fz	0.035 mm/tooth		
Order-No	4226_3.000	Vf	1114 mm/min	Vm	223 mm/min

NC-Options		Cycle Time	
Machine Control	Sinumerik [DIN]	Total Time	8.53 sec.
Cutting Path	Center path, incremental		
Milling process	Conventional milling		
No. of passes	One cut		

Note CNC-program serves as a programming example and should be tested by simulation before use on component.

CNC-Code

```
; Tool= MTM3 SP Mikro-Gewindefräser M3
; Material= M1
; Vc=60 m/min
; fz=0.035 mm/tooth
; Conventional milling
; One cut
; Thread Type= Internal Right-Hand Thread
N10 M6 T1
N20 G90 G54 G00 X0.000 Y0.000
N30 Z2.000 S7958 M3 M8
```

Attention, for controls that refer to outer path, values in brackets to be used!



CNC-Code

N40 G00 Z0.500
N50 G91
N60 G42 G01 X0.000 Y1.200 F111 (F557)
N70 G02 X0.000 Y-2.700 I0.000 J-1.350 Z-0.075
N80 G02 X0.000 Y0.000 I0.000 J1.500 Z-0.500 F223 (F1114)
N90 G02 X0.000 Y0.000 I0.000 J1.500 Z-0.500
N100 G02 X0.000 Y0.000 I0.000 J1.500 Z-0.500
N110 G02 X0.000 Y0.000 I0.000 J1.500 Z-0.500
N120 G02 X0.000 Y0.000 I0.000 J1.500 Z-0.500
N130 G02 X0.000 Y0.000 I0.000 J1.500 Z-0.500
N140 G02 X0.000 Y0.000 I0.000 J1.500 Z-0.500
N150 G02 X0.000 Y0.000 I0.000 J1.500 Z-0.500
N160 G02 X0.000 Y0.000 I0.000 J1.500 Z-0.500
N170 G02 X0.000 Y0.000 I0.000 J1.500 Z-0.500
N180 G02 X0.000 Y0.000 I0.000 J1.500 Z-0.500
N190 G02 X0.000 Y0.000 I0.000 J1.500 Z-0.500
N200 G02 X0.000 Y0.000 I0.000 J1.500 Z-0.500
N210 G02 X0.000 Y0.000 I0.000 J1.500 Z-0.500
N220 G02 X0.000 Y0.000 I0.000 J1.500 Z-0.500
N230 G02 X0.000 Y0.000 I0.000 J1.500 Z-0.500
N240 G02 X0.000 Y2.700 I0.000 J1.350 Z-0.075
N250 G40 G01 X0.000 Y-1.200
N260 G90
N270 G00 Z2.000 M9
N280 M30

Attention, for controls that refer to outer path, values in brackets to be used!

Micro-thread milling cutters



P	•	Cutting data page 60
M	•	
K	•	
N	•	
S	•	
H		

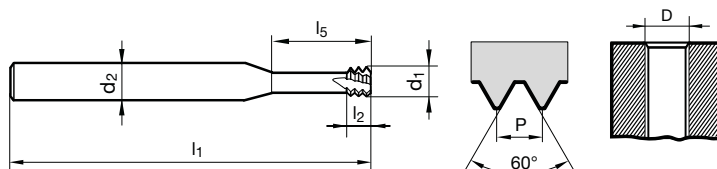
Tool material **Solid carbide**

Surface

Type **MTM3 SP**

Internal cooling

Shank form **HA**



Company std.

Article no.

4226

D	P	d1	d2	l1	l2	l5	Z	Code no.	Availability
	mm	mm	mm	mm	mm	mm			
M1,6	0.350	1.200	3.000	39.000	1.100	4.800	3	1.600	•
M1,8	0.350	1.400	3.000	39.000	1.100	5.400	3	1.800	•
M2	0.400	1.550	3.000	39.000	1.200	6.000	4	2.000	•
M2,5	0.450	1.950	3.000	39.000	1.400	7.500	4	2.500	•
M3	0.500	2.400	6.000	58.000	1.500	9.500	4	3.000	•
M3,5	0.600	2.800	6.000	58.000	1.800	11.000	4	3.500	•
M4	0.700	3.200	6.000	58.000	2.100	12.500	4	4.000	•
M5	0.800	4.000	6.000	58.000	2.400	16.000	4	5.000	•
M6	1.000	4.800	6.000	58.000	3.000	20.000	4	6.000	•
M8	1.250	5.950	6.000	58.000	3.800	24.000	4	8.000	•
M10	1.500	7.800	8.000	73.000	4.500	33.000	4	10.000	•
M12	1.750	9.000	10.000	84.000	5.300	38.000	4	12.000	•
M16	2.000	11.800	12.000	84.000	6.000	35.000	5	16.000	•



Micro-thread milling cutters

Tool material **Solid carbide**

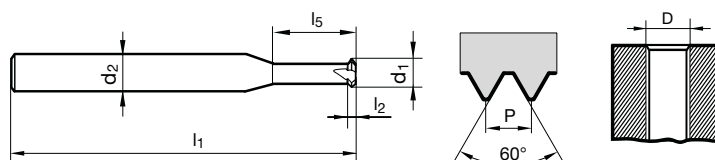
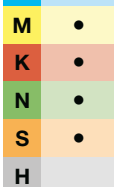
Surface

Type **MTM1 SP**

Internal cooling

Shank form **HA**

P	•
M	•
K	•
N	•
S	•
H	

 Cutting data page 60


Company std.

Article no.

4225

D	P max.	d1	d2	l1	l2	l5	Z	Code no.	Availability
	mm	mm	mm	mm	mm	mm			
M1.4 - M1.8	0.350	1.050	3.000	39.000	0.400	3.800	3	1.800	•
M2 - M2.4	0.400	1.500	3.000	39.000	0.400	7.000	3	2.400	•
M2.5 - M3	0.500	2.000	3.000	39.000	0.500	9.000	4	3.000	•
M3.5 - M4.5	0.750	2.800	6.000	58.000	0.800	14.000	4	4.500	•
M5 - M7	1.000	4.000	6.000	58.000	1.000	19.000	4	7.000	•
M8 - M10	1.500	6.400	8.000	64.000	1.500	24.000	5	10.000	•

Micro-thread milling cutters



P	•
M	•
K	•
N	•
S	•
H	

Cutting data page 60

Thread milling cutters for internal and external threads

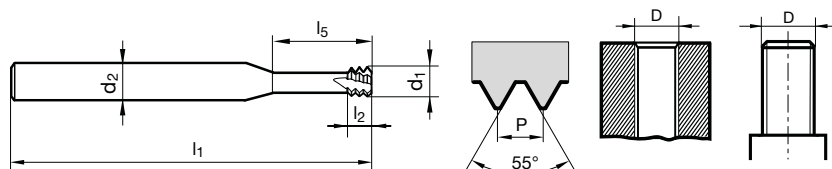
Tool material **Solid carbide**

Surface

Type **MTM3 SP**

Internal cooling

Shank form **HA**



Company std.

Article no.

4228

D	P	d1	d2	l1	l2	l5	Z	Code no.	Availability
	G/inch	mm	mm	mm	mm	mm			
G1/16-G1/8	28.000	6.200	8.000	64.000	2.700	19.500	4	9.728	•
G1/4-G3/8	19.000	9.950	10.000	73.000	4.000	25.000	4	16.662	•
G1/2-G7/8	14.000	11.950	12.000	84.000	5.400	37.000	4	30.201	•
G1-G2	11.000	15.950	16.000	105.000	6.900	44.000	5	59.614	•



Micro-thread milling cutters

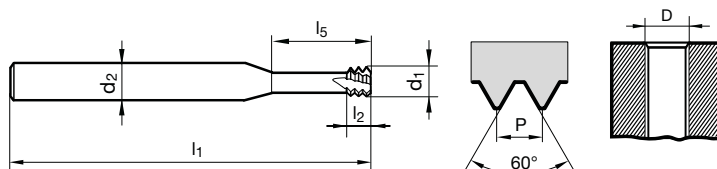


P	•
M	•
K	•
N	•
S	
H	

Cutting data page 60

Tool material **Solid carbide**Surface **C**Type **MTM3 SP**

Internal cooling

Shank form **HA****NEW**

Company std.

Article no.

4223

D	P	d1	d2	l1	l2	l5	Z	Code no.	Availability
	G/inch	mm	mm	mm	mm	mm			
UNF No 1	72.000	1.450	3.000	39.000	1.100	5.800	3	1.853	•
UNC No 1+UNF No 2	64.000	1.400	3.000	39.000	1.200	6.000	3	1.854	•
UNC No 2+UNF No 3	56.000	1.650	3.000	39.000	1.400	7.000	4	2.184	•
UNC No 3+UNF No 4	48.000	1.900	3.000	39.000	1.600	8.000	4	2.515	•
UNC No 4	40.000	2.100	6.000	58.000	1.900	9.000	4	2.845	•
UNC No 5+UNF No 6	40.000	2.450	6.000	58.000	1.900	10.000	4	3.175	•
UNC No 6	32.000	2.550	6.000	58.000	2.400	11.000	4	3.505	•
UNF No 8	36.000	3.300	6.000	58.000	2.100	12.000	4	4.165	•
UNC No 8	32.000	3.200	6.000	58.000	2.400	13.000	4	4.166	•
UNF No10	32.000	3.700	6.000	58.000	2.400	15.000	4	4.825	•
UNC No10+UNC No12	24.000	3.500	6.000	58.000	3.200	16.000	4	4.826	•
UNF No12	28.000	4.200	6.000	58.000	2.700	16.000	4	5.485	•
UNF 1/4	28.000	5.000	6.000	58.000	2.700	19.600	4	6.349	•
UNC 1/4	20.000	4.750	6.000	58.000	3.800	20.000	4	6.350	•
UNF 5/16+UNF 3/8	24.000	6.600	8.000	64.000	3.200	24.000	4	7.937	•
UNC 5/16	18.000	6.000	6.000	58.000	4.200	23.000	4	7.938	•
UNC 3/8	16.000	6.700	8.000	64.000	4.800	25.000	4	9.525	•
UNF 7/16	20.000	8.000	8.000	64.000	3.800	34.600	4	11.112	•
UNC 7/16	14.000	7.700	8.000	64.000	5.400	25.000	4	11.113	•
UNF 5/8	18.000	12.000	12.000	84.000	4.200	35.000	4	15.874	•

Micro-thread milling cutters



P	•
M	•
K	•
N	•
S	•
H	•

Cutting data page 60

with internal coolant $\geq$ UNJF 1/4

Tool material **Solid carbide**

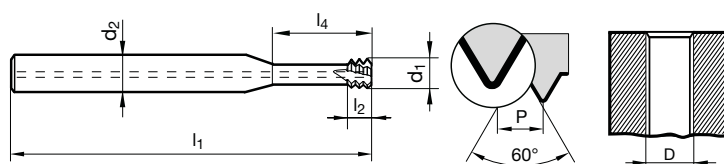
Surface

Type **MTM3 SP**

Internal cooling

Shank form **HA**

NEW



Company std.

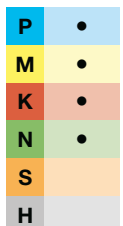
Article no.

4215

D	P	d1	d2	l1	l2	l5	Z	Code no.	Availability
	G/inch	mm	mm	mm	mm	mm			
UNJC No 6	32.000	2.700	6.000	58.000	2.400	11.000	4	3.505	•
UNJC No 8+UNJF No10	32.000	3.300	6.000	58.000	2.400	14.000	4	4.166	•
UNJC No10+UNJC No12	24.000	3.700	6.000	58.000	3.200	15.000	4	4.826	•
UNJF 1/4	28.000	5.100	8.000	64.000	2.700	19.500	4	6.349	•
UNJC 1/4	20.000	4.900	6.000	58.000	3.800	19.500	4	6.350	•
UNJF 5/16+UNJF 3/8	24.000	6.700	8.000	64.000	3.200	24.000	4	7.937	•
UNJC 5/16+UNJF 9/16	18.000	6.150	8.000	64.000	4.200	24.000	4	7.938	•
UNJC 3/8+UNJF 3/4	16.000	6.900	8.000	64.000	4.800	26.000	4	9.525	•
UNJF 7/16	20.000	8.000	10.000	73.000	3.800	30.000	4	11.112	•
UNJC 7/16+UNJF 7/8	14.000	7.900	10.000	73.000	5.400	30.000	4	11.113	•
UNJC 1/2	13.000	9.400	10.000	73.000	5.900	30.000	4	12.700	•



Micro-thread milling cutters



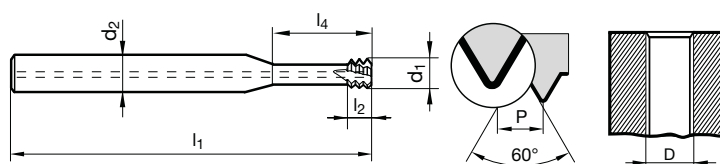
Cutting data page 60

with internal coolant $\geq$ MJ5Tool material **Solid carbide**

Surface

Type **MTM3 SP**

Internal cooling

Shank form **HA****NEW**

Company std.

Article no.

4214

D	P	d1	d2	l1	l2	l5	Z	Code no.	Availability
	mm	mm	mm	mm	mm	mm			
MJ 3	0.500	2.400	6.000	58.000	1.500	9.500	4	3.000	•
MJ 4	0.700	3.200	6.000	58.000	2.100	12.500	4	4.000	•
MJ 5	0.800	3.900	6.000	58.000	2.400	16.000	4	5.000	•
MJ 6	1.000	4.800	6.000	58.000	3.000	19.000	4	6.000	•
MJ 8	1.250	6.100	8.000	64.000	3.800	25.000	4	8.000	•
MJ10	1.500	8.000	8.000	73.000	4.500	33.000	4	10.000	•
MJ12	1.750	9.200	10.000	73.000	5.300	30.000	4	12.000	•
MJ16	2.000	10.800	12.000	84.000	6.000	35.000	5	16.000	•

Micro-thread milling cutters



P	Cutting data page 60
M	
K	
N	
S	○
H	● for hard machining 45-65 HRC

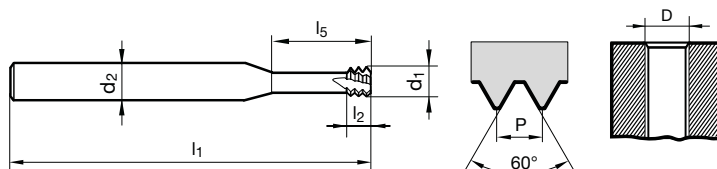
Tool material **Solid carbide**

Surface **A**

Type **MTMH3 SP**

Internal cooling

Shank form **HA**



Company std.

Article no.

4227

D	P	d1	d2	l1	l2	l5	Z	Code no.	Availability
	mm	mm	mm	mm	mm	mm			
M2	0.400	1.550	3.000	39.000	1.200	6.000	4	2.000	●
M2,5	0.450	1.950	3.000	39.000	1.400	7.500	4	2.500	●
M3	0.500	2.350	6.000	58.000	1.500	9.500	4	3.000	●
M4	0.700	3.100	6.000	58.000	2.100	12.500	4	4.000	●
M5	0.800	3.800	6.000	58.000	2.400	16.000	4	5.000	●
M6	1.000	4.800	6.000	58.000	3.000	20.000	4	6.000	●
M8	1.250	5.950	6.000	58.000	3.800	24.000	4	8.000	●
M10	1.500	7.800	8.000	64.000	4.500	23.000	4	10.000	●
M12	1.750	9.000	10.000	73.000	5.300	26.000	5	12.000	●



The characteristics of different thread types

geometry drawing	Standard	application	geometry drawing	Standard	application
M ISO-metric thread 	DIN 13-1	General standard thread	MF ISO-metric fine thread 	DIN 13-2 to DIN 13-11	General fine thread
UNC Unified National Coarse thread 	ASME B1.1	General UN standard thread	UNF Unified National Fine thread 	ASME B1.1 ISO-metric trapezoidal thread	General UN Fine thread
UNEF Unified National Extra Fine thread 	ASME B1.1	General UN Extra Fine thread	UNS Unified Special thread 	ASME B1.1	General UN Special thread
G Cylindrical Pipe thread without thread sealing connections 	DIN EN ISO 228-1	Threads for pipes, pipe connections and fittings	Rp Whitworth pipe thread cylindrical internal thread 	DIN EN 10226-1 (based on ISO 7-1) Replacement for DIN 2999-1	Internal thread for pipe threads and fittings (for in the thread sealing connections)
NPT American Standard Pipe Threads tapered for sealing 	ANSI/ASME B1.20.1	pipe threads and fittings	UNJ inch thread 	ISO 3161	For the aerospace industry
MJ thread metric thread 	DIN ISO 5855-1	For the aerospace industry	external thread internal thread play		

Taping size holes for thread milling cutters

Std. ISO metric threads DIN 13					ISO metric fine threads DIN 13								UNC threads ASME B1.1						
nom. Ø	pitch P	tapping size hole Ø DIN 336 mm	core diameter of int. thread 6H*		nom. x Ø	pitch P	tapping size hole Ø DIN 336 mm	core diameter of int. thread 6H		nom. x Ø	pitch P	tapping size hole Ø DIN 336 mm	core diameter of int. thread 6H		nom. Ø	threads	tapping size hole Ø DIN 336 mm	core diameter of int. thread 2B	
	mm		min. mm	max. mm		mm		min. mm	max. mm		mm		min. mm	max. mm		per inch		min. mm	max. mm
M 1	0.25	0.75	0.729	0.785	M 2.5 x 0.35	2.15	2.121	2.221		M 22 x 1.50	20.50	20.376	20.676		No. 1 - 64	1.55	1.425	1.580	
M 1.1	0.25	0.85	0.829	0.885	M 3.0 x 0.35	2.65	2.621	2.721		M 22 x 2.00	20.00	19.835	20.210		No. 2 - 56	1.85	1.694	1.872	
M 1.2	0.25	0.95	0.929	0.985	M 3.5 x 0.35	3.15	3.121	3.221		M 24 x 1.00	23.00	22.917	23.153		No. 3 - 48	2.10	1.941	2.146	
M 1.4	0.30	1.10	1.075	1.142	M 4.0 x 0.50	3.50	3.459	3.599		M 24 x 1.50	22.50	22.376	22.676		No. 4 - 40	2.35	2.157	2.385	
M 1.6	0.35	1.25	1.221	1.321	M 4.5 x 0.50	4.00	3.959	4.099		M 24 x 2.00	22.00	21.835	22.210		No. 5 - 40	2.65	2.487	2.698	
M 1.8	0.35	1.45	1.421	1.521	M 5.0 x 0.50	4.50	4.459	4.599		M 25 x 1.00	24.00	23.917	24.153		No. 6 - 32	2.85	2.642	2.896	
M 2	0.40	1.60	1.567	1.679	M 5.5 x 0.50	5.00	4.959	5.099		M 25 x 1.50	23.50	23.376	23.676		No. 8 - 32	3.50	3.302	3.531	
M 2.2	0.45	1.75	1.713	1.838	M 6.0 x 0.75	5.20	5.188	5.378		M 25 x 2.00	23.00	22.835	23.210		No.10 - 24	3.90	3.683	3.937	
M 2.5	0.45	2.05	2.013	2.138	M 7.0 x 0.75	6.20	6.188	6.378		M 27 x 1.00	26.00	25.917	26.153		No.12 - 24	4.50	4.343	4.597	
M 3	0.50	2.50	2.459	2.599	M 8.0 x 0.50	7.50	7.459	7.599		M 27 x 1.50	25.50	25.376	25.676		1/4 - 20	5.10	4.978	5.258	
M 3.5	0.60	2.90	2.850	3.010	M 8.0 x 0.75	7.20	7.188	7.378		M 27 x 2.00	25.00	24.835	25.210		5/16 - 18	6.60	6.401	6.731	
M 4	0.70	3.30	3.242	3.422	M 8.0 x 1.00	7.00	6.917	7.153		M 28 x 1.00	27.00	26.917	27.153		3/8 - 16	8.00	7.798	8.153	
M 4.5	0.75	3.70	3.688	3.878	M 9.0 x 0.75	8.20	8.188	8.378		M 28 x 1.50	26.50	26.376	26.676		7/16 - 14	9.40	9.144	9.550	
M 5	0.80	4.20	4.134	4.334	M 9.0 x 1.00	8.00	7.917	8.153		M 28 x 2.00	26.00	25.835	26.210		1/2 - 13	10.80	10.592	11.024	
M 6	1.00	5.00	4.917	5.153	M 10 x 0.75	9.20	9.188	9.378		M 30 x 1.00	29.00	28.917	29.153		9/16 - 12	12.20	11.989	12.446	
M 7	1.00	6.00	5.917	6.153	M 10 x 1.00	9.00	8.917	9.153		M 30 x 1.50	28.50	28.376	28.676		5/8 - 11	13.50	13.386	13.868	
M 8	1.25	6.80	6.647	6.912	M 10 x 1.25	8.80	8.647	8.912		M 30 x 2.00	28.00	27.835	28.210		3/4 - 10	16.50	16.307	16.840	
M 9	1.25	7.80	7.647	7.912	M 11 x 0.75	10.20	10.188	10.378		M 30 x 3.00	27.00	26.752	27.252		7/8 - 9	19.50	19.177	19.761	
M 10	1.50	8.50	8.376	8.676	M 11 x 1.00	10.00	9.917	10.153		M 32 x 1.50	30.50	30.376	30.676		1 - 8	22.25	21.971	22.606	
M 11	1.50	9.50	9.376	9.676	M 12 x 1.00	11.00	10.917	11.153		M 32 x 2.00	30.00	29.835	30.210		1 1/8 - 7	25.00	24.638	25.349	
M 12	1.75	10.20	10.106	10.441	M 12 x 1.25	10.80	10.647	10.912		M 33 x 1.50	31.50	31.376	31.676		1 1/4 - 7	28.00	27.813	28.524	
M 14	2.00	12.00	11.835	12.210	M 12 x 1.50	10.50	10.376	10.676		M 33 x 2.00	31.00	30.835	31.210		1 3/8 - 6	30.75	30.353	31.115	
M 16	2.00	14.00	13.835	14.210	M 14 x 1.00	13.00	12.917	13.153		M 33 x 3.00	30.00	29.752	30.252		1 1/2 - 6	34.00	33.528	34.290	
M 18	2.50	15.50	15.294	15.744	M 14 x 1.25	12.80	12.647	12.912		M 35 x 1.50	33.50	33.376	33.676		1 3/4 - 5	39.50	38.938	39.802	
M 20	2.50	17.50	17.294	17.744	M 14 x 1.50	12.50	12.376	12.676		M 36 x 1.50	34.50	34.376	34.676		2 - 4.5	45.00	44.679	45.593	
M 22	2.50	19.50	19.294	19.744	M 15 x 1.00	14.00	13.917	14.153											
M 24	3.00	21.00	20.752	21.252	M 15 x 1.50	13.50	13.376	13.676											
M 27	3.00	24.00	23.752	24.252	M 16 x 1.00	15.00	14.917	15.153											
M 30	3.50	26.50	26.211	26.771	M 16 x 1.25	14.80	14.647	14.912											
M 33	3.50	29.50	29.211	29.771	M 16 x 1.50	14.50	14.376	14.676											
M 36	4.00	32.00	31.670	32.270	M 17 x 1.00	16.00	15.917	16.153											
M 39	4.00	35.00	34.670	35.270	M 17 x 1.50	15.50	15.376	15.676											
M 42	4.50	37.50	37.129	37.799	M 18 x 1.00	17.00	16.917	17.153											
M 45	4.50	40.50	40.129	40.799	M 18 x 1.50	16.50	16.376	16.676											
M 48	5.00	43.00	42.587	43.297	M 20 x 1.00	19.00	18.917	19.153											
M 52	5.00	47.00	46.587	47.297	M 20 x 1.50	18.50	18.376	18.676											
M 56	5.50	50.50	50.046	50.796	M 20 x 2.00	18.00	17.835	18.210											
					M 22 x 1.00	21.00	20.917	21.153											

* M 1.1 up to M 1.4 tapping size hole of int. thread 5H

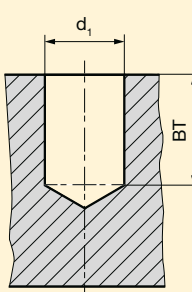
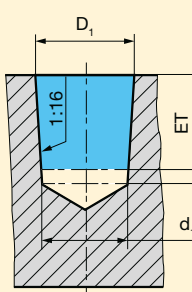
MJ threads DIN ISO 5855					UNJC threads ISO 3161					UNJF threads ISO 3161				
nom. Ø	x pitch P mm	tapping size hole Ø mm	core diameter of int. thread 5H*		nom. Ø	threads per inch	tapping size hole Ø mm	core diameter of int. thread 3B		nom. Ø	threads per inch	tapping size hole Ø mm	core diameter of int. thread 3B	
			min. mm	max. mm				min. mm	max. mm				min. mm	max. mm
MJ 3	x 0.50	2.60	2.513	2.653	No. 6 - 32	2.85	2.733	2.939		No. 6 - 40	3.00	2.888	3.053	
MJ 4	x 0.70	3.40	3.318	3.498	No. 8 - 32	3.55	3.393	3.599		No. 8 - 36	3.60	3.480	3.663	
MJ 5	x 0.80	4.30	4.221	4.421	No. 10 - 24	4.00	3.795	4.064		No. 10 - 32	4.20	4.054	4.255	
MJ 6	x 0.50	5.55	5.513	5.625	No. 12 - 24	4.60	4.455	4.704		No. 12 - 28	4.75	4.602	4.816	
MJ 6	x 0.75	5.35	5.269	5.419	1/4 - 20	5.30	5.113	5.387		1/4 - 28	5.60	5.466	5.662	
MJ 6	x 1.00	5.10	5.026	5.216	5/16 - 18	6.75	6.563	6.833		5/16 - 24	7.00	6.906	7.109	
MJ 8	x 0.50	7.55	7.513	7.625	3/8 - 16	8.20	7.978	8.255		3/8 - 24	8.60	8.494	8.679	
MJ 8	x 0.75	7.35	7.269	7.419	7/16 - 14	9.60	9.346	9.639		7/16 - 20	10.00	9.876	10.084	
MJ 8	x 1.00	7.10	7.026	7.216	1/2 - 13	11.00	10.798	11.095		1/2 - 20	11.60	11.463	11.661	
MJ 8	x 1.25	6.90	6.782	6.994	9/16 - 12	12.40	12.228	12.482		9/16 - 18	13.00	12.913	13.122	
MJ 10	x 1.00	9.10	9.026	9.216	5/8 - 11	13.80	13.627	13.904		5/8 - 18	14.60	14.501	14.702	
MJ 10	x 1.25	8.90	8.782	8.994										
MJ 10	x 1.50	8.60	8.539	8.775										
MJ 12	x 1.75	10.40	10.295	10.560										
MJ 16	x 2.00	14.20	14.051	14.351										



Taping size holes for thread milling cutters

UNF threads ASME B1.1					BSW (Whitworth) threads BS84					(Whitworth) threads (DIN-ISO 228-1)					Steel armoured conduit threads to DIN 40430				
nom. Ø	threads per inch	tapping size hole Ø DIN 336 mm	core diameter of int. thread 2B		nom. Ø	threads per inch	tapping size hole Ø mm	core diameter of int. thread		nom. Ø	threads per inch	tapping size hole Ø DIN 336 mm	core diameter of int. thread		nom. Ø	threads per inch	tapping size hole Ø mm	core diameter of int. thread	
No. 1- 72		1.55	1.473	1.610	W 1/16	60	1.20	1.045	1.230	G 1/16	28	6.80	6.561	6.843	Pg 7	20	11.40	11.280	11.430
No. 2- 64		1.85	1.755	1.910	W 3/32	48	1.80	1.704	1.912	G 1/8	28	8.80	8.566	8.848	Pg 9	18	14.00	13.860	14.010
No. 3- 56		2.15	2.024	2.197	W 1/8	40	2.50	2.362	2.591	G 1/4	19	11.80	11.445	11.890	Pg 11	18	17.30	17.260	17.410
No. 4- 48		2.40	2.271	2.459	W 5/32	32	3.20	2.952	3.214	G 3/8	19	15.25	14.950	15.395	Pg 13.5	18	19.00	19.060	19.210
No. 5- 44		2.70	2.550	2.741	W 3/16	24	3.60	3.407	3.745	G 1/2	14	19.00	18.631	19.172	Pg 16	18	21.30	21.160	21.310
No. 6- 40		2.95	2.819	3.023	W 7/32	24	4.50	4.201	4.539	G 5/8	14	21.00	20.587	21.128	Pg 21	16	26.90	26.780	27.030
No. 8- 36		3.50	3.404	3.607	W 1/4	20	5.10	4.724	5.156	G 3/4	14	24.50	24.117	24.658	Pg 29	16	35.50	35.480	35.730
No. 10- 32		4.10	3.962	4.166	W 5/16	18	6.50	6.130	6.590	G 7/8	14	28.25	27.877	28.418	Pg 36	16	45.50	45.480	45.730
No. 12- 28		4.60	4.496	4.724	W 3/8	16	7.90	7.492	7.987	G 1	11	30.75	30.291	30.931	Pg 42	16	52.50	52.480	52.730
1/4 - 28		5.50	5.359	5.588	W 7/16	14	9.20	8.789	9.330	G 1 1/8	11	35.50	34.939	35.579	Pg 48	16	57.80	57.780	58.030
5/16 - 24		6.90	6.782	7.036	W 1/2	12	10.50	9.989	10.591	G 1 1/4	11	39.50	38.952	39.592					
3/8 - 24		8.50	8.382	8.636	W 9/16	12	12.00	11.577	12.179	G 1 1/2	11	45.25	44.845	45.485					
7/16 - 20		9.90	9.728	10.033	W 5/8	11	13.50	12.918	13.558	G 1 3/4	11	51.00	50.788	51.428					
1/2 - 20		11.50	11.328	11.608	W 3/4	10	16.25	15.797	16.483	G 2	11	57.00	56.656	57.296					
9/16 - 18		12.90	12.751	13.081	W 7/8	9	19.25	18.611	19.353										
5/8 - 18		14.50	14.351	14.681	W 1	8	22.00	21.334	22.147										
3/4 - 16		17.50	17.323	17.678	W 1 1/8	7	24.50	23.928	24.832										
7/8 - 14		20.40	20.269	20.650	W 1 1/4	7	27.75	27.103	28.007										
1 - 12		23.25	23.114	23.571	W 1 3/8	6	30.50	29.504	30.528										
1 1/8 - 12		26.50	26.289	26.746	W 1 1/2	6	33.50	32.679	33.703										
1 1/4 - 12		29.50	29.464	29.921	W 1 5/8	5	35.50	34.769	35.963										
1 3/8 - 12		32.75	32.639	33.096	W 1 3/4	5	39.00	37.944	39.138										
1 1/2 - 12		36.00	35.814	36.271	W 2	4.5	44.50	43.571	44.877										

NPT ANSI B 2.1
American tapered pipe thread 1:16

Version A (avoid if possible)	Version B	nom. Ø	threads per inch	tapp. size hole Ø cylindrical (A) d ₁	tapp. size hole Ø conical (B) D ₁	cutting depth ET mm	cutting depth BT (min) mm
		1/16	- 27	6.15	6.39	9.29	10.7
		1/8	- 27	8.40	8.74	9.32	10.8
		1/4	- 18	11.10	11.36	13.52	15.6
		3/8	- 18	14.30	14.80	13.83	16.0
		1/2	- 14	17.90	18.32	18.07	20.8
		3/4	- 14	23.30	23.67	18.55	21.3
		1	- 11.5	29.00	29.69	22.29	25.6
		1 1/4	- 11.5	37.70	38.45	22.80	26.1
		1 1/2	- 11.5	43.70	44.52	22.80	26.1
		2	- 11.5	55.60	56.56	23.20	26.5
		2 1/2	- 8	66.30	67.62	31.75	36.3
		3	- 8	82.30	83.52	33.74	38.5

Metric/metric fine EG-threads (EG M14 x 1.25) for wire thread inserts DIN 8140					UNC (UNC-STI) EG-threads for wire thread inserts ASME B18.29.1					EG UNF (UNF-STI) threads for wire thread inserts ASME B18.29.1				
nom. Ø	x pitch P mm	tapping size hole Ø mm	core diameter of int. thread		nom. Ø	threads per inch	tapping size hole Ø mm	core diameter of int. thread		nom. Ø	threads per inch	tapping size hole Ø mm	core diameter of int. thread	
			min. mm	max. mm				min. mm	max. mm				min. mm	max. mm
EG M 4	0.70	4.20	4.152	4.292	EG No. 6 - 32		3.80	3.678	3.879	EG No. 6 - 40		3.70	3.644	3.818
EG M 5	0.80	5.25	5.174	5.334	EG No. 8 - 32		4.40	4.338	4.524	EG No. 8 - 36		4.40	4.321	4.498
EG M 6	1.00	6.30	6.217	6.407	EG No. 10 - 24		5.20	5.055	5.283	EG No. 10 - 32		5.10	4.999	5.184
EG M 8	1.25	8.40	8.271	8.483	EG No. 12 - 24		5.80	5.715	5.944	EG No. 12 - 28		5.70	5.682	5.809
EG M10	1.50	10.50	10.324	10.560	EG 1/4 - 20		6.70	6.624	6.868	EG 1 1/4 - 28		6.60	6.546	6.721
EG M12	1.75	12.50	12.379	12.644	EG 5/16 - 18		8.40	8.242	8.489	EG 5/16 - 24		8.25	8.166	8.352
EG M14 x 1.25		14.40	14.271	14.483	EG 3/8 - 16		10.00	9.868	10.127	EG 3/8 - 24		9.80	9.754	9.931
EG M16	2.00	16.50	16.433	16.733	EG 7/16 - 14		11.60	11.506	11.783	EG 7/16 - 20		11.50	11.389	11.585
					EG 1/2 - 13		13.30	13.122	13.393	EG 1 1/2 - 20		13.10	12.974	13.172
					EG 9/16 - 12		14.90	14.747	15.032	EG 9/16 - 18		14.70	14.592	14.798
					EG 5/8 - 11		16.50	16.375	16.673	EG 5/8 - 18		16.25	16.180	16.386

The Guhring thread milling cutter types

TM SP – thread milling cutter w/o countersink step



- Simple and cost-efficient tool for the milling of internal threads
- 2-3 thread sizes with the same pitch can be produced over the specified nominal dimension
- Application in materials $\leq 1000 \text{ N/mm}^2$
- Available with or without internal cooling

Thread types: M, MF, UNC, UNF, G, NPT

TMCP SP – Thread milling cutter with 45° countersinking step



- Countersinking and thread milling with only one tool
- Very smooth running and low lateral forces
- Designed for the application of difficult-to-machine materials also available w/o countersinking step
- 2-3 thread sizes with the same pitch can be produced over the specified nominal dimension
- Only available with internal cooling

Thread types: M, MF, G

TMU SP – universal milling cutter with collar recess



- Universal application possibilities
- For various thread sizes with the same pitch, i.e. thread M30x1.5 with milling cutter $\varnothing 12 \times \text{M}1.5$, $\varnothing 16 \times \text{M}1.5$ or $\varnothing 20 \times \text{M}1.5$
- Only available with internal cooling

Thread types: M, MF, G, UN, NPT and external thread M, MF, G

DTMC SP – drill/thread milling cutter with 2 cutting edges and 45° chamfer



- Drilling, countersinking and thread milling with only one tool
- Resulting in reduced machining times and tool costs as well as reduced space requirements
- Application only in aluminium, cast materials, brass and plastics
- Available with or without internal cooling

Thread types: M

MTM 3 SP – micro-thread milling cutter



- Thread size and pitch are predetermined
- Excellent characteristics with high-tensile materials such as titanium, stainless steel etc.
- Suitable for the machining of hardened steel 45HRC-65HRC
- Threads up to 3xD
- Available with or without internal cooling

Thread types: M, MF, G, UNC, UNF, MJ, UNJC, UNJF

MTM 1 SP – micro-thread milling cutter



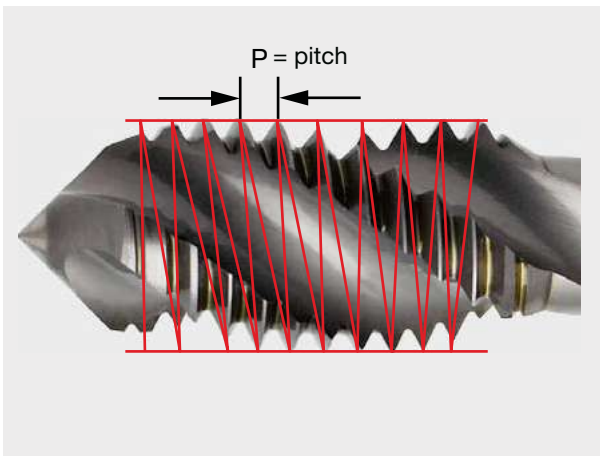
- Universal production of nominal thread diameters up to a maximum pitch
- Only available with internal cooling

Thread types: M, MF



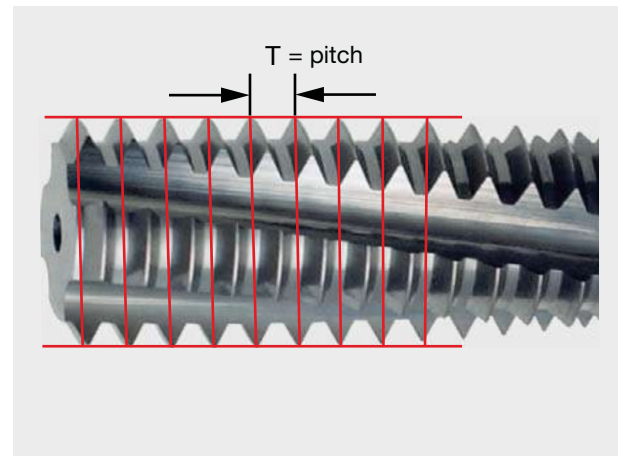
Difference between taps/fluteless taps and thread milling cutters

Taps/fluteless taps



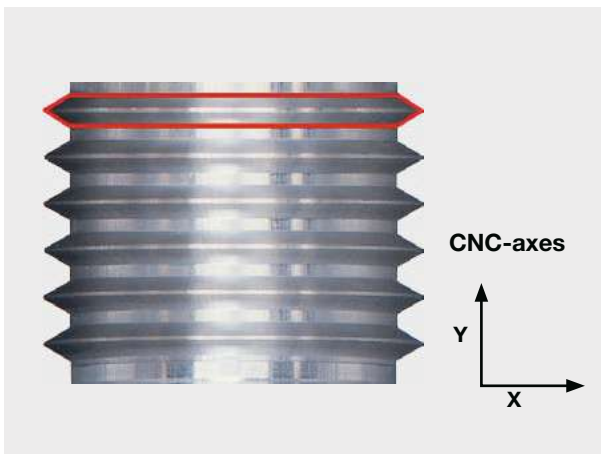
The red lines show the pitch angle of the thread that is ground into the tool. This means the pitch is cut into the workpiece by the tool.

Thread milling cutter

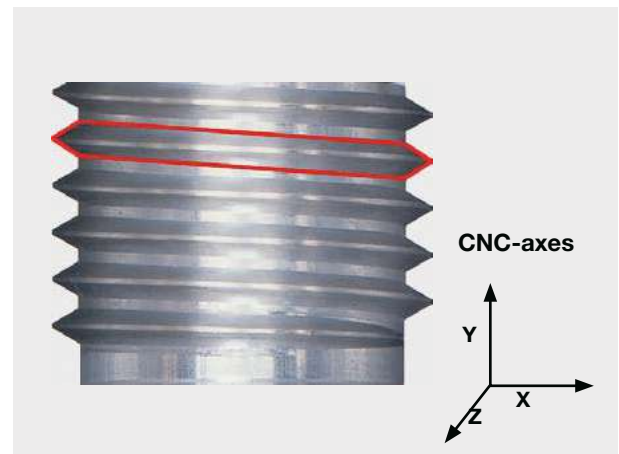


The red lines show that the tool does not possess a pitch angle. The pitch is produced by the Z-axis of a CNC machine.

Creation of the thread with thread milling



Thread profile without axial feed (Z-axis) of the machine. A groove profile is created without pitch. A functioning thread is not created.



Through the additional programming of the Z-axis the necessary pitch is produced.

Note:

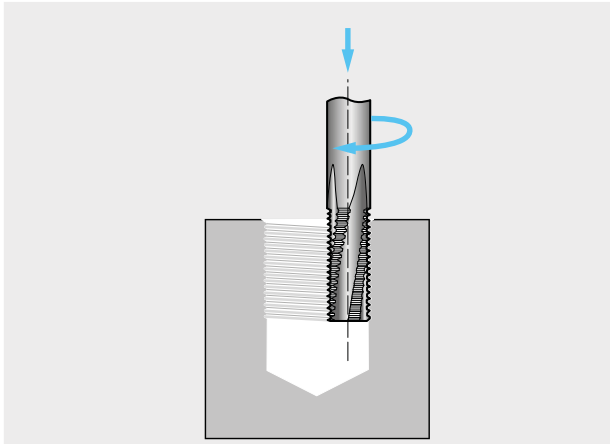
Due to diagonal milling in the pitch angle (**Z-axis**) the thread profile of the tool is **transferred onto the component distorted**.

The more the milling cutter diameter (80% of nom. Ø) approaches the nominal thread diameter and the higher the thread pitch the more pronounced the profile distortion is.

Differentiating between two milling processes

Reverse rotation milling

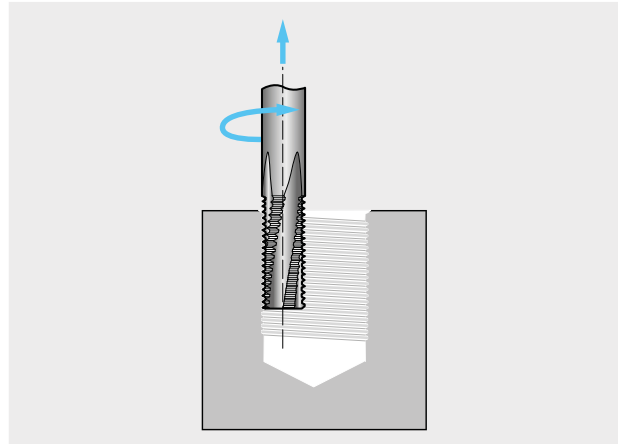
clockwise, with G02



Reverse rotation milling is preferentially applied for the machining of harder materials or to remedy taper threads.

Synchronous milling

anticlockwise, with G03

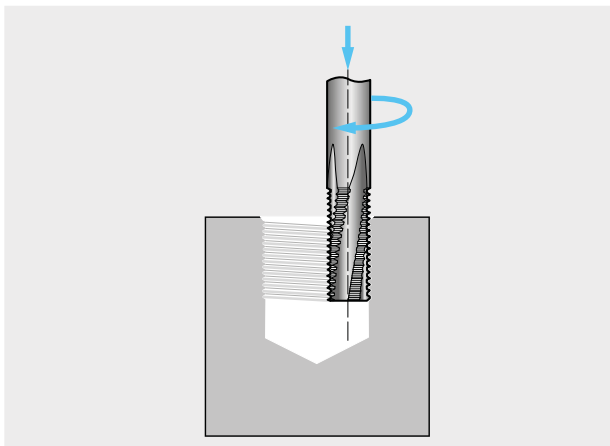


Synchronous milling is applied with thread depths smaller than $1.5 \times D$. Advantage: A better surface finish is achieved.

Thread production with one tool

Right-hand thread

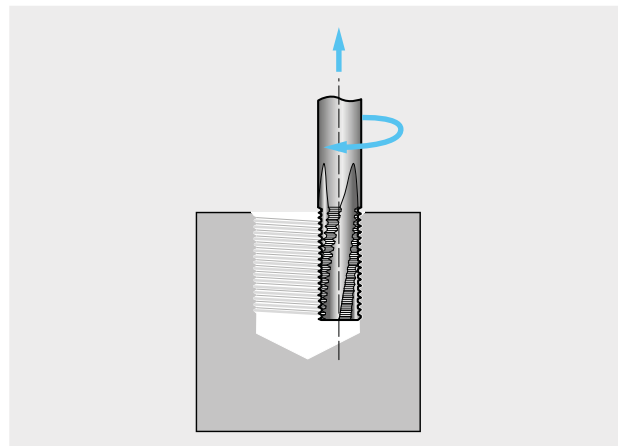
Reverse rotation milling



Tool rotates clockwise from top to bottom

Left-hand thread

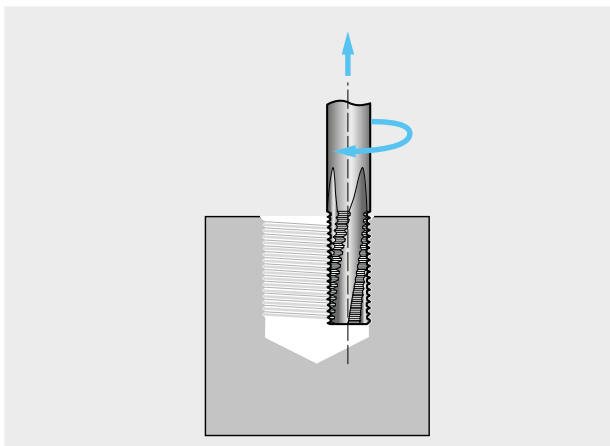
Reverse rotation milling



Tool rotates clockwise from bottom to top

Right-hand thread

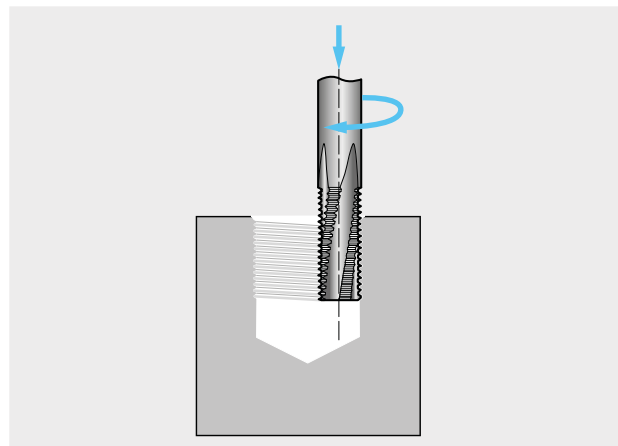
Synchronous milling



Tool rotates clockwise from bottom to top

Left-hand thread

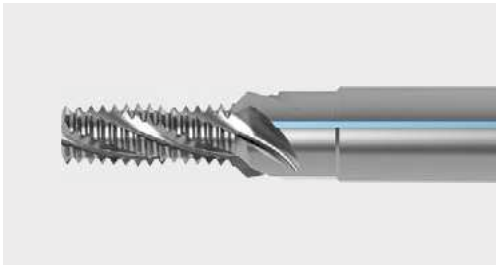
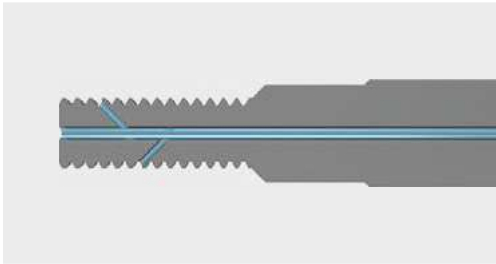
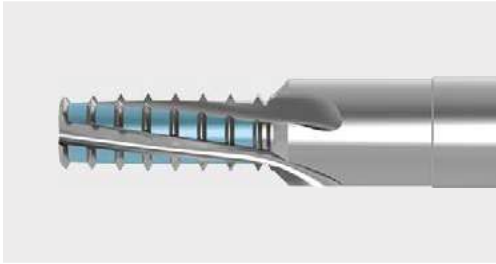
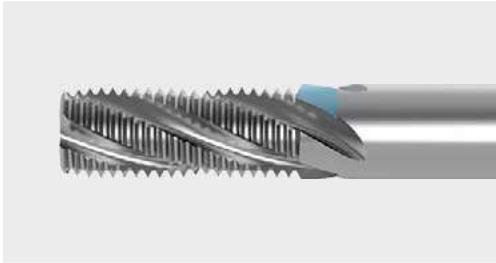
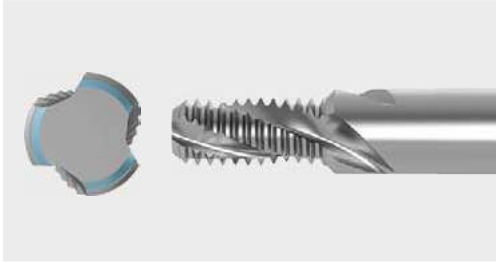
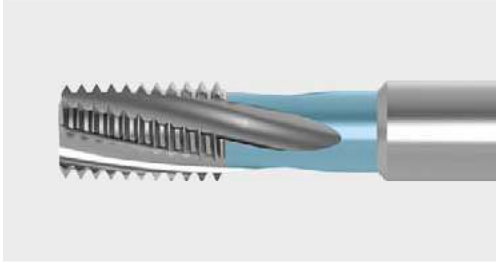
Synchronous milling



Tool rotates clockwise from top to bottom



Thread milling cutter modifications

Illustration	Modification	Effect
	Cooling slots on shank	Targeted cooling, without weakening the tool cross-section in the cutting edge area
	Radial coolant exits	Targeted cooling with through hole threads
	Threads removed	Reduced cutting forces but longer machining time because two cycles are required
	De-burring cutting edge	Removing the incomplete threads at the thread run-in without additional operating step.
	First thread profile lengthened at the face	Chamfering a tapping size hole
	Grinding collar	Enables axial distribution of cuts – useful for deep threads

Thread milling programming

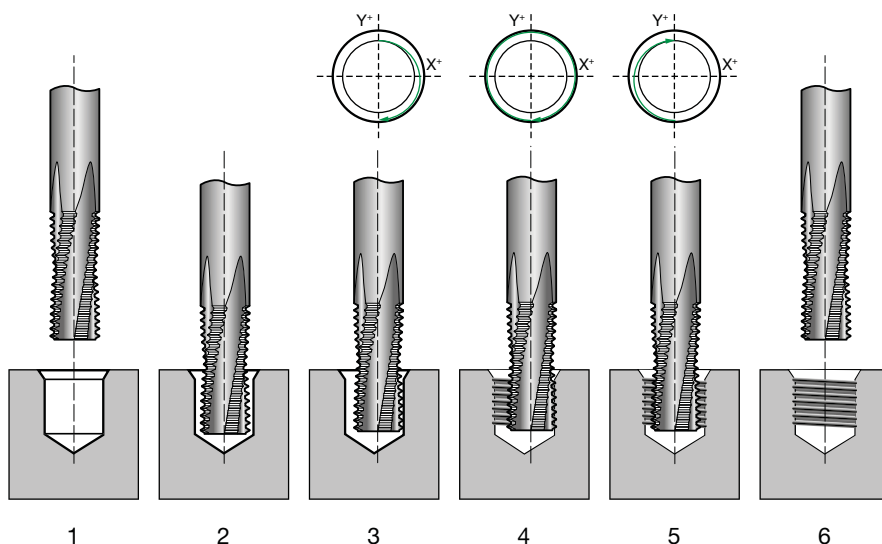
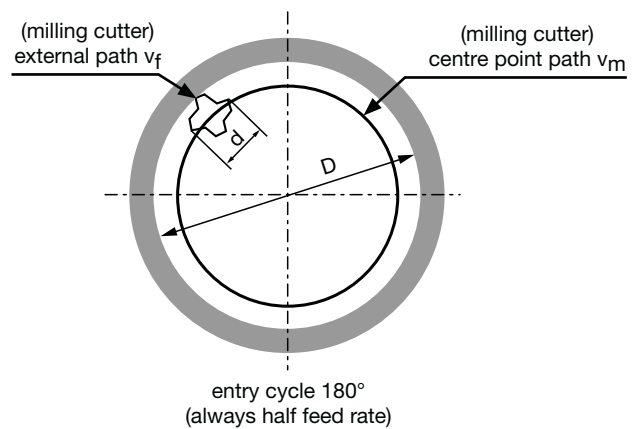
Program specifications

Thread milling functions

G00 Rapid movement	G90 Absolute dimension
G01 Feed	G91 Incremental dimension
G02 Circular interpolation (clockwise)	M03 Spindle on (clockwise rotation)
G03 Circular interpolation (anti-clockwise)	M05 Spindle stop
G17 Layer selection x-y axis	M08 Coolant on
G18 Layer selection z-x axis	X Axis
G19 Layer selection y-z axis	Y Axis
G40 Cancel tool correction	Z Axis
G41 Tool path correction (left of contour)	I Thread pitch parallel to X-axis
G42 Tool path correction (right of contour)	J Thread pitch parallel to Y-axis
G43 Tool length compensation (call-up)	S Spindle speed
G49 Tool length compensation (deselect)	F Feed
G54 Work offset	

CNC internal thread milling

1. Moving to start position
2. Moving to thread depth in bore
3. 180° descending loop to contour
4. 360° full circular movement of thread milling cutter
5. 180° exit loop to centre of bore
6. Rapid movement from bore to start position



Formula of calculation

$$v_c = \frac{d \cdot \pi \cdot n}{1000}$$

$$n = \frac{v_c \cdot 1000}{d \cdot \pi}$$

$$v_f = n \cdot z \cdot f_z$$

$$v_m = \frac{v_f \cdot (D - d)}{D}$$

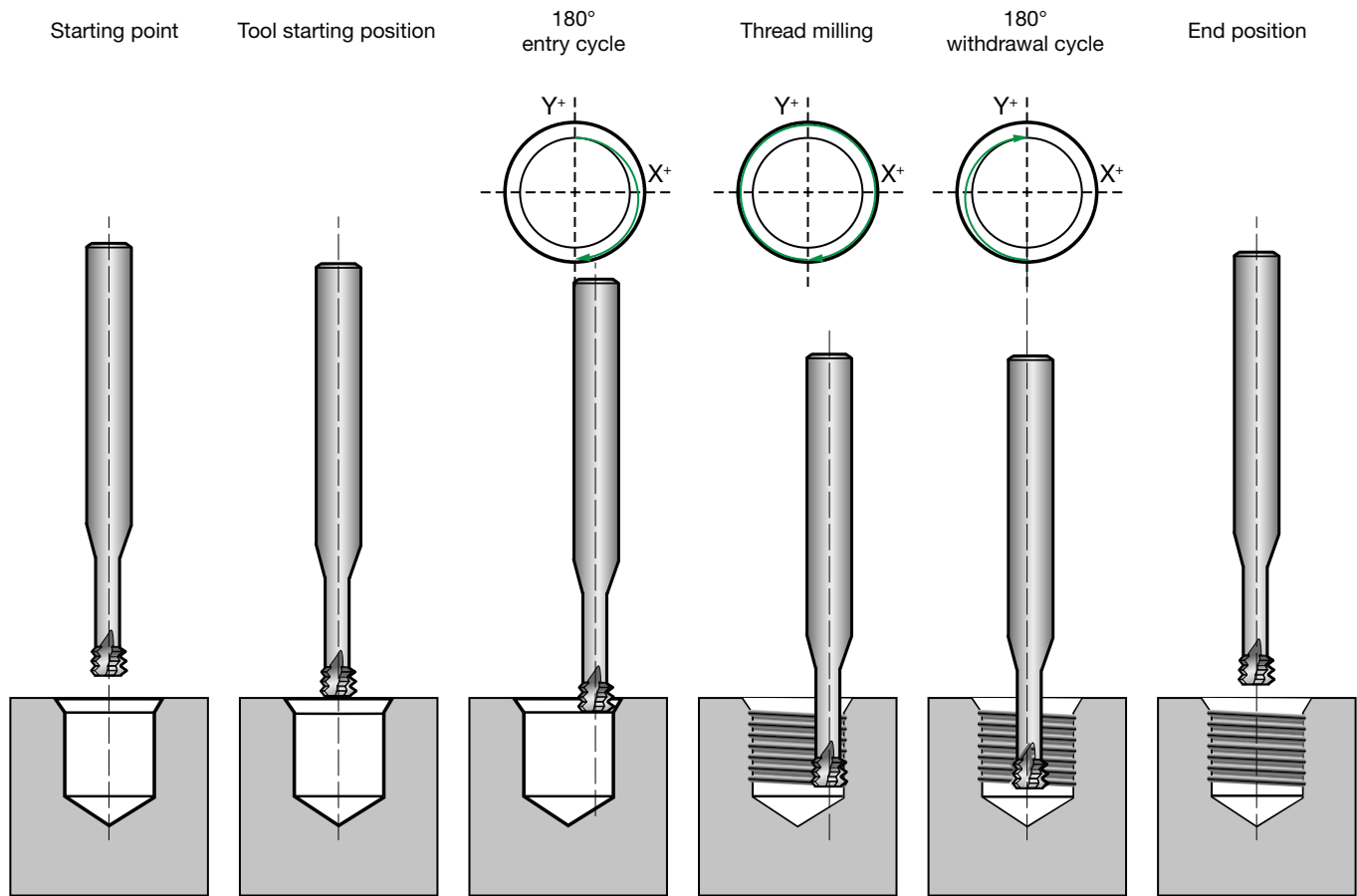
$$v_b = n \cdot f_b$$

v_c = cutting speed
 v_f = contour feed
 v_m = centre point path feed
 n = revolutions
 z = number of teeth
 f_z = feed per tooth
 f_b = feed per drill per revolution*
 v_b = drill feed rate*
 D = Ø nom. of thread [mm]
 d = milling cutter nom. Ø [mm]
 * for drill/thread milling



Thread milling programming

Programming process for micro-thread milling (right-hand thread in reverse rotation)



Possibilities to reduce radial forces

To reduce radial forces cut distribution can be undertaken:

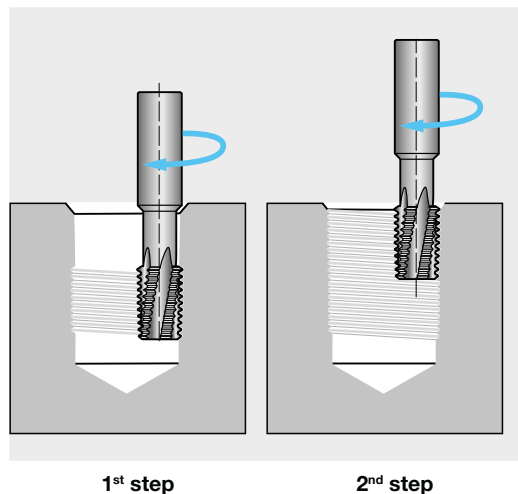
Advantage:

- for larger thread depths
- counteracts taper threads
- for unstable clamping conditions

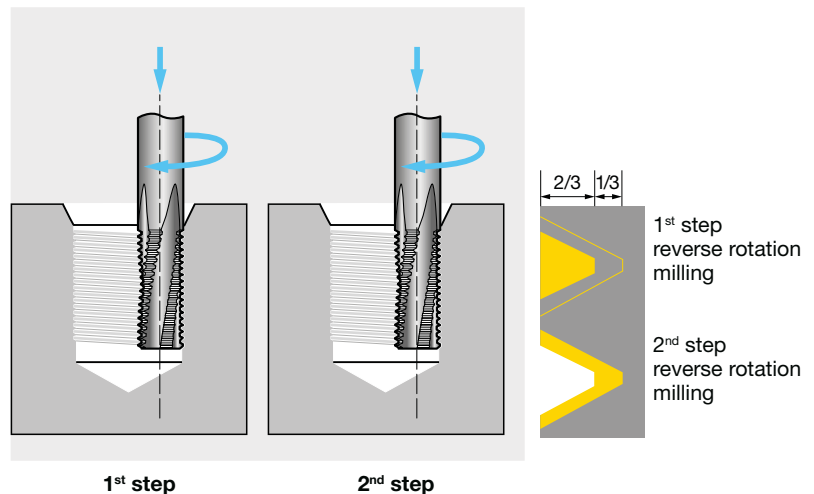
Disadvantage:

- increased tool wear
- longer production time

Axial distribution of cut



Radial distribution of cut



Selecting the correct clamping chuck

Correct tool clamping also plays an essential role with thread milling. Thread milling cutters should as a rule be clamped as short as possible. A compact and mechanical clamping force is preferable. The error in concentricity should not exceed 0.02 millimetres.

Power chucks



max. permissible error in concentricity: 0.003 mm

A power chuck excels thanks to extremely accurate concentricity. The high clamping forces and optimal smooth running are a perfect prerequisite for the production of threads in all materials including a high pitch.

Side lock holders



max. permissible error in concentricity: 0.002 mm

A side lock holder for HB and HE shanks is a robust, cost-efficient clamping chuck with a maximum clamping force. The clamping surface prevents the tool twisting or being pulled out during machining. Therefore, side lock holders are suitable for the production in all materials including a high pitch.

Shrink fit chucks



max. permissible error in concentricity: 0.005 mm

A shrink fit chuck creates a rigid connection with the shrink fitted tool. Incorrect shrink fitting or older shrink fit chucks can result in the pulling out of the tool. Tool breakage and possible loss of the component would be the consequence. Therefore, the shrink fit chuck is only suitable for a thread pitch $< P=1.5$ mm.

Hydraulic chucks



max. permissible error in concentricity: 0.005 mm

A hydraulic chuck, similar to the shrink fit chuck, has only limited suitability for thread milling. Especially with high radial forces this clamping chuck reaches its limits. Therefore, the hydraulic chuck is recommended for softer materials such as aluminium and a thread pitch $< P=1.5$ mm.

Collet holders



max. permissible error in concentricity: 0.01 mm

Collet chucks are very well suited for micro-thread milling because only axial stresses are created. The low clamping forces only permit the milling of softer materials. Consequently, collet holders are not suitable for conventional thread milling.



Practical application of thread milling cutters

1.) Tool clamping:

good concentricity is important, therefore clamping as short and rigid as possible

2.) Enter tool data in machine memory

- 1.) Tool length from the front face, take drill/thread milling cutters (DTMC) from point.
- 2.) Measure tool radius with tool pre-setting equipment. General rule: measured radius - $0.022 \times \text{pitch}$ provides the input value in machine memory.

3.) Input of CNC program in control

- (preferably integrated as sub-program at corresponding positions)
- a.) Call-up of a self-controlling cycle (procedures should be known)
 - b.) Integration of data file from our threadmill-software (DIN or Haidenhain).

4.) Trial run over workpiece

- a) Tool length dimension in memory extending by an approximate value dependent on contact length (i.e. 30 mm) or offset zero point.
- b) Run program in single set, visual check of travel path.
- c) Allow program to run in automatic mode.

Attention:

With controls where it is not definitely clear what milling path is assigned it must be clarified if the feed is positioned on the external path v_f or at the centre path v_m . As a rule we specify the milling centre point path v_m .

5.) Application in workpiece

Re-set the tool extension or the zero point. Then allow the program to run in the workpiece the feed regulation must be 100% selected. Should the thread not be true to gauge, the tool radius requires correction in the tool memory:

Example:

- thread too tight: Radius correction – input
- thread too large: Radius correction + input







Maximum economic efficiency thanks to refurbishing to original quality

Even the most wear-resistant tool will wear sometime under heavy stresses. Thanks to the refurbishment to original geometries and coatings Guhring manages to reproduce the original performance of the tool



Re-grinding

In our service centres, tools are re-ground on the front rake face according to the degree of wear.

According to width of wear marks the re-grind service is possible two or three times (from milling part diameter $d_1 > 5.0$ mm).

In order to re-define the milling portion diameter, the number of re-grinds is indicated by a notch on the end of the shank. This means every notch is assigned to a diameter and re-etched.



Re-coating

If a thread mill was enhanced with a coating, the tool is re-coated following the re-grind. This way, not only the wear- and corrosion-protection as well as the glide characteristics are re-produced but also the tool life prolonged.



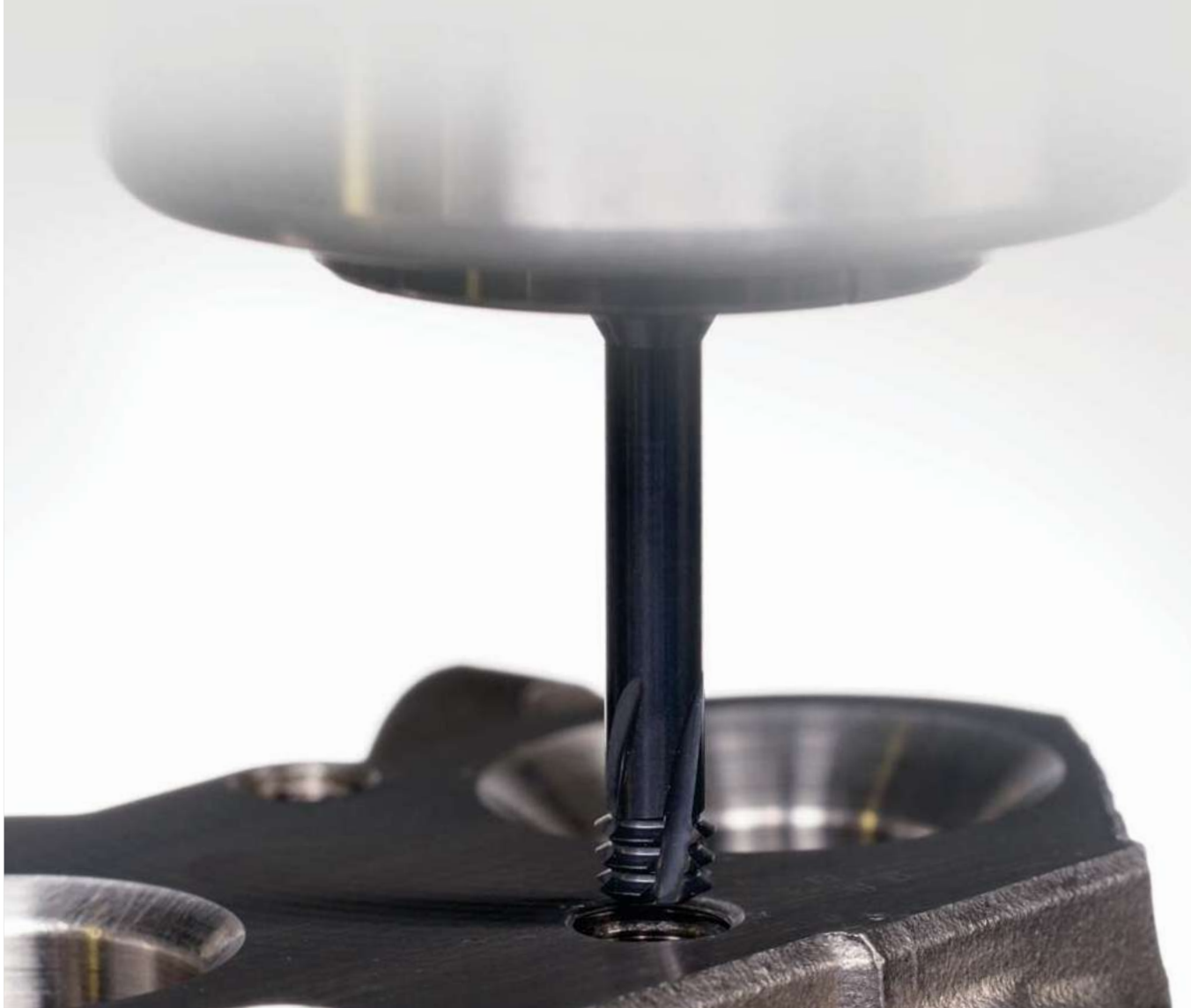




Programming example for hardened steels

Programming example internal threads M6x(1)

Material:	1.2379 / HRC 62
Thread:	M6x(1), deep 16.0 mm / blind hole
Tapping size:	Tapping size-Ø 5.1 mm
Tool:	MTMH 3 SP M, M6x(1) material-Ø 4.8 mm Z=4
Cooling:	dry
Parameter:	$v_c = 44$ m/min, $f_z = 0.03$ (reverse rotation milling)
Processing:	cut distribution in diameter 2/3 - 1/3
Tool life:	30 threads



Application recommendations thread milling cutters and micro-thread milling cutters

ISO		Material group	Hardness	Example materials	Material no.
P	P1	Structural/free-cutting steels, Unalloyed heat-treatable-/ case hardened steels	< 800 N/mm ²	S235JR C15 11SMnPb30	1.0037 1.0401 1.0718
	P2	Free-cutting steels, Unalloyed case hardened steels, nitriding steels	800 - 1000 N/mm ²	S355J2 C60 31CrMo12 42CrMo4 36CrNiMo4	1.0577 1.0601 1.8515 1.7225 1.6511
	P3	Alloyed heat-treatable steels, heat-treatable steels, high speed steels	800-1200 N/mm ²	X36CrMo17 HS 6-5-2 X5CrNi18-10 X6CrNiTi18-10 X8CrNiS18-9	1.2316 1.3343 1.4301 1.4571 1.4305
M	M1	Stainless steel sulfured, austenitic	< 1000 N/mm ²	X17CrNi16-2 X90CrMoV18 X2CrTi12	1.4057 1.4112 1.4512
	M2	Stainless and acid-resist. steel steels, martensitic	< 1000 N/mm ²	X2CrNiMoN22-5-3 X2CrNiMoN25-7-4 X2CrNiMoCuWn25-7-4	1.4462 1.441 1.4501
	M3	duplex and super duplex	< 1300 N/mm ²	EN-GJL-150 EN-GJL-250 EN-GJL-300	0.6015 0.6025 0.603
K	K1	cast iron	300 HB	EN-GJS-400-15 EN-GJS-600-3 EN-GJS-700-2	0.704 0.706 0.707
	K2	Spher. graph. iron and mall. cast iron	350 HB	EN-GJS1000-5 EN-GJV250 EN-GJV400	
	K3	ADI, GGV	1000 N/mm ² 350 HB	AI99,5H AlMgSi1 AlZn4,5Mg	3.025 3.2315 3.4335
N	N1	Aluminium and wrought alloys	< 450 N/mm ²	GD-AISi5Cu1Mg GD-AISi8Cu3 G-AISi9Mg G-AISi12	3.2134 3.2162 3.2373 3.2581
	N2	Aluminium- cast alloys	< 600 N/mm ²	GDMgAl8Zn1 CuZn20	3.5812.08 2.025
	N3	Magnesium alloys	< 500 N/mm ²	CuZn37Pb0,5 short-chipping CuZn43Pb2	2.0332 2.038 2.041
S	N4	Copper and copper alloys	long-chipping	Ampco PMMA, POM,PVC short-chipping	
	N5	Copper special alloys	< 1400 N/mm ²	Titanium TiAl5Sn2 TiAl6V4	3.7025 3.7115 3.7165
	N6	Plastics [thermoplastics, duroplastics]	long-chipping	Hastelloy C4 Inconel 718 Nimonic Hardox PM30	2.461 2.4668 2.4634
H	H1 H2	High tensile steels, hardened steels	45-55 HRC 55-62 HRC		

Application recommendations drill thread milling cutters
1.5xD, 2xD, 2.5xD

ISO		Material group	Hardness	Example materials	Material no.
K	K1	cast iron	300 HB	EN-GJL-150 EN-GJL-250 EN-GJL-300	0.6015 0.6025 0.6030
	K2	Spher. graph. iron and mall. cast iron	350 HB	EN-GJS-400-15 EN-GJS-600-3 EN-GJS-700-2	0.7040 0.7060 0.7070
	K3	ADI, GGV	1000 N/mm ² 350 HB	EN-GJS1000-5 EN-GJV250 EN-GJV400	
N	N1	Aluminium and wrought alloys	< 450 N/mm ²	AI99,5H AlMgSi1 AlZn4,5Mg	3.0250 3.2315 3.4335
	N2	Aluminium- cast alloys	< 600 N/mm ²	GD-AISi5Cu1Mg GD-AISi8Cu3 G-AISi9Mg G-AISi12	3.2134 3.2162 3.2373 3.2581
	N3	Magnesium alloys	< 500 N/mm ²	GDMgAl8Zn1 CuZn20	3.5812.08 2.0250
N	N4	Copper and copper alloys	long-chipping short-chipping	CuZn37Pb0,5 CuZn39Pb2 CuZn43Pb2	2.0332 2.0380 2.0410
	N5	Copper special alloys	< 1400 N/mm ²	Ampco	
	N6	Plastics [thermoplastics, duroplastics]	long-chipping short-chipping	PMMA, POM,PVC Pertinax	

Please note:

The cutting values specified in the respective columns are guide values, they have to be adapted according to application conditions (material, lubrication, tool clamping, machine etc.)

Depending on the machining task the optimal cutting values can differ from those in the table by up to +- 30%!



Type

TM	TMC	TMU	MTM3	MTM1	MTMH3
					

	Cutting speed v _c (m/min)	Milling part diameter [d1] / feed per tooth [fz]															[conventional milling]											
		Ø1	Ø2	Ø3	Ø4	Ø5	Ø6	Ø7	Ø8	Ø9	Ø10	Ø12	Ø14	Ø16	Ø18	Ø20												
		mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm											
	90	0.01	0.02	0.02	0.025	0.03	0.035	0.045	0.05	0.055	0.06	0.06	0.065	0.065	0.07	0.08	●●	●●	●●	●●	●●	○						
	80	0.01	0.02	0.02	0.025	0.03	0.035	0.045	0.05	0.055	0.06	0.06	0.065	0.065	0.07	0.08	●●	●●	●●	●●	●●	○						
	70	0.01	0.02	0.02	0.025	0.03	0.035	0.045	0.05	0.055	0.06	0.06	0.065	0.065	0.07	0.08	●	●●	●●	●●	●●	●						
	55	0.01	0.02	0.025	0.03	0.03	0.03	0.035	0.04	0.05	0.055	0.06	0.065	0.065	0.07	0.075	●	●●	●●	●●	●●	○						
	50	0.01	0.02	0.025	0.03	0.03	0.03	0.035	0.04	0.05	0.055	0.06	0.065	0.065	0.07	0.075	●	●●	●●	●●	●●	○						
	45	0.01	0.02	0.025	0.03	0.03	0.03	0.035	0.04	0.05	0.055	0.06	0.065	0.065	0.07	0.075	●	●●	●●	●●	●●	○						
	120	0.01	0.02	0.025	0.03	0.035	0.04	0.045	0.05	0.06	0.065	0.07	0.08	0.09	0.1	0.12	●●	●●	●●	●●	●●	○						
	100	0.01	0.02	0.025	0.03	0.035	0.04	0.045	0.05	0.06	0.065	0.07	0.08	0.09	0.1	0.12	●●	●●	●●	●●	●●	○						
	80	0.01	0.02	0.025	0.03	0.035	0.04	0.045	0.05	0.06	0.065	0.07	0.08	0.09	0.1	0.12	●●	●●	●●	●●	●●	●						
	250	0.02	0.03	0.035	0.04	0.045	0.05	0.055	0.06	0.065	0.07	0.08	0.085	0.09	0.1	0.12	●●	●●	●●	●●	●●	○						
	230	0.02	0.03	0.035	0.04	0.045	0.05	0.055	0.06	0.065	0.07	0.08	0.085	0.09	0.1	0.12	●●	●●	●●	●●	●●	○						
	180	0.02	0.03	0.035	0.04	0.045	0.05	0.055	0.06	0.065	0.07	0.08	0.085	0.09	0.1	0.12	●●	●●	●●	●●	●●	○						
	130	0.01	0.02	0.025	0.03	0.035	0.04	0.045	0.05	0.055	0.06	0.065	0.07	0.075	0.08	0.09	●●	●●	●●	●●	●●	○						
	160	0.01	0.02	0.025	0.03	0.035	0.04	0.045	0.05	0.055	0.06	0.06	0.065	0.07	0.075	0.08	●●	●●	●●	●●	●●	○						
	300	0.02	0.03	0.04	0.045	0.05	0.055	0.06	0.07	0.08	0.09	0.09	0.1	0.12	0.13	0.15	●●	●●	●●	●●	●●	○						
	40	0.01	0.01	0.015	0.02	0.025	0.03	0.035	0.04	0.04	0.045	0.05	0.055	0.06	0.065	0.07	●●	●●	●●	●●	●●	○						
	30	0.01	0.01	0.015	0.02	0.025	0.03	0.035	0.04	0.04	0.045	0.05	0.055	0.06	0.065	0.07	●●	●●	●●	●●	●●	●●						
	45	x	0.01	0.015	0.02	0.025	0.03	0.03	0.035	0.04	0.045	0.05	0.055	0.06	0.065	0.07	●	●●	●	●●	●	●●						
	40	x	0.01	0.015	0.02	0.025	0.03	0.03	0.035	0.04	0.045	0.05	0.055	0.06	0.065	0.07	○	○	○	○	○	●●						

Type

DTMC	DTMC
	

	Cutting speed v _c (m/min)	Thread size / drill feed [fb] / feed per tooth [fz] 1.5xD, 2xD / 2.5xD [conventional milling]																			
		M3		M4		M5		M6		M8		M10		M12		M14		M16			
		fb mm/rev	fz mm	fb mm/rev	fz mm	fb mm/rev	fz mm	fb mm/rev	fz mm	fb mm/rev	fz mm	fb mm/rev	fz mm	fb mm/rev	fz mm	fb mm/rev	fz mm	fb mm/rev	fz mm		
	110	0.060	0.010	0.060	0.015	0.070	0.020	0.080	0.025	0.100	0.035	0.120	0.040	0.130	0.050	0.150	0.060	0.180	0.070	●	●●
	90	0.060	0.010	0.060	0.015	0.070	0.020	0.080	0.025	0.100	0.035	0.120	0.040	0.130	0.050	0.150	0.060	0.180	0.070	●	●●
	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	○	○
	250	0.060	0.015	0.070	0.025	0.080	0.025	0.100	0.035	0.110	0.040	0.120	0.055	0.150	0.065	0.170	0.070	0.200	0.085	●●	●
	230	0.060	0.015	0.070	0.025	0.080	0.025	0.100	0.035	0.110	0.040	0.120	0.055	0.150	0.065	0.170	0.070	0.200	0.085	●●	●●
	180	0.060	0.015	0.070	0.025	0.080	0.025	0.100	0.035	0.110	0.040	0.120	0.055	0.150	0.065	0.170	0.070	0.200	0.085	●●	●
	130	0.05	0.01	0.06	0.01	0.07	0.02	0.08	0.03	0.09	0.04	0.10	0.05	0.11	0.06	0.12	0.06	0.13	0.07	●	●●
	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	○	○
	300	0.07	0.02	0.08	0.03	0.09	0.04	0.1	0.05	0.11	0.06	0.12	0.07	0.13	0.08	0.14	0.09	0.15	0.1	●●	○

General recommendation:

- 1.) From 2.5xD [thread depth] thread Ø should be programmed in 2 passes. [2/3-1/3 in the conventional milling]
- 2.) Generally in VA and in hard machining from > HRC40 it is recommended thread Ø is programmed in 2 passes. [2/3-1/3 in the conventional milling]

- optimally suited
● suited
○ not suitable



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