

GÜHRING

MTMH3-Z

**HELICAL DRILL THREAD MILLING
INTO SOLID MATERIAL
UP TO 66 HRC**

螺旋下刀加工、同時鑽孔銑牙
可加工材質硬度達HRC 66度

PROMOTION
VALID UNTIL
31.12.2020

Helical drill thread milling cutter 鑽孔銑牙刀

GÜHRING – YOUR WORLDWIDE PARTNER

MTMH3-Z 2.5xD

HELICAL DRILL THREAD MILLING INTO SOLID MATERIAL UP TO 66 HRC

The new helical drill thread milling cutter for high-strength and hardened steels up to 66 HRC combines core hole and thread production in one tool. The MTMH3-Z guarantees process reliability and true to gauge threads.

新設計的螺旋下刀鑽孔銑牙同時完成，可以加工高抗張強度材質及 HRC66 度的高硬度材質
此刀具 MTMH3-Z 加工過程穩定、可信賴度高，並符合牙規公差要求

Two oil grooves on the shaft ensure optimum cooling with emulsion or air.

柄部雙油溝設計，
幫助切削液與空氣
能確實達到最佳冷卻

Thanks to the special face geometry with hollow grinding, the process-safe core hole and thread milling in almost all steels is possible.

特殊端面設計及精細的研磨、
幾乎所有鋼料都能鑽孔銑牙同時完成



Thanks to the **left cutting geometry** the tool stabilises itself during the climb milling process – perfect, true to gauge threads up to 66 HRC are guaranteed.

由於是左旋切削設計、在螺旋切削過程中相對穩定
牙型符合牙規要求、並保證可以加工至 HRC66 度

Thanks to the **temperature-resistant TiSiN coating**, dry and wet machining is possible.

TiSiN 耐熱性佳的鍍層，乾、濕式加工皆可以使用

The MTMH3-Z is made of a **special fine-grained carbide**, which is characterised by its high hardness and is optimally suited for hard machining.

特殊極細顆粒鎢鋼材質、硬度高、特別適合高硬度材質加工



- process reliability guaranteed 保證加工過程可靠穩定
- excellent machining results in dry and wet machining 乾、濕式加工皆可以達到優越的結果
- core holes and threads in one step: significantly shorter cycle and setting time
鑽孔銑牙同時完成：大大節省加工時間、提昇效率
- universally applicable in unhardened and hardened materials up to 66 HRC
應用範圍廣泛、有、無硬化之材質皆能使用，加工最高硬度達 HRC66 度



Micro thread milling cutters



可加工深度2.5D

P	•
M	•
K	•
N	•
S	•
H	≤ 65 with cooling grooves

Tool material

Solid carbide

Surface



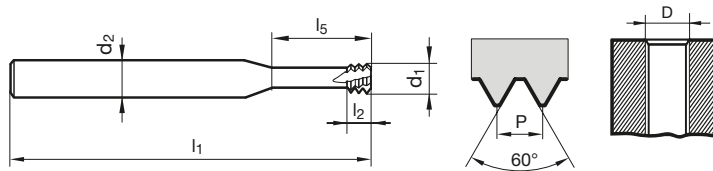
Type

MTMH3-Z

Shank form

HB 側固

刀具為左旋刃口
只能逆時針轉動切削
M4 counter clockwise



Article no. 編號

4002

D	P	d1	d2	l1	l2	l5	Z	Code no.	價格
加工規格	mm	mm	mm	mm	mm	mm			
M2	0.400	1.400	3.000	39.000	1.200	5.000	4	2.000	10,000
M2,5	0.450	1.800	3.000	39.000	1.300	6.500	4	2.500	10,000
M3	0.500	2.400	6.000	58.000	1.500	7.500	4	3.000	11,000
M3,5	0.600	2.700	6.000	58.000	1.800	9.000	4	3.500	11,000
M4	0.700	3.100	6.000	58.000	2.100	10.000	4	4.000	11,000
M5	0.800	3.800	6.000	58.000	2.400	12.500	4	5.000	11,000
M6 + M7	1.000	4.600	8.000	64.000	3.000	15.000	4	6.000	12,000
M8 + M9	1.250	6.200	8.000	64.000	3.600	20.000	4	8.000	12,000
M10 + M12	1.500	7.500	10.000	73.000	4.500	25.000	4	10.000	13,000
M12	1.750	9.000	10.000	73.000	5.200	30.000	4	12.000	13,000
M16	2.000	11.500	12.000	90.000	6.000	40.000	4	16.000	16,000

- 1、右螺旋：刀具逆時針旋轉，順時針螺旋往下銑孔及銑牙。
- 2、左螺旋：刀具逆時針旋轉，逆時針螺旋往下銑孔及銑牙。

Youtube 實際加工影片

<https://www.youtube.com/watch?v=EUYUX8xvGSw>

一般右螺旋銑牙刀加工方式如下：

一般銑牙刀皆為右螺旋切削，下孔徑皆已經加工完成，銑牙方式如下：

- 1、右螺旋通孔：刀具順時針旋轉，順時針螺旋往下銑牙。
- 2、右螺旋盲孔：刀具順時針旋轉，由底部逆時針螺旋往上銑牙。
- 3、左螺旋通孔：刀具順時針旋轉，逆時針螺旋往下銑牙。
- 4、左螺旋盲孔：刀具順時針旋轉，由底部順時針螺旋往上銑牙。

(詳細資訊與其他銑牙刀產品資訊請參考第8頁，或洽詢鈷領業務技術人員)

APPLICATION EXAMPLE 實際應用案例

Component 工件：	Injection moulding tool 模具射出工具
Thread dimension 牙尺寸：	M8x(1.25), 深度 16mm, 盲孔
Tool 使用刀具編號：	Article 4002 MTMH3-Z M8 2.5xD SP
Material 工件材質：	1.2379 / 60+2 HRC
Parameter 加工參數：	$v_c = 30\text{ m/min}$, $f_z = 0.02\text{ mm}$ (climb milling, M4 counter clockwise 左旋逆時針旋轉切削)
Coolant 冷卻：	dry (with air) 乾式空氣

60+2
HRC

➤ **Tool life 壽命 : 138 threads incl. core holes**

APPLICATION EXAMPLE 實際應用案例

Component 工件：	Holder 刀桿
Thread dimension 牙尺寸：	M6x(1), 深度 13mm, 盲孔
Tool 使用刀具編號：	Article 4002 MTMH3-Z M6 2.5xD SP
Material 工件材質：	1.4301 不銹鋼
Parameter 加工參數：	$v_c = 50\text{ m/min}$, $f_z = 0.02\text{ mm}$ (climb milling, M4 counter clockwise 左旋逆時針旋轉切削)
Coolant 冷卻：	Emulsion 8% 水溶性 8%

VA
1.4301

➤ **Tool life 壽命 : 618 threads incl. core holes**

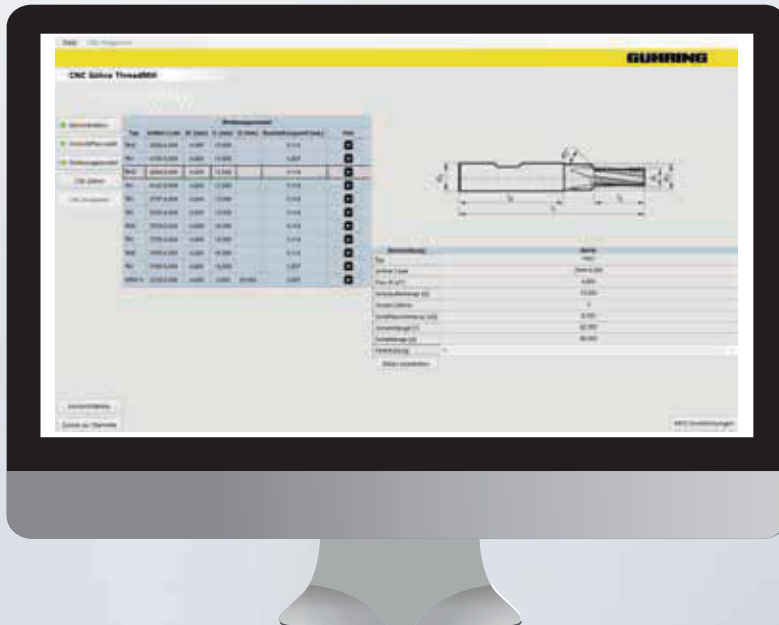
CNC Gühro ThreadMill



Free programming software

for thread milling cutters and drill thread milling cutters

CNC 程式免費提供、線上下載



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

"CNC Gühro ThreadMill" is available free-of-charge. Simply download it from our homepage www.guehring.com.

德國鈷領網頁即可免費下載

To the optimal CNC programme in five steps

1. Specify the thread data 選擇螺紋尺寸
Select from all current thread standards
2. Select the material 選擇工件材質
You are always referred to the optimal parameters 選擇最佳加工參數
3. Select the tool 選擇刀具編號
Technical data, drawing, machining time and video simplify selection
技術資料、圖面、加工時間，選用圖片上加工方式，選擇適合之加工方式
4. Record CNC data CNC 程式資料紀錄
Enter required milling strategy and parameters 輸入參數
5. Receive CNC programme with code and data sheet
Programming data (Sinumerik, Haidenhain, FANUC, Philips, Mazatrol or Hurco)
are imported and automatically recognised
選取 CNC 機台控制器廠牌，下載 CNC 程式資料

APPLICATION RECOMMENDATIONS 加工參數推薦

MTMH3-Z 2.5xD [Please note, M4 counter clockwise 左旋逆時針旋轉切削]

ISO	Material group 材質	Hardness 硬度	Example materials 材質範例	Material no. 材質編號	Cutting speed v _c (m/min) 切削速度	
P	P1	Structural and free cutting steels, heat-treatable steels unalloyed	< 800 N/mm ²	S235JR C15 11SMnPb30 S355J2	1.0037 1.0401 1.0718 1.0577	80
	P2	Free-cutting steels, unalloyed case hardened steels, nitriding steels	800-1000 N/mm ²	C60 31CrMo12	1.0601 1.8515	70
	P3	Alloyed heat-treatable steels, tool steels, high speed steels	800-1200 N/mm ²	42CrMo4 36CrNiMo4 X36CrMo17 HS 6-5-2	1.7225 1.6511 1.2316 1.3343	70
M	M1	Stainless steels, sulphured, austenitic	< 1000 N/mm ²	X5CrNi18-10 X6CrNiTi18-10 X8CrNiS18-9	1.4301 1.4571 1.4305	55
	M2	Stainless- and acidresistant steels, martensitic	< 1000 N/mm ²	X17CrNi16-2 X90CrMoV18 X2CrTi12	1.4057 1.4112 1.4512	50
	M3	Duplex and Super Duplex	< 1300 N/mm ²	X2CrNiMoN22-5-3 X2CrNiMoN25-7-4 X2CrNiMoCuWn25-7-4	1.4462 1.441 1.4501	50
K	K1	Cast iron	300 HB	EN-GJL-150 EN-GJL-250 EN-GJL-300	0.6015 0.6025 0.603	80
	K2	Spheroidal graphite iron and malleable cast iron	350 HB	EN-GJS-400-15 EN-GJS-600-3 EN-GJS-700-2	0.704 0.706 0.707	75
	K3	ADI, GGV	1000 N/mm ² 350 HB	EN-GJS1000-5 EN-GJV250 EN-GJV400		65
N	N1	Aluminium and wrought alloys	< 450 N/mm ²	Al99,5H AlMgSi1 AlZn4,5Mg	3.025 3.2315 3.4335	x
	N2	Al cast alloys	< 600 N/mm ²	GD-ALSi5Cu1Mg GD-ALSi8Cu3 G-ALSi9Mg G-ALSi12	3.2134 3.2162 3.2373 3.2581	120
	N3	Magnesium alloys	< 500 N/mm ²	GDMgAl8Zn1	3.5812.08	x
	N4	Copper and copper alloys	long-chipping short-chipping	CuZn20 CuZn37Pb0,5 CuZn39Pb2 CuZn43Pb2	2.025 2.0332 2.038 2.041	80
	N5	Copper special alloys	< 1400 N/mm ²	Ampco		65
	N6	Plastics [Thermoplastics, Duroplastics]	long-chipping short-chipping	PMMA, POM, PVC Pertinax		x
S	S1	Ti and Ti alloys	< 1200 N/mm ²	Titanium TiAl5Sn2 TiAl6V4	3.7025 3.7115 3.7165	45
	S2	Nickel, cobalt and iron alloys	< 1400 N/mm ²	Hasteloy C4 Inconel 718 Nimonic	2.461 2.4668 2.4634	45
H	H1	High tensile steels, hardened steels	45-55 HRC	Hardox		40
	H2		55-66 HRC	PM30		30

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.)

上述加工參數推薦，仍須視實際加工情況調整，例如工件材質與夾持情況、冷卻潤滑情形、刀具夾持與刀桿型式、機台條件

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

加工條件仍可以微調±30%，需視上述之工況



MTMH3-Z



Milling part diameter [d1] / feed per tooth [f _z] 銑孔每刃進給 [climb milling] 螺旋銑孔											
M2	M2,5	M3	M3,5	M4	M5	M6	M8	M10	M12	M16	
0.4	0.45	0.5	0.6	0.7	0.8	1.0	1.25	1.5	1.75	2	
mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	
0.008	0.008	0.012	0.014	0.018	0.026	0.028	0.030	0.035	0.040	0.048	●●
0.008	0.008	0.012	0.014	0.018	0.026	0.028	0.030	0.035	0.040	0.048	●●
0.007	0.007	0.010	0.011	0.012	0.016	0.020	0.025	0.030	0.036	0.044	●●
0.007	0.007	0.010	0.011	0.012	0.016	0.020	0.025	0.030	0.036	0.044	●●
0.007	0.007	0.010	0.011	0.012	0.016	0.020	0.025	0.030	0.036	0.044	●●
0.005	0.005	0.007	0.008	0.010	0.014	0.016	0.018	0.020	0.026	0.033	●●
0.008	0.008	0.012	0.014	0.016	0.020	0.024	0.030	0.036	0.040	0.048	●●
0.008	0.008	0.012	0.014	0.016	0.020	0.024	0.030	0.036	0.040	0.048	●●
0.007	0.007	0.011	0.013	0.015	0.018	0.022	0.028	0.033	0.038	0.046	●●
x	x	x	x	x	x	x	x	x	x	x	○
0.007	0.007	0.011	0.013	0.015	0.018	0.022	0.028	0.033	0.038	0.046	●●
x	x	x	x	x	x	x	x	x	x	x	○
0.008	0.008	0.012	0.014	0.016	0.020	0.024	0.030	0.036	0.040	0.048	●●
0.007	0.007	0.010	0.011	0.012	0.016	0.020	0.025	0.030	0.036	0.048	●●
x	x	x	x	x	x	x	x	x	x	x	○
0.007	0.007	0.010	0.011	0.012	0.016	0.020	0.025	0.030	0.036	0.044	●●
0.007	0.007	0.010	0.011	0.012	0.016	0.020	0.025	0.030	0.036	0.044	●●
0.007	0.007	0.010	0.011	0.012	0.016	0.020	0.025	0.030	0.036	0.044	●●
0.005	0.005	0.008	0.009	0.010	0.014	0.018	0.022	0.028	0.033	0.042	●●

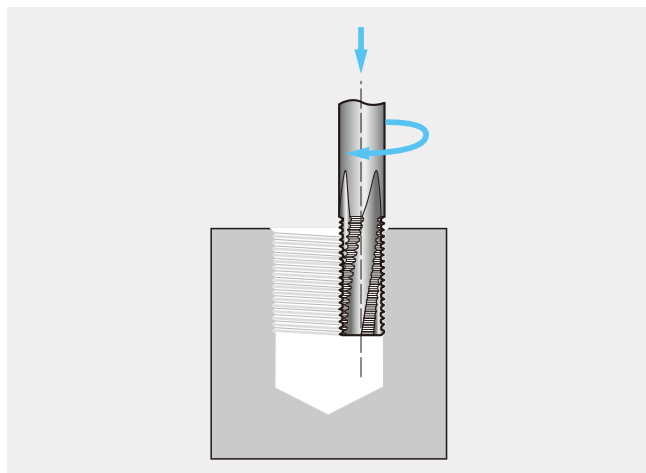
- optimally suited 非常適用
- suited 適用
- not suitable 不適用



參考資料 右螺旋銑牙刀兩種不同順、逆銑牙方式

Reverse rotation milling 逆銑削

clockwise, with G02 G02 順時針螺旋下刀

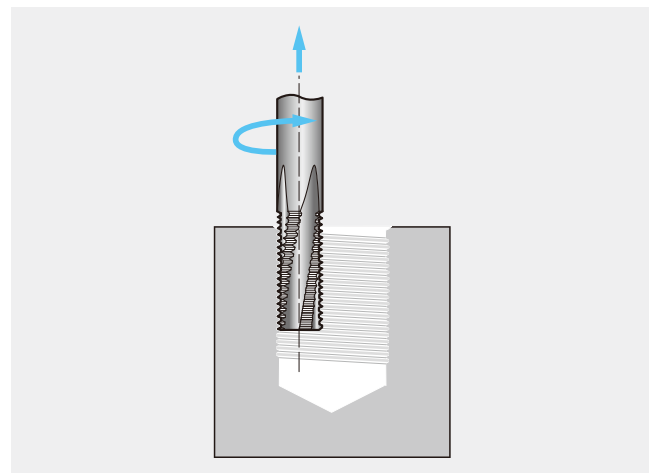


Reverse rotation milling is preferentially applied for the machining of harder materials or to remedy taper threads.

逆銑削優先用於較硬材料的加工或修補錐度螺紋

Synchronous milling 順銑削

anticlockwise, with G03 G03 逆時針螺旋下刀



Synchronous milling is applied with thread depths smaller than 1.5xD.

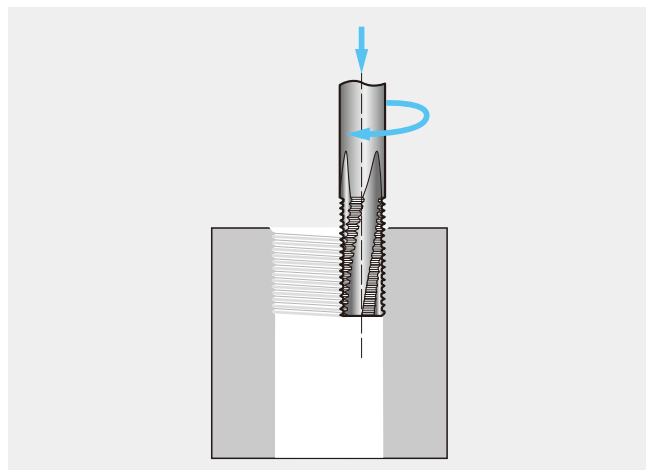
Advantage: A better surface finish is achieved.

順銑削的螺紋深度小於1.5xD，優點是獲得更好的牙表面光潔度

Thread production with one tool 銑牙刀加工方式

Right-hand thread 右螺紋 (通孔)

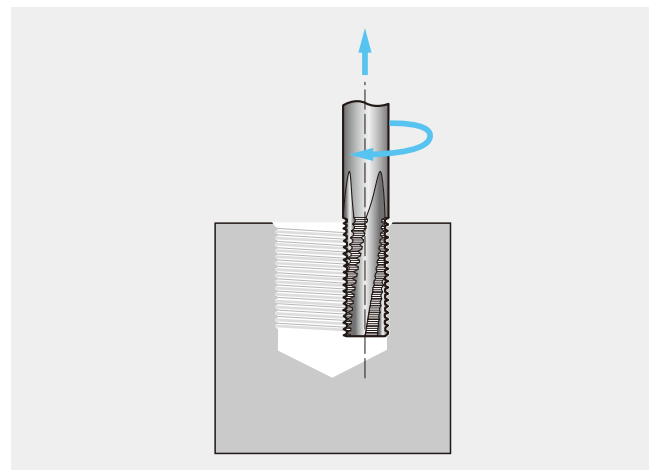
Reverse rotation milling 逆銑削



Tool rotates clockwise from top to bottom
刀具順時針轉動切削、由上順時針螺旋往下銑牙

Left-hand thread 左螺紋 (盲孔)

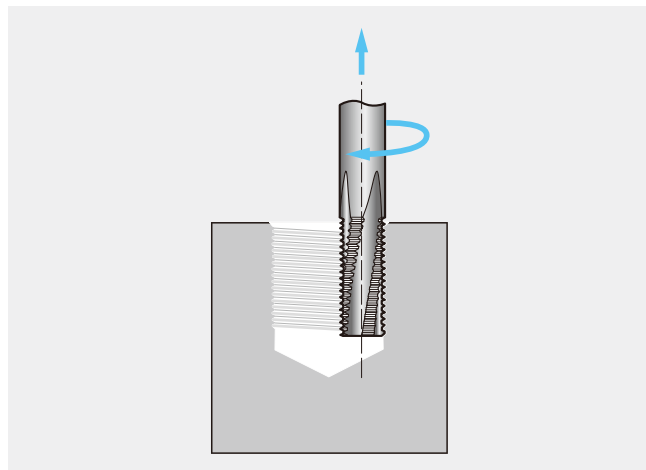
Reverse rotation milling 逆銑削



Tool rotates clockwise from bottom to top
刀具順時針轉動切削、由孔底順時針螺旋往上銑牙

Right-hand thread 右螺紋 (盲孔)

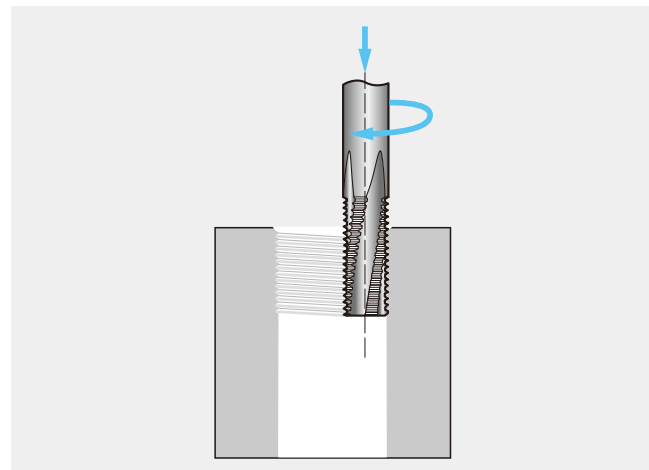
Synchronous milling 順銑削



Tool rotates clockwise from bottom to top
刀具順時針轉動切削、由孔底逆時針螺旋往上銑牙

Left-hand thread 左螺紋 (通孔)

Synchronous milling 順銑削



Tool rotates clockwise from top to bottom
刀具順時針轉動切削、由上逆時針螺旋往下銑牙

Technical section



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