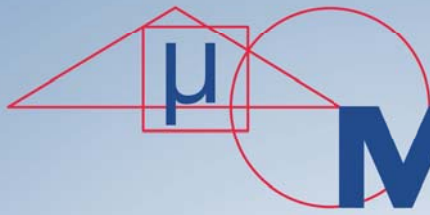




漢科斯榮譽代理



MIKROMAT

軸件加工研磨機



MIKROMAT GSERIES

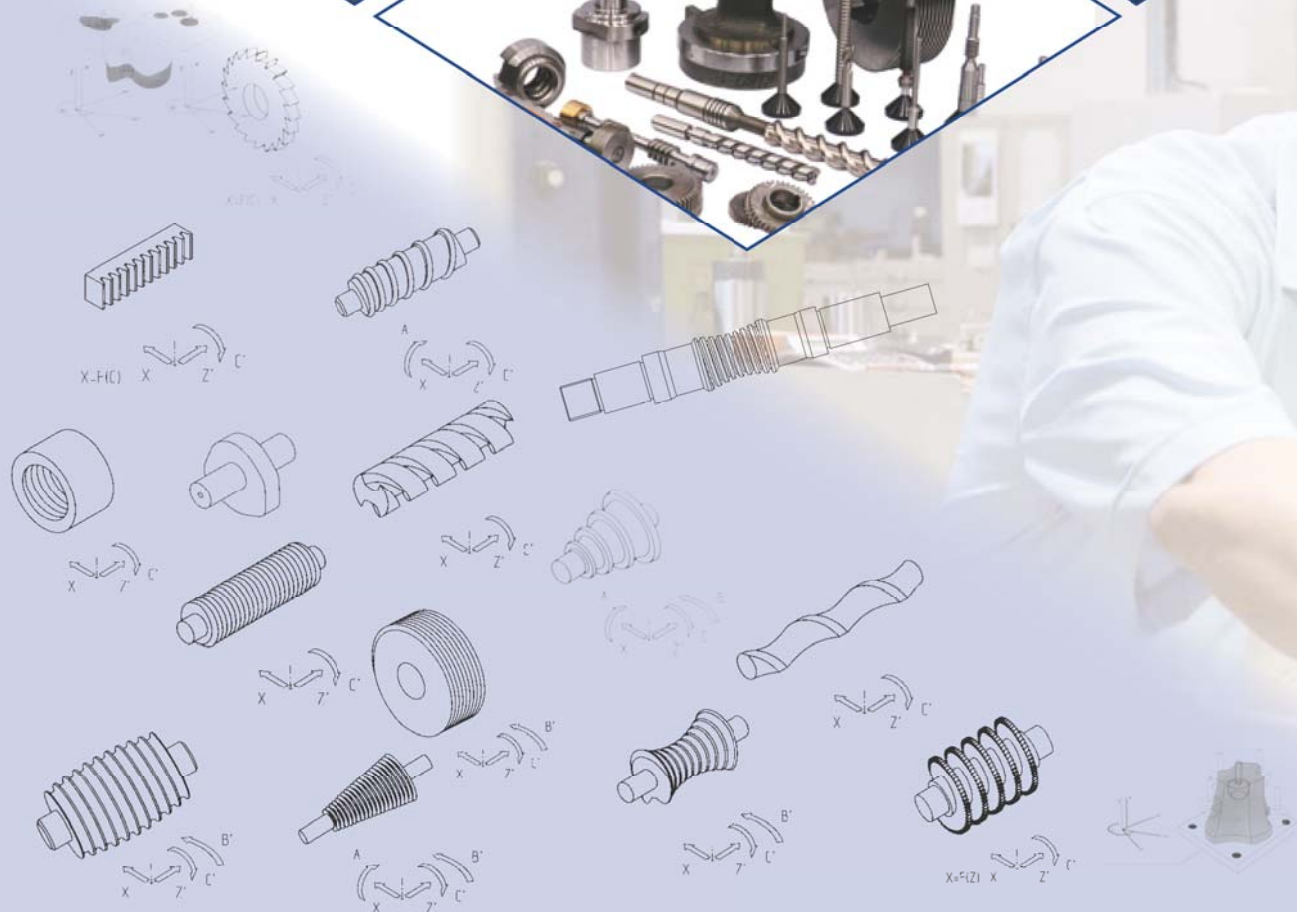
MIKROMAT thread grinders have been designed for precision machining of workpieces, featuring most different symmetrically as well intricate profiles. Internal and external shapes can be grind.

The CNC-Controller developed by MIKROMAT provides for precise interpolation of all the axes as well as reliable and comfortable programming. The easy operating oriented and operator-interface based programs can be drawn up directly or via interface to the machine. Any movement required for grinding as well as dressing of the grinding wheels is a controlled one and equipped with digital drive assemblies.

MIKROMAT 螺紋研磨機是專門設計用來加工高精度工件、各種對稱的工件、或是複雜形狀的工件，無論是工件外部或是內部都可以施做研磨加工。

MIKROMAT開發的數值控制器能提供各軸精確插補以及可靠與輕鬆的程式編寫。以"簡單操作"為導向與基於操作者界面程序可以直接或通過界面將程式傳到機器上。

在砂輪上為因應複雜且精密的研磨或修砂所要求的任何動作是以數值驅動去驅動而被準確控制著。



Machining Technologies / 加工技術

- Right-and left-hand profiles / 右旋與左旋的齒形
- Single- and multi-start profiles / 單牙口與多牙口的齒形
- Relief grinding / 滾刀鏟磨
- Progressive-lead grinding / 逐行式導程磨削
- Progressive-diameter grinding / 逐行式直徑磨削
- Concave and convex contours / 凹形與凸形輪廓磨削
- External cylindrical as well as plunge-grinding operations / 外圓與外圓錐磨削
- Groove profiles / 槽形狀磨削
- Thread shafts (metric, inch, trapezoidal, cylindrical and others more) / 牙桿 (公制, 英制, 梯形, 圓柱形與其他更多形)
- Pump profiles, pump rotors / 幫浦齒形, 幫浦轉子
- Screws spindle / 螺桿磨削
- Special profiles, optionally with or without lead / 帶導程或不帶導程的特殊磨削
- Worm shafts (ZA, ZK, ZI, ZN, ZC) / 蝸桿磨削 (五型)
- Ball screws / 導螺桿磨削
- Thread rollers / 螺旋轉子
- Spline shafts / 花鍵軸
- Racks / 齒排、齒條
- Profile shafts / 特殊形狀軸件
- Rotor shafts, screw pumps / 轉子軸, 螺絲幫浦
- Fine-finishing rollers, bead rollers, cam-profile rollers / 超精密轉子、滾珠、凸輪式轉子
- Globoidal worms / 弧面刮桿
- Hobbing cutters / 滾齒刀



Technical specifications / 技術規格		3G	GI	5G	10G	15 G
Work table Z-Achse / 工件檯面水平左右移動軸Z						
Workpiece diameter max. / 最大工件外徑	mm	320	300	320	320	320
Grinding lenght, single profile / 研磨長度	mm	300	-	500	1000	1500
Distance between center max. / 最大中心距	mm	450	-	750	1250	1750
Workpiece weight / 工件重量						
between center / 雙頂心間	kg			160	160	160
center+ lunettes / 單頂心配驅動架	kg	50		160	200	300
Grinding saddle X-Achse / 研磨頭前進後退軸X						
Infeed stroke max. / 最大進給行程	mm	310		265	265	265
Min. infeed value / 最小進給量	mm	0,001	0,001	0,001	0,001	0,001
Tilting axis A / 螺旋角擺角軸A						
Helix angle max. / 最大螺旋角		-90/+60	-15/15	-40/+40	-40/+40	-40/+40
(Option) / 選配	Grad	(-200/+20)		(-90/+60)	(-90/+60)	(-90/+60)
Tilting axis B (option) / 砂輪迴旋軸B (選配)						
Tilting angle max. / 最大傾角	Grad	-15/+15		-15/+15	-15/+15	-15/+15
Headstock C-axis / 工件驅動軸C						
Number of starts radial, / 徑向牙口數						
automatically indexable / 自動分度數	Grad	beliebig	beliebig	beliebig	beliebig	beliebig
Headstock spindle / 工件驅動軸主軸		MK4		metr.80	metr.80	metr.80
Grinding wheel drive / 砂輪驅動						
Cutting speed max., rpm-regulated / 最大切削速度, 受調控RPM						
infinitely adjustable / 無段調速	m/s	50	50	50	50	50
Cone / 錐規格		1 : 7,5	M14	1:6	1:6	1:6
Grinding Wheel dimensions / 砂輪尺寸						
Diameter min. / 最小直徑	mm	Ø200 + 2x		Ø300 + 2x	Ø300 + 2x	Ø300 + 2x
		Profilhöhe		Profilhöhe	Profilhöhe	Profilhöhe
Diameter max. / 最大直徑	mm	400		500	500	500
Grinding wheel width / 砂輪寬度	mm	8 - 30		8-66	8-66	8-66
Grinding wheel mounting bore hole / 孔徑	mm	127		203,2	203,2	203,2
Dresser / 砂輪修整器						
with 2 diamond form rollers (U/W) / 雙片式		8		12	12	12
(Option) / 選配				(20)	(20)	(20)
with 2 diamond form rollers (X/Z) / 雙片式Modul		10		(10)	(10)	(10)
Bore diameter for diamond form and profile rollers / 修整片孔徑	mm	Ø40 ^{H3}		Ø40 ^{H3}	Ø40 ^{H3}	Ø40 ^{H3}
(Option) / 選配				Ø52 ^{H3}	Ø52 ^{H3}	Ø52 ^{H3}
Accuracy of the machine and dresser axes according to VDI / DGQ 3441 / 機台軸與修整器個軸精度依據VDI/DGQ3441規範						
Positional uncertainty P / 定位不確定值P	mm	0,0024	0,0024	0,0024	0,0024	0,0024
Max. positional scatter P _{max} / 最大定位分散值	mm	0,0016	0,0016	0,0016	0,0016	0,0016
Max. reversal error U _{max} / 最大返回誤差	mm	0,0010	0,0010	0,0010	0,0010	0,0010
Weight without cooling systeme / 全機重(不含冷卻系統) t						
		7,5	7,5	9	10	12
Dimension / 尺寸 (長寬高) LxBxH						
incl. cooling systeme / 包含冷卻系統	m	3,8 x 2,8 x 1,7		4,7 x 5,5 x 3,2	4,7 x 5,6 x 3,2	4,7 x 6,0 x 3,2



20G	30G
320	320
2000	3000
2250	3250
160	160
350	400
265	265
0,001	0,001
-40/+40 (-90/+60)	-40/+40 (-90/+60)
-15/+15	-15/+15
beliebig metr.80	beliebig metr.80
50	50
1:6	1:6
Ø300 + 2x Profilhöhe	Ø300 + 2x Profilhöhe
500	500
8-66	8-66
203,2	203,2
12 (20) (10)	12 (20) (10)
Ø40 ^{H3} Ø52 ^{H3}	Ø40 ^{H3} Ø52 ^{H3}
0,0024	0,005
0,0016	0,0016
0,0010	0,0010
15	16

Fields of application of the G-series: Machine building and tool manufacture, medical technology as well as precision and optical engineering industries including similar sectors. Standard profiles are stored as program modules. Moreover, driving screws and adjusting screws of different design, threading tools and limit plug gauges as well as a large variety of other workpieces can be effectively produced. But special workpiece such as thread rollers, regulating wheels as well as transport drums for centreless grinding, screws for screw pumps or pinions for gear pumps can be generated and machined, too. Appropriate solutions are also on offer for workpieces characterised by cylindrical sections and faces, also for single and large-batch runs.

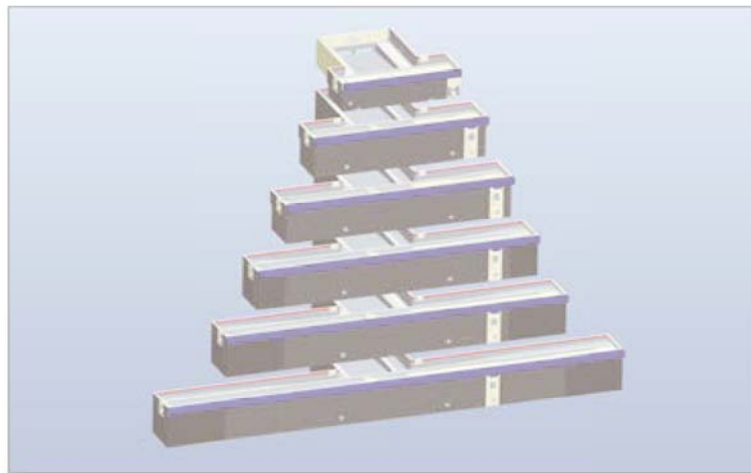
MIKROMAT的G系列設備適合的應用範圍非常廣，例如設備業者、刀具業者、醫藥業者與精密光學工業業者或其他相似業者均可擁有，標準的齒形已經包含在基本程式模組中。另外像是不同設計的驅動用螺桿和可調式螺桿，以及帶螺旋線的刀具與塞規或更多不同的工件均可以使用G系列做有效率的生產製作。更厲害的是像其他特殊的工作，比如無心研磨機器上會用到的帶螺旋線的滾柱、導輪、傳送鼓；螺絲幫浦的螺絲軸或齒輪幫浦的小齒輪均可以生產製造。針對工件特性，像是圓柱截面、表面或少量與大量的工作都可以在G系列的設備上處理。

Depending on the concrete machining job, the grinding wheels are profiled by single-grain diamonds, form or profile rolls. As for series production, we offer robots to load and unload the machines from suitable magazines as well as measuring equipment quality control.

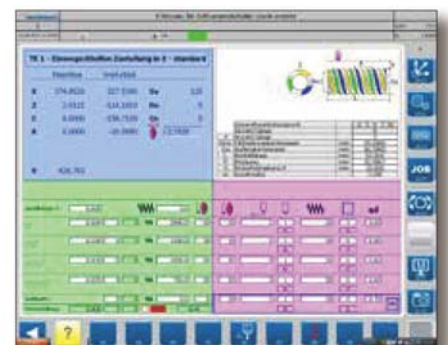
根據具體的加工作業，砂輪修形可以用單點鑽石修砂、成形修砂或修砂輪修砂。在一系列的加工生產中，我們提供機械手臂與適當的輸送裝置做自動上下工件，也提供在線量測裝置做品質管理。

The MIKROMAT G-series includes compact machines for the manufacture of very small as well as medium-sized workpieces and in addition, machines up to 3.000 mm grinding length.

MIKROMAT的G系列設備可以生產非常小型的工件與中型的工件，另一點是可以有長到3米的研磨能力。



4,7 x 7,0 x 3,2 4,7 x 8,2 x 3,2



External threads/
worms
外牙外螺紋 / 蝸桿



Internal threads
內牙內螺紋



Tools
刀具



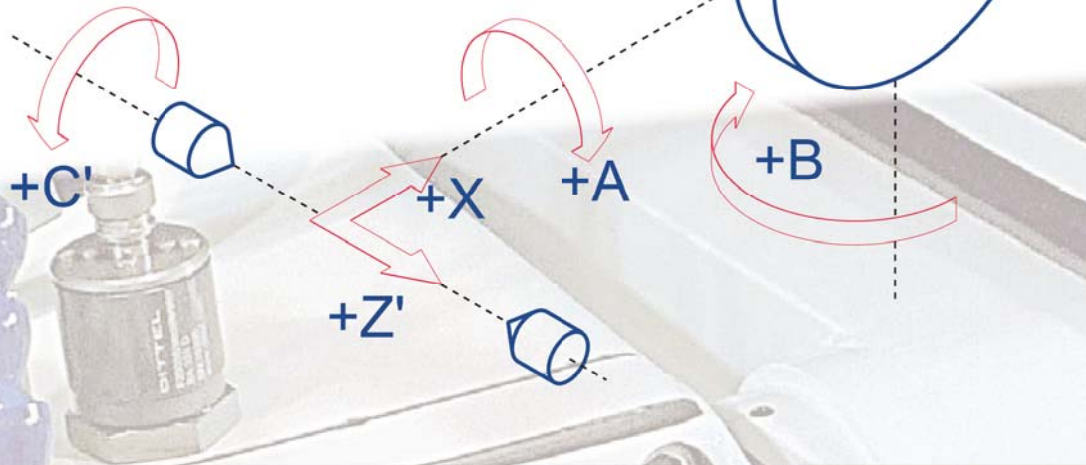
External cylindrical
grinding as well as
plunge-grinding
外圓柱磨削與切入
式磨削



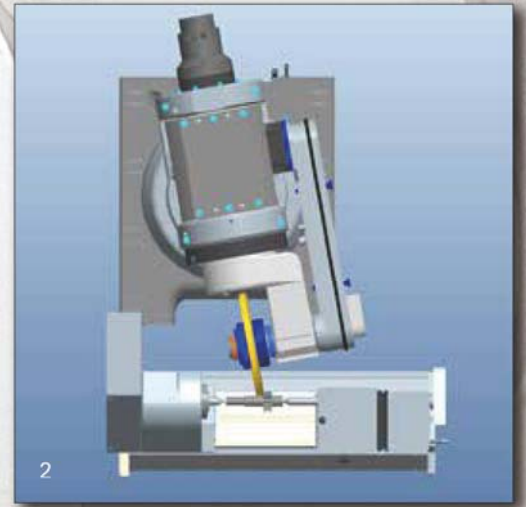
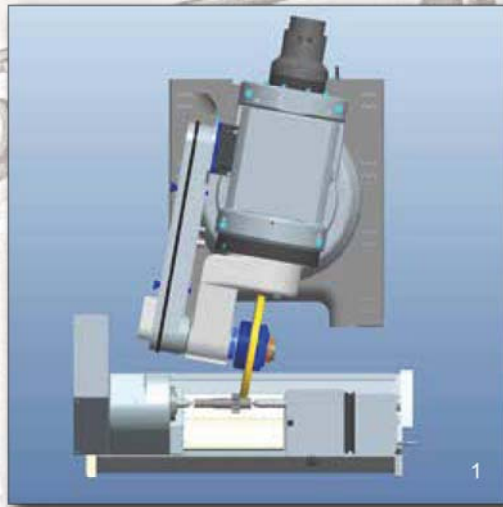
Gears/
axial parallel Profile
齒輪 / 平行軸齒形
工件 / 擺線盤



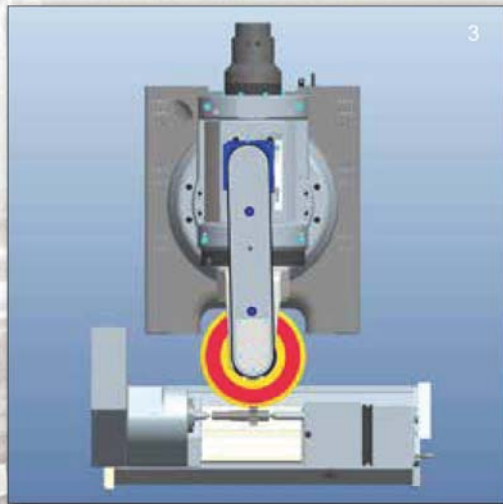
- A : 螺旋角擺角軸
- B : 砂輪迴旋軸 (選配)
- C : 工件驅動軸
- D : 砂輪主軸
- X : 研磨頭前進後退軸
- Z : 工件檯面水平左右移動軸

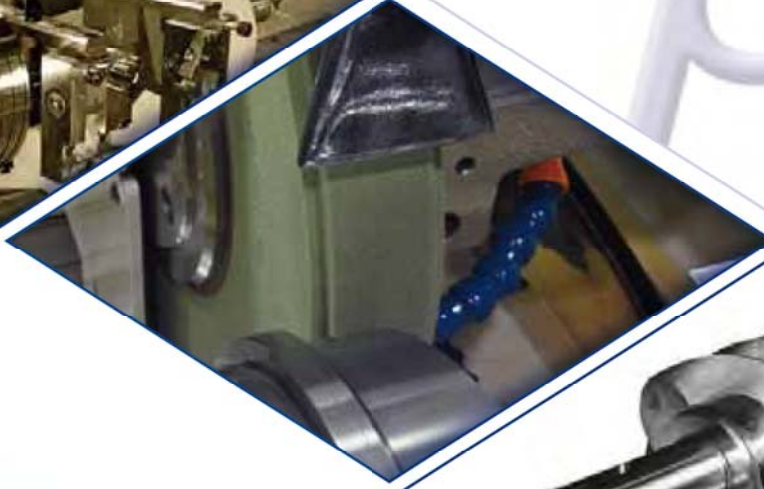
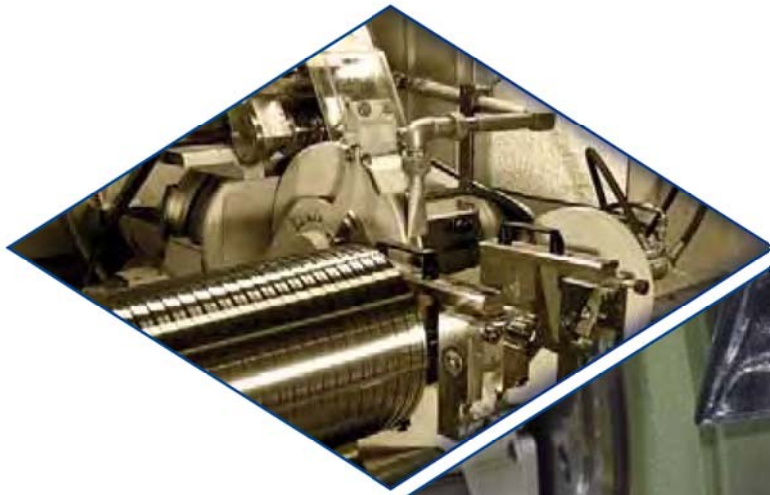


- 1 : A軸正方向+B軸正方向
C軸旋轉+Z軸左右移動
- 2 : A軸負方向+B軸負方向
C軸旋轉+Z軸左右移動



- 3 : A軸0度位置+B軸0度位置
C軸旋轉+Z軸左右移動
- 4 : 微小軸件外圓加工實例





Rotational form and thread grinding machine

旋轉運作的工件的齒形與螺紋磨削設備

MIKROMAT 3G - 5G - 10G - 15G - 20G - 60G



The rotational form and thread grinding machines are characterised by their high production quality, performance, universality and comfort. Due to the technical parameters, the machines can be used efficiently for the intensive and finishing grinding of various work piece geometries, with high effectiveness and the highest level of precision.

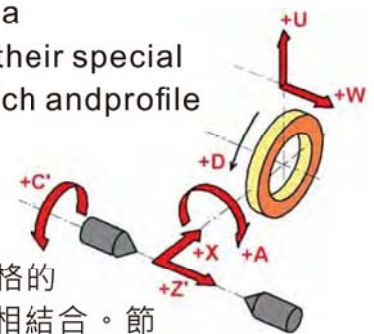
旋轉運作的工件的齒形與螺紋磨床以高生產品質、高性能、加工的多樣性與加工的便捷性為其特徵。此系列設備可以用於加工各種各樣具有不同幾何形狀工件的高效率與最高精度層級的磨削加工。



MIKROMAT - specific software with a user interface guarantees a high level of workshop acceptance, and enables the user to combine their special grinding skills with MIKROMAT's know-how. The generation of the pitch and profile is achieved by electronic coupling of the appropriate axes.

The rotational form and thread grinding machine's 6 NC axes allow highly complex shape elements to be designed

MIKROMAT開發擁有友善操作介面的軟體，可確保客戶對產品生產最嚴格的要求，並可以方便的使客戶其自身的磨削經驗與MIKROMAT的技術訣竅相結合。節距與齒形是採用各個相關運動軸的電子聯軸方式創生而成。因為旋轉運作的工件的齒形與螺紋磨削設備是數控軸數達6軸的設備，所以可以讓客戶採用更複雜的形狀元素來設計客戶的產品。



Optimal dressing of grinding tools is provided for all grinding jobs: NC dresser, dressing unit with diamond wheel, steel pressure roller and conventional dressers. Preliminary machining of contours of any kind by means of other machining processes is no longer necessary. The machine allows automatic complete grinding of work pieces. A modern, thermally-controlled, high-capacity coolant system creates the preconditions required for highly productive intensive grinding with constant accuracy.

最佳化的修砂可以讓所有的研磨工作要用到的：數控修砂器、採用鑽石磨輪的修砂單元與傳統修砂器。之前為了一些磨削工作，砂輪修出輪廓已經不再需要了，機工作可以完全的自動完成，這非常現代化、有著好的熱容量的冷卻系統，可以連續的提

砂輪可以被精準的修形、鋼質壓力滾輪與需要預先將砂器磨削工設備是非常穩定控制、有這些條件讓磨削設備供高效穩定的生產能力。



Automatic adjusting in pre-machined work pieces for efficient grinding of highly-precise small and medium series.

在加工小型或中型高精度工件時，可以對已經經過預加工的工件進行自動調整。





The high level of universality of the modular series with additional equipment allows

- * internal grinding
- * relief grinding
- * axially-parallel grinding
- * pitch and diameter progressive grinding

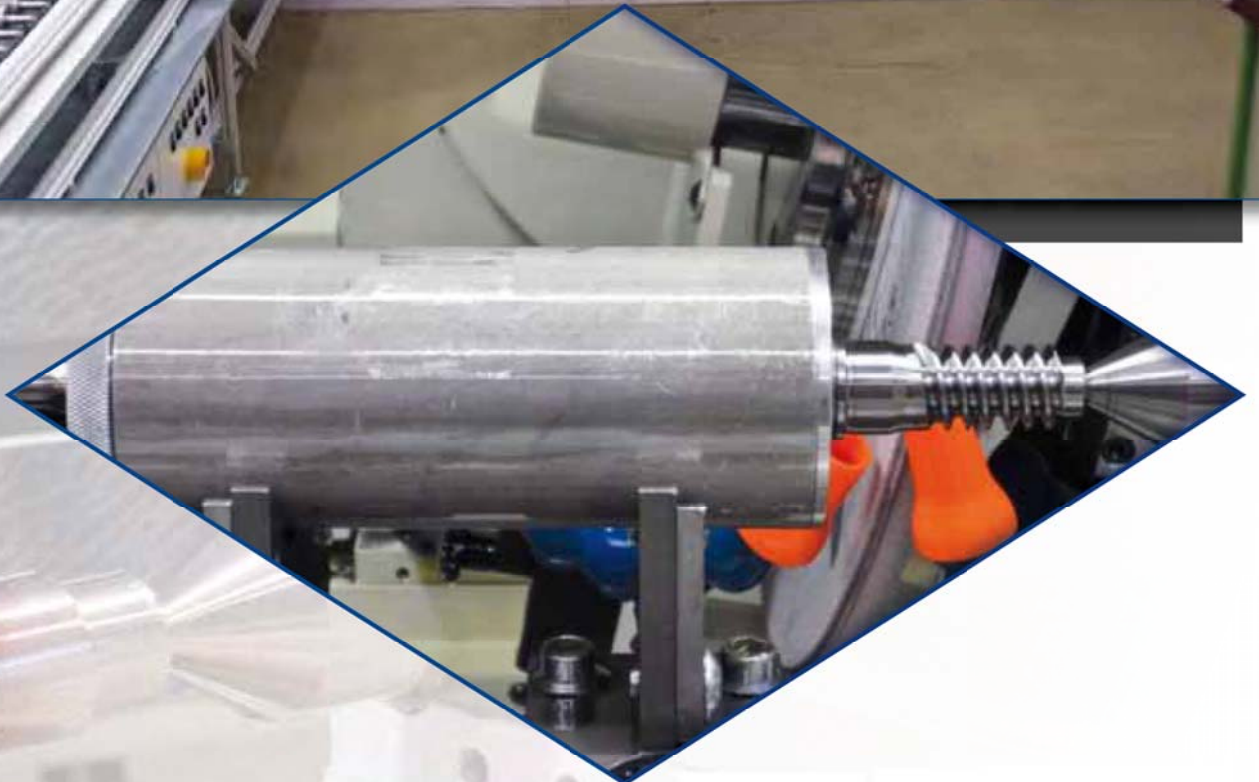
搭配附加設備後的模組化設計具有最高等級的通用性，可以執行下列的加工：

- * 工件內部的磨削
- * 鏟磨
- * 軸向平行軸磨削
- * 節距與直徑的逐行式磨削



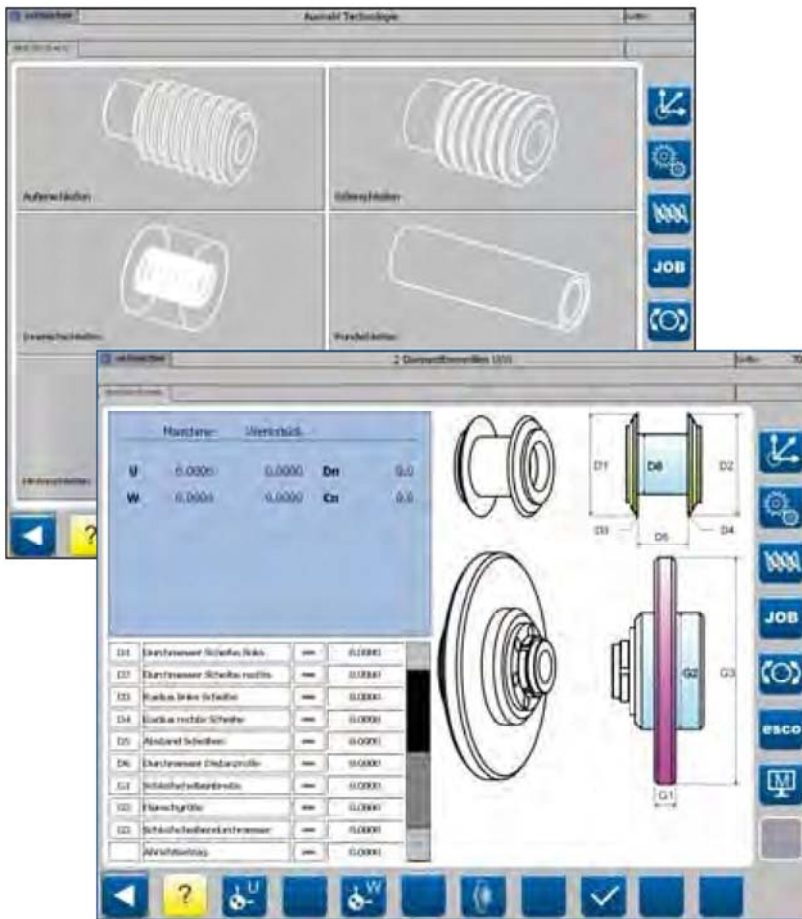


MIKROMAT



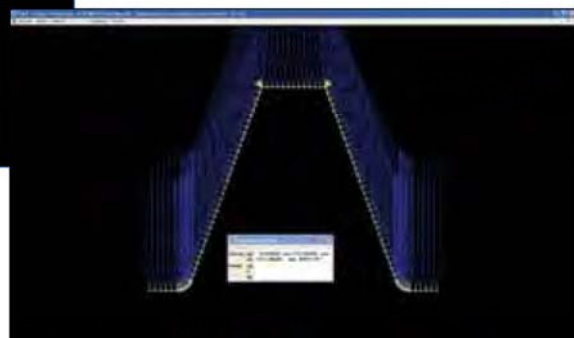
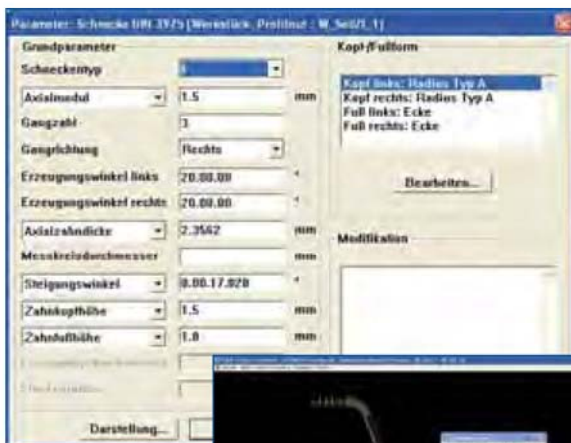
The integrated automation systems for loading and unloading work pieces allow the efficient machining of highly-precise medium and large series.

完美整合好的自動上下料系統可以對中型批量和大型批量高精度的工作做更有效率的加工。



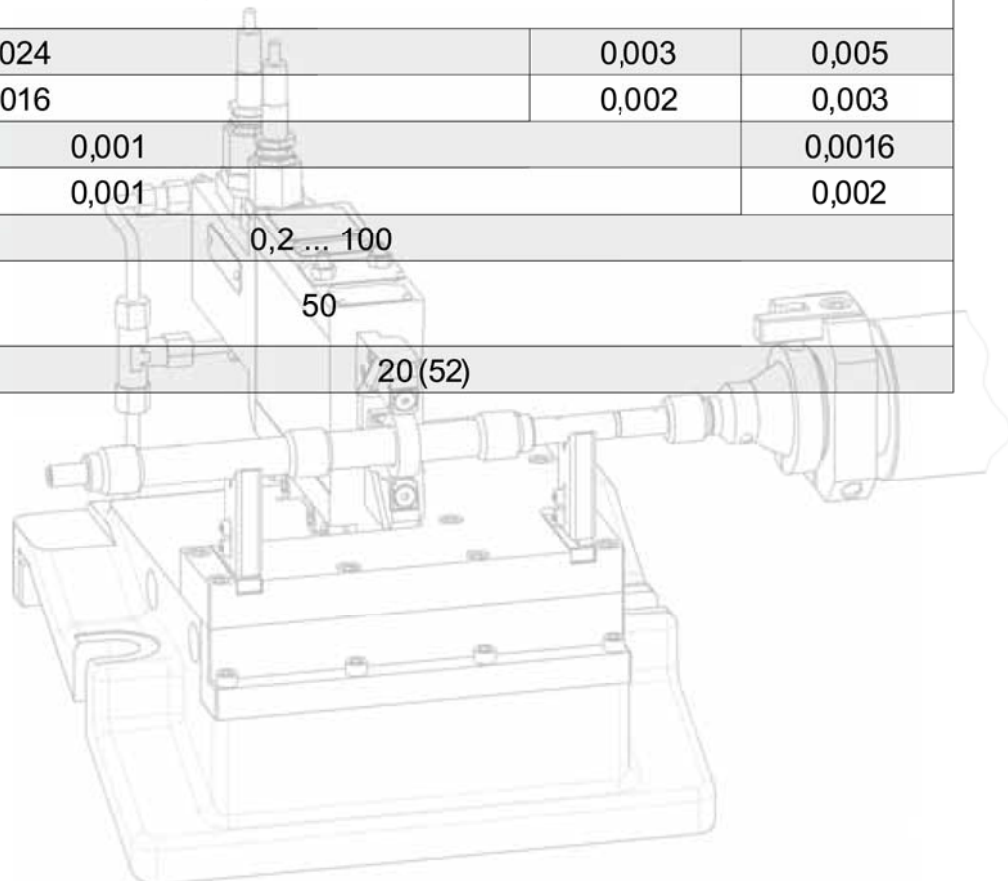
Grinding of precision threads requires experience and mechanical knowledge. Programming skills are not necessary, since drawing specification are entered directly.

磨削高精度螺紋需要經驗和機械技術，由於工件圖已經提供程式輸入所要的資料，編寫程式的工作已經不再需要。

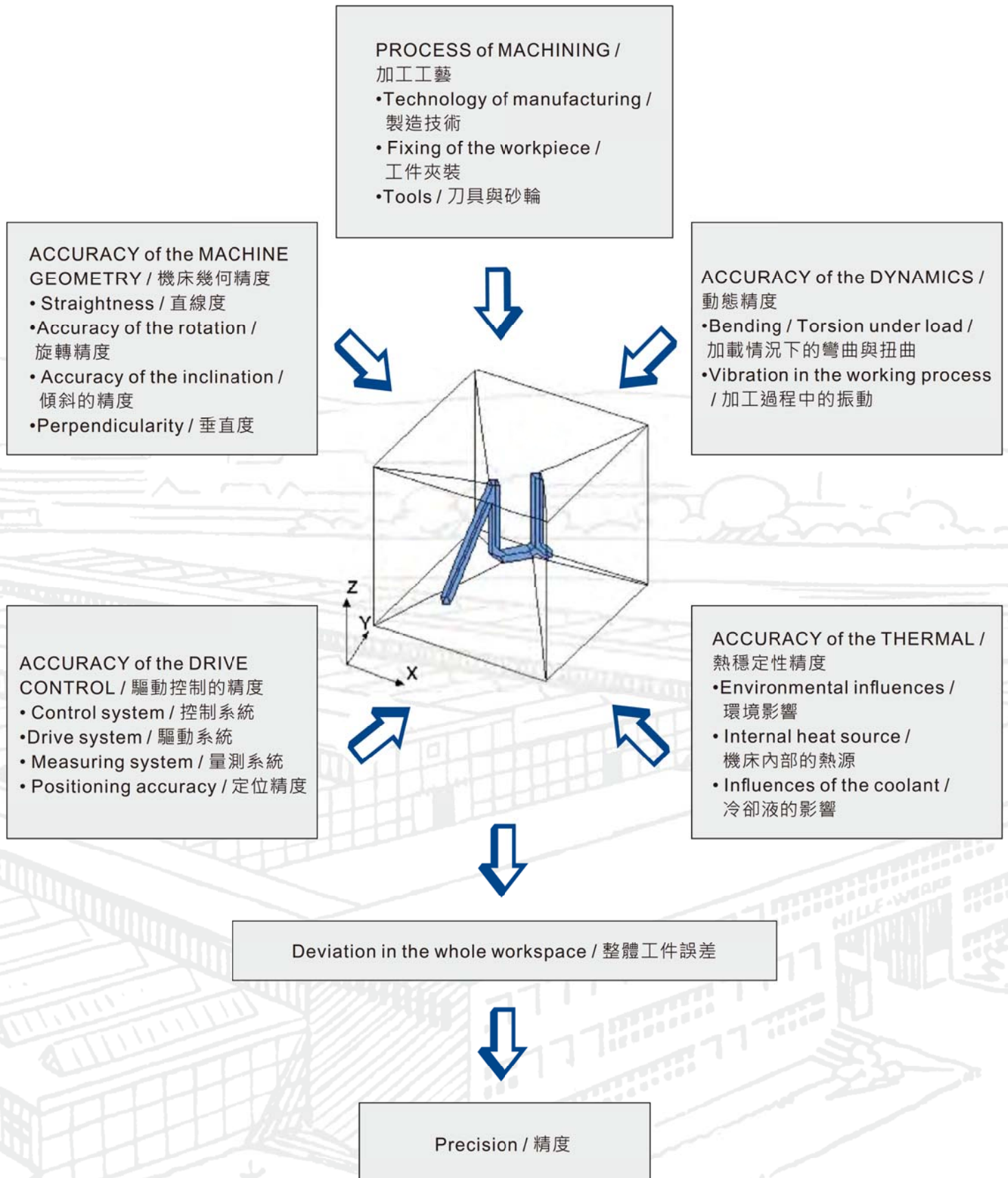


Max. grindable workpiece diameter external 可磨削的工件最大外徑	mm
Max. grindable workpiece diameter internal 可磨削的工件最大內徑	mm
Max. grindable thread length, single profile external 可磨削的外螺紋最大長度(單齒形)	mm
Max. grindable thread length, single profile internal 可磨削的內螺紋最大長度(單齒形)	mm
Max. workpiece length with internal thread 最大內螺紋工件長度	mm
Max. distance between centers / 最大頂心距	mm
Max. weight of workpiece between centers 雙頂心夾持的最大工件重量	kg
Grinding wheel adjustment range / 砂輪可調範圍	mm
Grinding wheel diameter min. / max. 砂輪最小與最大直徑	mm
Grinding wheel width min. / max. / 砂輪最小與最大寬度	mm
Space requirement / 佔地面積	L-B-H
Net weight / 機床淨重	kg
Feed / rapid traverse Z axis 工件檯面水平左右移動 Z 軸進給/快速移動速度	mm/ min
Feed / rapid traverse X axis 研磨頭前進後退 X 軸進給/快速移動速度	mm/ min
Positional uncertainty 定位不確定性 (P) X,Z / U, W	mm
Positional scatter 定位發散度 (Ps) X,Z / U, W	mm
Reversibility 返向誤差 (U) X,Z / U, W	mm
Positional deviation 定位偏差 (Pa) X,Z / U, W	mm
Spindle speed rate / 主軸轉速	min ⁻¹
Grinding wheel drive, max. grinding speed 砂輪驅動 · 最大磨削速度	m/s
Capacity of grinding wheel drive 100% / 砂輪驅動能力	kW

MIKROMAT						
3G	5GI	5G (P)	10G (P)	15G (P)	20G (P)	60G (P)
250	400	320				
-	320	280				-
300	-	500	1000	1500	2000	6000
-	300	-	50	150	250	-
-	350	-	150	450	700	-
400	-	750	1250	1750	2225	6250
50	80	160	160	240	300	1000
265						
200+2x Profilhöhe/ 350	13/ 32	300+2x Profilhöhe/ 500				
8/ 30		8/ 60				
2,2-3,0-1,6	7,0-4,0-3,0			8,0-4,0-3,0	9,0-4,0-3,0	
5000	9000			12000	15000	20000
5000/ 15000						
1000/ 4000						
0,0024				0,003	0,005	
0,0016				0,002	0,003	
0,001					0,0016	
0,001					0,002	
0,2 ... 300	0,2 ... 100					
60	50					
12	15	20 (52)				



Experience in Precision / 針對精度的經驗





漢科斯榮譽代理

漢科斯國際企業有限公司 42051 台中市豐原區保康路56號2樓之2
電話：04-2523-0895 傳真：04-2523-0897 sales@atmax-tech.com
<http://www.atmax-tech.com>

