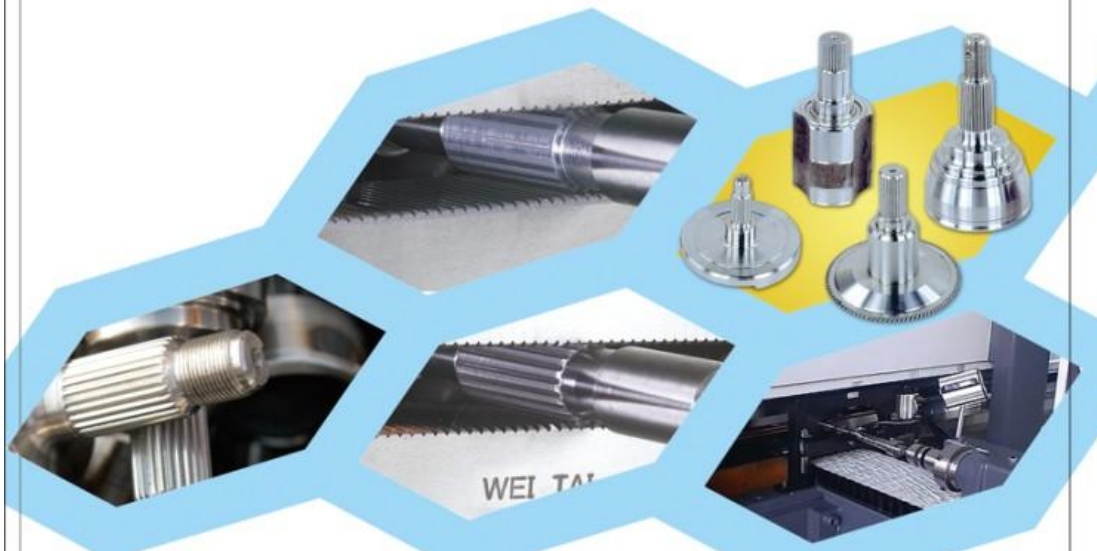


滾軋機系列

冷成形工藝的創新技術

成型滾齒條，主要在常溫精密滾齒加工漸開線，齒輪軸所用的滾齒刀具，特別是汽車之軸零件加工所不可欠缺的工具。

The forming rack bar is mainly used under room temperature and precisely to roll gears, machine involute and hobbing tools required for gear shaft. It is a prerequisite tool for machining car shaft parts.

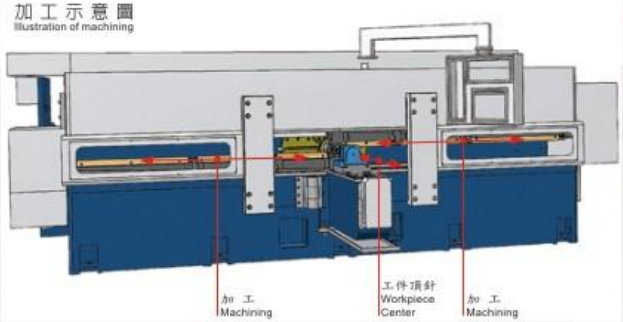
優 點：

銑切加工及小齒輪切削加工相比，具有能夠高效率加工，花鍵齒輪、螺紋、無切屑，以及節省材料、提高被加工齒形的強度等多項優點。此加工法雖然多用於汽車零件加工。但一般零件的加工亦可廣泛應用之。

Advantages:

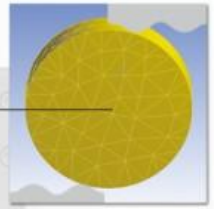
The rolling machine is more efficient than pinion gear on milling parts. It can machine spline gears and spiral without chips produced. Besides, it saves material, strengthens the gear profile, and has many advantages. This machining method is often used on the car parts. For ordinary parts, it is also widely used.

加工示意圖
Illustration of machining

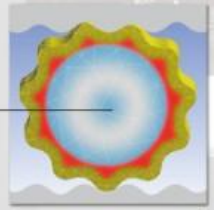


冷成形過程模擬

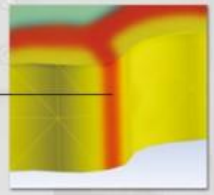
Cold forming
process simulation



步驟 2
STEP 2



步驟 100
STEP 100



3D細節圖示
3D illustration

• WT-1225XEL

滾軋機尚可做如下加工：

漸開線花鍵鋸齒。少齒數螺旋齒輪，螺紋油溝漸開線花鍵之壓力角有20˚、30˚、37˚30' 等種類代表性規格在JIS、ANSI、DIN等都有規定。再者漸開線鋸齒的壓力角約是45˚，這在JES、ANSI都有相關規格。

The rolling machine can also do following work:

Involute spline cutting tooth and spiral gear with few teeth. There are 20°, 30° and 37°30' for the profile angles of involute splines of spiral oil grooves. Some representative specifications are regulated in JIS, ANSI and DIN standards. Furthermore, the profile angle of involute tooth form is about 45°. It is regulated in JES and ANSI standards.

機 械 規 格 Specification

No	項目內容 Items	產品規格 Product Specifications									備註 Remarks
1	機械型號 Machine Model	WT-800	WT-800X	WT-800S	WT-800XL	WT-1225	WT-1225S	WT-1225X	WT-1225XL	WT-1225XEL	
2	佔地面積 Floor Occupied	3.5M x 3.2M	3.5M x 3.2M	3.5M x 3.4M	3.5M x 3.4M	3.5M x 4.0M	3.5M x 4.0M	3.5M x 4.0M	4.5M x 6M	5M x 6.5M	
3	機台高度 Height of Machine	1.7M	1.7M	1.7M	1.7M	1.7M	1.7M	1.7M	2.1M	2.1M	
4	機台總重 Weight of Machine	約7.5t	約7.5t	約9t	約9t	約11t	約11t	約13t	約22t	約24t	
5	開口部尺寸 Size of opening area	5.5"	5.5"	5.5"	5.5"	5.5"	5.5"	5.5"	5.5"	5.5"	可選用開口部尺寸6"
6	加工最大模數 Maxi. Machining module	M1.0583	M1.0583	M1.25	M1.25	M1.5	M1.5	M1.5	M1.75	M1.75	
7	加工最大長度 Maxi. Machining length	70L	110L	70L	110L	70L	110L	80L	110L	110L	
8	齒刀壓力角範圍 Profile angles of rolling rack	20°~45°	20°~45°	20°~45°	20°~45°	20°~45°	20°~45°	20°~45°	20°~45°	20°~45°	
9	加工最大外徑 Maxi. Outer diameter of machining	Ø32	Ø32	Ø32	Ø36	Ø36	Ø42	Ø60	Ø60	Ø 60	
10	工件最大長度 Maxi. length of workpiecs	1000L	1000L	1000L	1000L	1000L	1000L	1000L	1000L	1000L	
11	主電力需求 Main power required	40HP	50HP	40HP	50HP	50HP	60HP	50HP	60HP	60HP	

冷成形工作原理
Cold forming principle of working

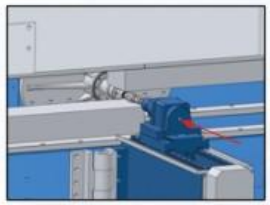
螺紋花鍵滾軋機比傳統切削加工快30倍，可加工螺旋齒、直齒、油溝齒螺牙滾花等加工，冷作成形的工件可獲得良好表面負載，較佳表面精度及高精密度。

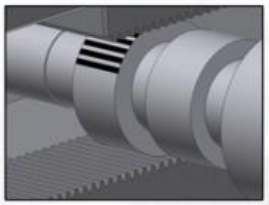
Spiral Spline Rolling Machine runs 30 times faster than conventional milling machine. This machine can process spiral teeth, straight teeth, oil groove teeth, thread knurls. Cold forming parts have excellent surface loading, better surface precision and high precision.

冷成形三步驟：
3 steps of coid forming:

步驟一：
工件由前後活動頂針固定、定位。

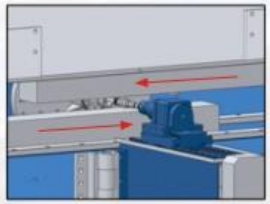
STEP 1 :
The workpiece is fixed in place by the back and forth center.

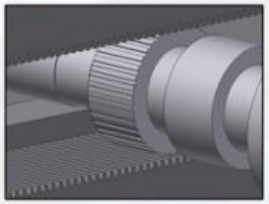




步驟二：
上下滑台同步作動，藉由成形齒條從兩側同時滾軋工件，完成滾軋成型加工。

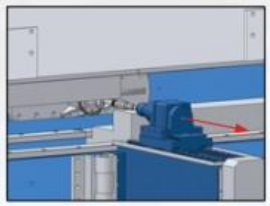
STEP 2 :
The upper and lower slides move synchronically. The forming racks roll the workpiece synchronically from two sides to finish the rolling forming.

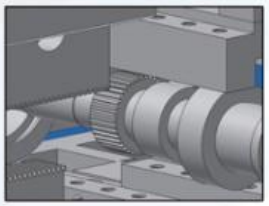




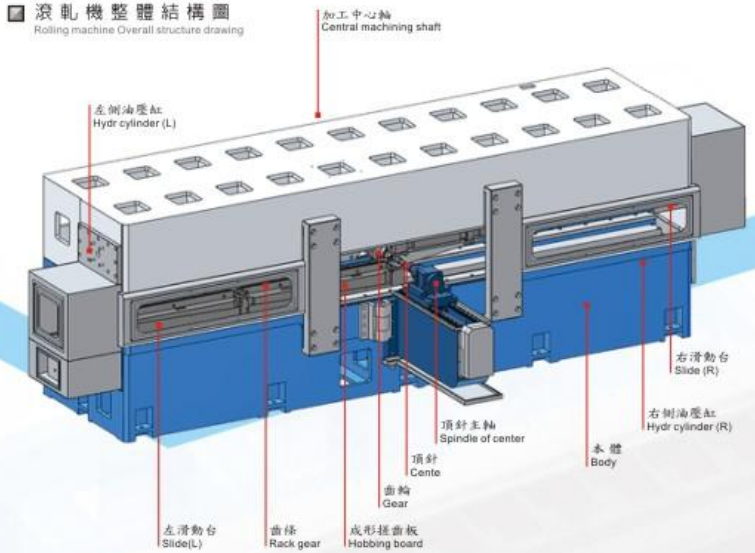
步驟三：
經過數秒後，滾軋工作完成，卸下工件，上下滑台復歸原點。

STEP 3 :
In a few seconds, the workpiece is finished rolling. Remove the workpiece. The upper and lower slides home return.





滾軋機整體結構圖
Rolling machine Overall structure drawing



滾軋機特徵及優點剖析：

成型滾軋機加工的特徵前已講述過，除了高效率及經濟性外，亦可得到高品質的加工，實際上加工只需數秒鐘即可完成，故此比銑切及切削加工來得效率高。再者，滾軋加工＝彈性加工，不會有切屑的問題。

其他優點如下：：

1. 同一軸上的花鍵、螺紋等可在第一工程同時加工完成，如果有段差的軸也可加工至離段差相當近的地方。
2. 同一軸上有三個部位花鍵不同齒數、壓力角、模數，可同時加工完成。
3. 可調整滾軋工具的安裝及對位，使得齒位偏移度小，所以不會有加工物的齒底，擠入金屬流向而產生龜裂現象。

Rolling machine characteristic and merit :

The performances of forming rolling machine are stated above. In addition to high efficiency and economy, this machine can achieve high quality machining. The actual machining time just needs a few seconds to finish the work. Therefore, this milling processing is more efficient than cutting processing. Furthermore, rolling processing is molding processing. There is no chip problem.

Other advantages are :

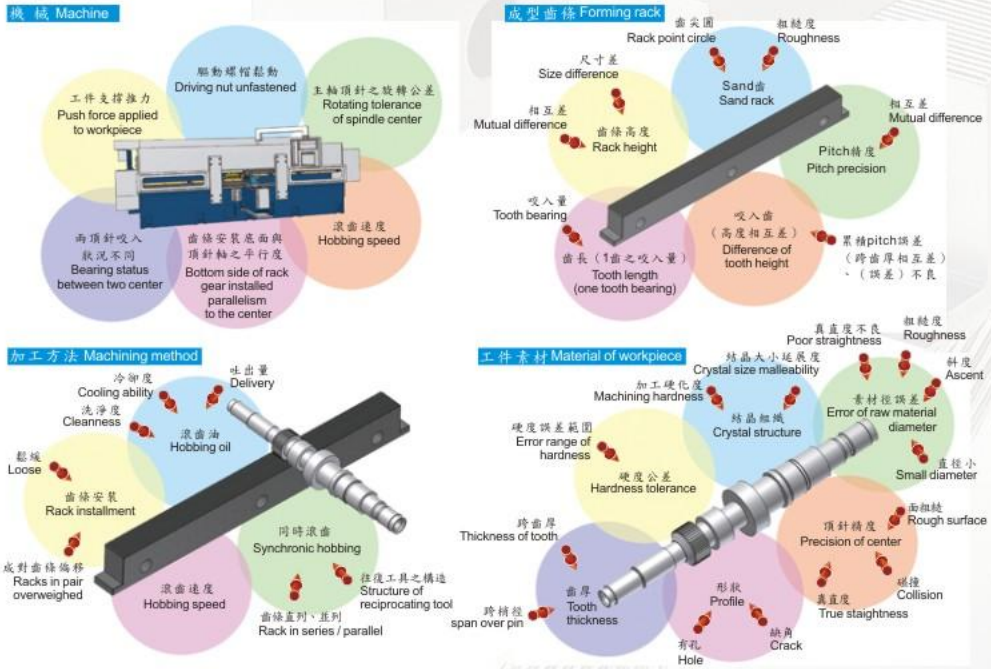
1. The spline and the threads on the same shaft can be finished at the same time at the 1st project. If there is a fall at the shaft junction, the machining can be very close to the junction.
2. Three splines at three positions on the same shaft, with different numbers of tooth, different profile angles and modules can be finished at the same time.
3. The installation and position of the rolling tool can be adjusted so as to minimize the tooth offset. Therefore, metal won't be rolled into tooth root, so the tooth won't crack.

加工素材種類 Mcghining workpiece category
20 CrMnTi
20 MnCr5
16 MnCr5
20 CrMo
20 Cr
40 Cr
40 CrMnTi
45＃鋼

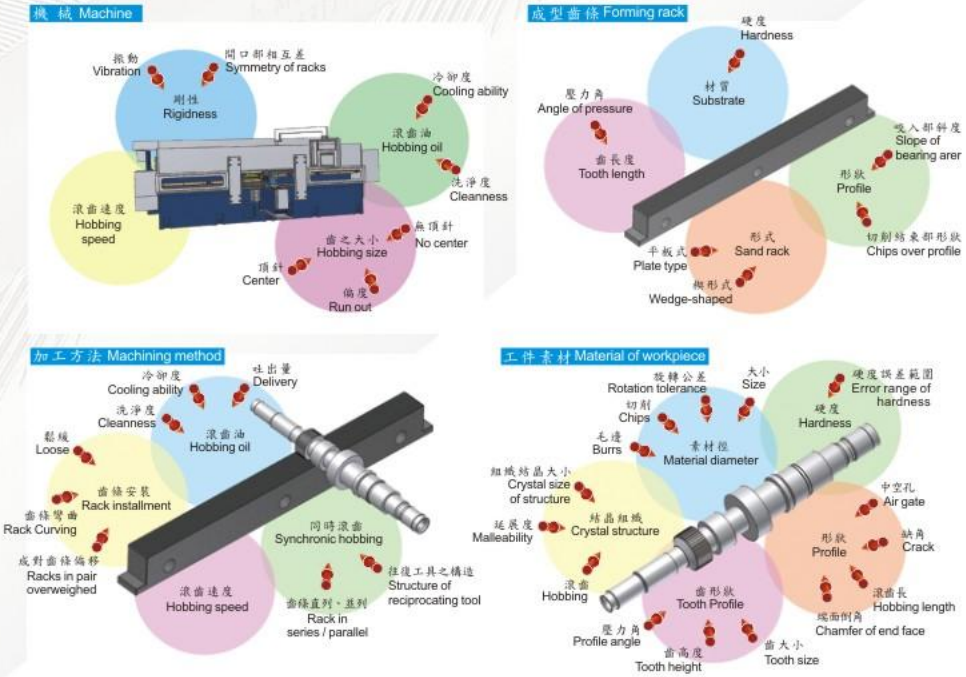
刀具壽命大約在80000~100000之間要依工件材質是否穩定而定。若成型刀具在640mm之間可保證公差在0.015m/m以測量over pins為準。

The durable life of a hobbing cutter is about 100000-200000 depending on stability of workpieces material. For a hobbing cutter of 640mm, tolerance of 0.015mm is assured based on the measuring over pins.

累積pitch誤差不良之特性主因圖



造成齒條壽命縮短特性主因圖

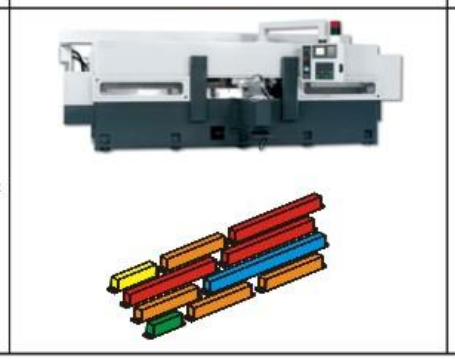
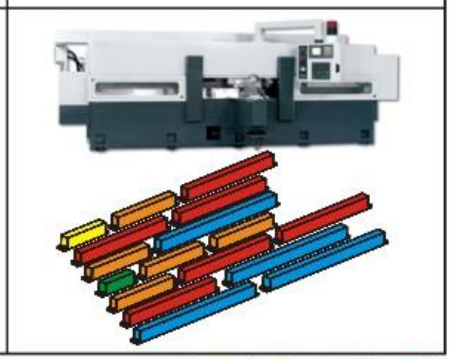


精密齒板刀具系列 Precision rolling tool system

齒條刀具種類及配置
Racks cutting tool type and disposition

刀 具 排 列 Tool Layout

Model No	WT-800 / WT-800X	WT-800S / WT-800XL	WT-1225 / WT-1225S	WT-1225X
刀具排列 Tool layout				

Model No	WT-1225XL	WT-1225XEL
刀具排列 Tool layout		

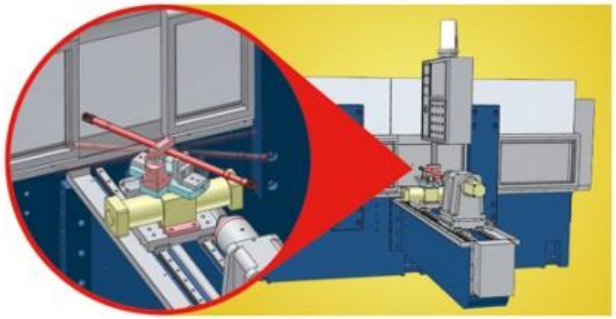
■13" ■18" ■24" ■36" ■48"

自動化系統(選購)
Auto System (Option)

■自 動 轉 向 系 統 ：
Auto Direction-turning System

可減少上下料更換工件方向時間，進而縮短上下料時間，提升加工效率。

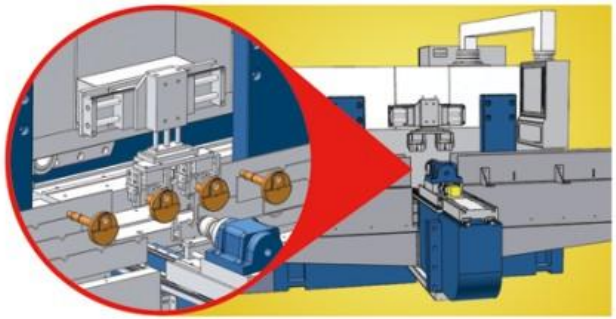
Unnecessary to unload and reload the workpiece for changing work direction of the workpiece. Thus, unloading and reloading time can be saved to increase work efficiency.



■自 動 送 料 系 統 ：
Auto Feed System

滑台復歸時，以加工和未加工，工件已替換，縮短上下料時間，提升加工效率，減少人力資源。

When the slide home returns, the finished workpiece and the unfinished workpiece are exchanged. It shortens the loading and unloading time, increases work efficiency, and reduces manpower.



冷成形機械發展史
Cold forming machine timeline list

1986
成功研發精密滾軋機。
Successfully developed the precision rolling machine.

1990
瑋泰于工具機展覽發表精密滾軋機。
Presented the precision rolling machine at machine tool show.

1992
汽車製造大廠，亦大量導入精密花鍵滾軋機，圓形絞板滾軋機逐漸全面停用。
Big automotive factories also employed a lot of splines of precision rolling machine. Thus round twisted plate rolling machines for cutting gears were not used anymore.

1998
三工位變速箱軸多工位精密滾軋機開發。
Develop 3-position gear box shaft and multiple-position precision rolling machine

2002
機密滾軋機開發自動上下料、轉向系統
Developed auto loading/unloading and direction-changing system for the precision rolling machine.