



# MACHINE REAMER SERIES

機械鉋刀系列

No. 250716007





## 機械鉋刀 - 特點介紹 MACHINE REAMER FEATURES

系列 Series	尺寸區間 Size Range	材質 Grade	刀刃樣式 Flute Type	適合加工孔樣式 Suitable Hole Type	建議加工材質 Recommended Workpiece Materials	應用 Application
MRU714	0.01MM	日本鎢鋼棒材 Japanese Tungsten Carbide Rods	直刃 Straight Flute	通孔 Through Hole	泛用材質加工 General-purpose materials	適合 CNC 加工中心機使用。 Ideal for CNC machining centers.
MRU717	0.01MM	日本鎢鋼棒材 Japanese Tungsten Carbide Rods	左螺旋刃 Left-Hand Spiral Flute	通孔 Through Hole	泛用材質加工，鋼材最佳 General-purpose materials, especially suitable for steel	短刃結構，自動車床、CNC 加工中心機均可使用。 Short flute design, suitable for automatic lathes and CNC machining centers.
MRU607	0.5MM	歐洲鎢鋼棒材 European Tungsten Carbide Rods	左螺旋刃 Left-Hand Spiral Flute	通孔 Through Hole	泛用材質加工，鋼材最佳 General-purpose materials, especially suitable for steel	適合 CNC 加工中心機使用。 Ideal for CNC machining centers.
MRU777	0.01MM	日本高速鋼含鈷棒材 Japanese HSS-Co Rods (High-Speed Steel with Cobalt)	左螺旋刃 Left-Hand Spiral Flute	通孔 Through Hole	未熱處理且 HRC < 20 材質 Materials not heat-treated and with HRC below 20	加工環境不穩定情況下，或是中低轉速下使用。 短刃結構，自動車床、CNC 加工中心機均可使用。 Can be used under unstable machining conditions or at low to medium spindle speeds. Short flute design, suitable for automatic lathes and CNC machining centers.



## 機械鉋刀 - 材料差異比較 MATERIAL COMPARISON FOR MACHINE REAMERS

差異 Category	鎢鋼棒材 Tungsten Carbide	高速鋼含鈷棒材 Cobalt-Alloyed High Speed Steel
精準度 Precision	優秀 Excellent	精度維持時間較短 Shorter precision retention
壽命 Tool Life	優於高速鋼 5-10 倍 5-10 times longer than HSS	一般未處理材料可使用 Usable on general untreated materials
進刀速度 Feed Rate	中高轉速 Medium to high feed rate	中低轉速 Low to medium feed rate



# 機械鉋刀 - 編碼規範

## MACHINE REAMER CODING STANDARDS

<b>MRU</b>	<b>7</b>	<b>1</b>	<b>4</b>	-	<b>3.5</b>
<b>MRU</b>	<b>7</b>	<b>7</b>	<b>7</b>	-	<b>4.13</b>
① 鉋刀系列 Reamer Series	② 流水號 Serial Number	③ 刀具材質 Cutting Tool Material	④ 直槽 / 螺旋槽 Straight Flute / Spiral Flute		⑤ 加工直徑 Cutting Diameter

鎢鋼直刃鉋刀  
Carbide Straight  
Flute Reamer

高速鋼螺旋鉋刀  
HSS Spiral  
Flute Reamer

記號 Symbol	材質 Grade	記號 Symbol	型式 Style
0-5	鎢鋼材質 Tungsten Carbide	4	直槽 Straight Flute
6-8	HSS-CO	7	螺旋槽 Spiral Flute
9	其他 Other		



## 鎢鋼超硬直刃鉸刀 SOLID CARBIDE STRAIGHT FLUTE REAMER

【MRU714 系列】 【MRU714 Series】



Fig.1

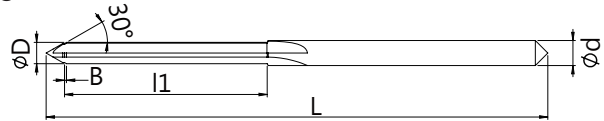
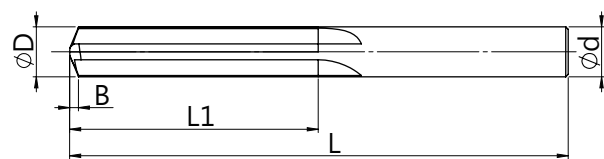


Fig.2



【特點】

- 刃徑公差 0~+0.005mm
- 直刃設計 · 一般普遍使用
- 適合通孔加工用
- 尺寸可區分為整數 · 0.1MM · 0.01MM 區間
- 可客製生產製造 0.005mm 尺寸

【Feature】

- Cutting diameter tolerance: 0 to +0.005 mm.
- Straight flute design; commonly used for general applications.
- Suitable for through-hole machining.
- Available in whole number sizes, as well as 0.1mm and 0.01mm increments.
- Custom sizes available in 0.005mm increments.

規格 Spec.	刃徑 D	柄徑 d	刃長 L1	倒角長 B	全長 L	刃數 Flutes	Fig.
整數尺寸區間 Size Range in Whole Numbers							
MRU714-2	2	2	18	0.4	50	4	1
MRU714-3	3	3	27	0.5	60	4	2
MRU714-4	4	4	27	0.5	60	4	2
MRU714-5	5	5	30	0.5	70	6	2
MRU714-6	6	6	30	0.8	80	6	2
MRU714-7	7	7	35	0.8	80	6	2
MRU714-8	8	8	35	0.8	80	6	2
MRU714-9	9	9	40	1.0	90	6	2
MRU714-10	10	10	40	1.0	90	6	2
MRU714-11	11	11	40	1.0	90	6	2
MRU714-12	12	12	45	1.0	90	6	2
0.1mm 尺寸區間 Size Range in 0.1mm Increments							
MRU714-1.8~1.9	1.8~1.9	2	18	0.4	50	4	1
MRU714-2.1~2.5	2.1~2.5	2.5	20	0.5	50	4	1
MRU714-2.6~2.9	2.6~2.9	3	20	0.5	50	4	1
MRU714-3.1~3.5	3.1~3.5	3.5	27	0.5	60	4	2
MRU714-3.6~3.9	3.6~3.9	4	27	0.5	60	4	2
MRU714-4.1~4.5	4.1~4.5	4.5	30	0.5	70	6	2
MRU714-4.6~4.9	4.6~4.9	5	30	0.5	70	6	2
MRU714-5.1~5.5	5.1~5.5	5.5	30	0.8	80	6	2
MRU714-5.6~5.9	5.6~5.9	6	30	0.8	80	6	2
MRU714-6.1~6.9	6.1~6.9	7	35	0.8	80	6	2
MRU714-7.1~7.9	7.1~7.9	8	35	0.8	80	6	2



鎢鋼超硬直刃鉸刀  
SOLID CARBIDE STRAIGHT FLUTE REAMER

【MRU714 系列】 【MRU714 Series】



Fig.1

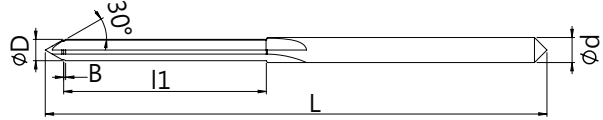
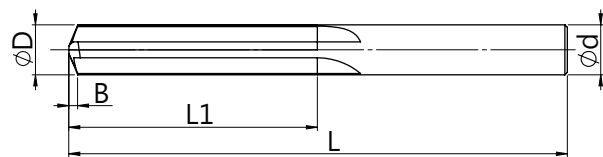


Fig.2



規格 Spec.	刃徑 D	柄徑 d	刃長 L1	倒角長 B	全長 L	刃數 Flutes	Fig.
0.1mm 尺寸區間 Size Range in 0.1mm Increments							
MRU714-8.1~8.9	8.1~8.9	9	40	1.0	90	6	2
MRU714-9.1~9.9	9.1~9.9	10	40	1.0	90	6	2
MRU714-10.1~10.9	10.1~10.9	11	40	1.0	90	6	2
MRU714-11.1~11.9	11.1~11.9	12	45	1.0	90	6	2
MRU714-12.1	12.1	12	45	1.0	90	6	2
0.01mm 尺寸區間 Size Range in 0.01mm Increments							
MRU714-1.81~ 1.99	1.80~ 1.99	2	18	0.4	50	4	1
MRU714-2.01~ 2.59	2.01~ 2.59	2.5	20	0.5	50	4	1
MRU714-2.61~ 2.89	2.61~ 2.89	3	20	0.5	50	4	1
MRU714-2.91 ~ 2.99	2.91 ~ 2.99	3	27	0.5	60	4	2
MRU714-3.01 ~ 3.49	3.01 ~ 3.50	3.5	27	0.5	60	4	2
MRU714-3.51 ~ 3.99	3.51 ~ 3.99	4	27	0.5	60	4	2
MRU714-4.01 ~ 4.49	4.01 ~ 4.49	4.5	27	0.5	60	6	2
MRU714-4.51 ~ 4.99	4.51 ~ 4.99	5	30	0.5	70	6	2
MRU714-5.01 ~ 5.49	5.01 ~ 5.49	5.5	30	0.8	80	6	2
MRU714-5.51 ~ 5.99	5.51 ~ 5.99	6	30	0.8	80	6	2
MRU714-6.01 ~ 6.99	6.01 ~ 6.99	7	35	0.8	80	6	2
MRU714-7.01 ~ 7.99	7.01 ~ 7.99	8	35	0.8	80	6	2
MRU714-8.01 ~ 8.99	8.01 ~ 8.99	9	40	1.0	90	6	2
MRU714-9.01 ~ 9.99	9.01 ~ 9.99	10	40	1.0	90	6	2
MRU714-10.01 ~ 10.99	10.01 ~ 10.99	11	40	1.0	90	6	2
MRU714-11.01 ~ 11.99	11.01 ~ 11.99	12	40	1.0	90	6	2
MRU714-12.01 ~ 12.09	12.01 ~ 12.09	12	45	1.0	90	6	2



### 鎢鋼超硬直柄機械鉸刀

### SOLID CARBIDE STRAIGHT SHANK MACHINE REAMER

【MRU717 系列】 【MRU717 Series】



Fig.1

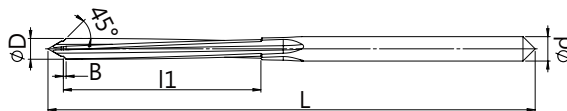
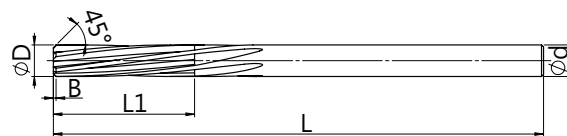


Fig.2



【特點】

- 刃徑公差 0~+0.005mm
- 螺旋刃設計，有較大的磨光效果，一般情況下表面粗糙度優於直刃
- 適合通孔加工用
- 短刃結構，自動車床、CNC 加工中心機均可使用
- 尺寸可區分為整數、0.1MM、0.01MM 區間
- 可客製生產製造 0.005mm 尺寸與英制尺寸

【Feature】

- Cutting diameter tolerance: 0 to +0.005 mm.
- Spiral flute design offers superior polishing effect; generally provides better surface roughness than straight flutes.
- Suitable for through-hole machining.
- Short flute design compatible with automatic lathes and CNC machining centers.
- Available in whole number sizes, as well as 0.1mm and 0.01mm increments.
- Custom sizes available in 0.005mm increments and inch sizes.

規格 Spec.	刃徑範圍 D	柄徑 d	刃長 L1	有效長 L2	倒角長 B	全長 L	刃數 Flutes	Fig.
整數尺寸區間 Size Range in Whole Numbers								
○ MRU717-1	1	3	12	-	0.2	40	4	1
○ MRU717-2	2	3	20	-	0.3	50	4	1
MRU717-3	3	3	20	30	0.4	60	6	2
MRU717-4	4	3	20	30	0.4	60	6	2
MRU717-5	5	4	25	35	0.5	65	6	2
MRU717-6	6	5	25	35	0.5	65	6	2
MRU717-7	7	6	25	40	0.5	70	6	2
MRU717-8	8	6	25	40	0.5	70	6	2
MRU717-9	9	8	25	40	0.5	70	6	2
MRU717-10	10	8	25	40	0.5	70	6	2
MRU717-11	11	10	30	45	0.5	80	6	2
MRU717-12	12	10	30	45	0.5	80	6	2
0.1mm 尺寸區間 Size Range in 0.1mm Increments								
○ MRU717-1.8~2.1	1.8~2.1	3	20	-	0.3	50	4	1
○ MRU717-2.2~2.6	2.2~2.6	3	20	-	0.3	60	4	1
○ MRU717-2.7~2.8	2.7~2.8	3	20	-	0.3	60	4	1
MRU717-2.9~3.1	2.9~3.1	3	20	30	0.4	60	6	2
MRU717-3.2~4.1	3.2~4.1	3	20	30	0.4	60	6	2
MRU717-4.2~5.1	4.2~5.1	4	25	35	0.5	65	6	2
MRU717-5.2~5.6	5.1~5.6	4	25	35	0.5	65	6	2
MRU717-5.7~6.1	5.7~6.1	5	25	35	0.5	65	6	2

○ 接單生產 Make to order.



鎢鋼超硬直柄機械鉸刀  
SOLID CARBIDE STRAIGHT SHANK MACHINE REAMER

【MRU717 系列】 【MRU717 Series】



Fig.1

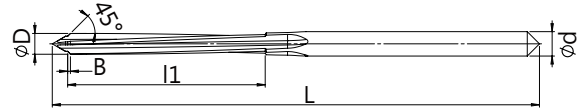
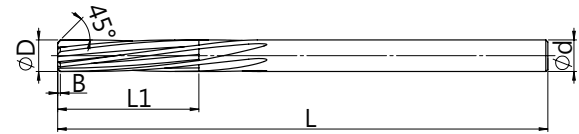


Fig.2



規格 Spec.	刃徑範圍 D	柄徑 d	刃長 L1	有效長 L2	倒角長 B	全長 L	刃數 Flutes	Fig.
0.1mm 尺寸區間 Size Range in 0.1mm Increments								
MRU717-6.2~6.6	6.2~6.6	5	25	35	0.5	65	6	2
MRU717-6.7~7.1	6.7~7.1	6	25	40	0.5	70	6	2
MRU717-7.2~8.1	7.2~8.1	6	25	40	0.5	70	6	2
MRU717-8.2~8.6	8.2~8.6	6	25	40	0.5	70	6	2
MRU717-8.7~9.1	8.7~9.1	8	25	40	0.5	70	6	2
MRU717-9.2~10.1	9.2~10.1	8	25	40	0.5	70	6	2
MRU717-10.2~10.6	10.2~10.6	8	25	40	0.5	70	6	2
MRU717-10.7~11.1	10.7~10.9	10	30	45	0.5	80	6	2
MRU717-11.2~12.1	11.2~11.9	10	30	45	0.5	80	6	2
0.01mm 尺寸區間 Size Range in 0.01mm Increments								
○ MRU717-1.81~2.09	1.81~2.09	3	20	-	0.3	50	4	1
○ MRU717-2.11~2.89	2.11~2.89	3	20	-	0.3	60	4	1
MRU717-2.91~3.09	2.91~3.09	3	20	30	0.4	60	4	2
MRU717-3.11~4.09	3.11~4.09	3	20	30	0.4	60	6	2
MRU717-4.11~5.09	4.11~5.09	4	25	35	0.5	65	6	2
MRU717-5.11~5.59	5.11~5.59	4	25	35	0.5	65	6	2
MRU717-5.61~6.09	5.61~6.09	5	25	35	0.5	65	6	2
MRU717-6.11~6.59	6.11~6.59	5	25	35	0.5	65	6	2
MRU717-6.61~7.09	6.61~7.09	6	25	40	0.5	70	6	2
MRU717-7.11~8.09	7.11~8.09	6	25	40	0.5	70	6	2
MRU717-8.11~8.59	8.11~8.59	6	25	40	0.5	70	6	2
MRU717-8.61~9.09	8.61~9.09	8	25	40	0.5	70	6	2
MRU717-9.11~10.09	9.11~10.09	8	25	40	0.5	70	6	2
MRU717-10.11~10.59	10.11~10.59	8	25	40	0.5	70	6	2
MRU717-10.61~11.09	10.61~11.09	10	30	45	0.5	80	6	2
MRU717-11.11~12.09	11.11~12.09	10	30	45	0.5	80	6	2

○ 接單生產 Make to order.

# 機械鉋刀系列

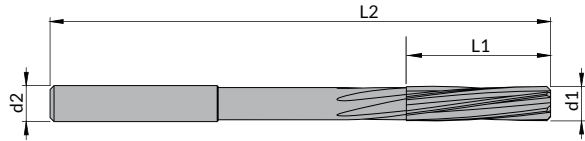
## MACHINE REAMER SERIES



# MRU 超微粒鎢鋼機械鉋刀

## ULTRA-FINE GRAIN CARBIDE MACHINE REAMER

【MRU607 系列】 【MRU607 Series】



### 【特點】

- 歐洲鎢鋼材料、瑞士生產設備，品質把關
- 柄徑公差 h6，刀徑公差 H7
- 螺旋刃設計，適合通孔加工

### 【Feature】

- Made from European ultra-fine grain carbide on Swiss machines.
- Shank diameter tolerance h6, edge diameter H7.
- Spiral flute design, ideal for through-hole machining.

規格 Spec.	刃徑 d1	刃長 L1	全長 L2	柄徑 d2	刃數 Flutes	螺旋角 Angle	工件材質 Workpiece Material
MRU607-020030	2	11	49	3	6	7°	<div style="display: flex; flex-direction: column; align-items: center; gap: 5px;"> <div style="background-color: #0056b3; color: white; padding: 2px 5px;">P</div> <div style="background-color: #ffc000; color: white; padding: 2px 5px;">M</div> <div style="background-color: #d62728; color: white; padding: 2px 5px;">K</div> <div style="background-color: #2ca02c; color: white; padding: 2px 5px;">N</div> <div style="background-color: #555555; color: white; padding: 2px 5px;">H</div> </div>
MRU607-025030	2.5	14	57	3	6	7°	
MRU607-030030	3	15	61	3	6	7°	
MRU607-035035	3.5	18	70	3.5	6	7°	
MRU607-040040	4	19	75	4	6	7°	
MRU607-045045	4.5	21	80	4.5	6	7°	
MRU607-050050	5	23	86	5	6	7°	
MRU607-055055	5.5	26	93	5.5	6	7°	
MRU607-060060	6	26	93	6	6	7°	
MRU607-065065	6.5	28	101	6.5	6	7°	
MRU607-070070	7	31	109	7	6	7°	
MRU607-075075	7.5	31	109	7.5	6	7°	
MRU607-080080	8	33	117	8	6	7°	
MRU607-085085	8.5	33	117	8.5	6	7°	
MRU607-090090	9	36	125	9	6	7°	
MRU607-095095	9.5	36	125	9.5	6	7°	
MRU607-100100	10	38	133	10	6	7°	
MRU607-105105	10.5	38	133	10.5	6	7°	
MRU607-110110	11	41	142	11	6	7°	
MRU607-115115	11.5	41	142	11.5	6	7°	
MRU607-120120	12	44	151	12	6	7°	





## 高速鋼含鈷螺旋刃機械鉸刀 HSS-CO SPIRAL FLUTE MACHINE REAMER

【MRU777 系列】 【MRU777 Series】



Fig.1

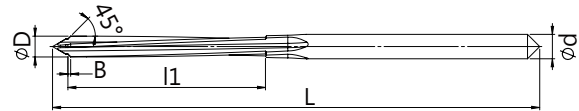
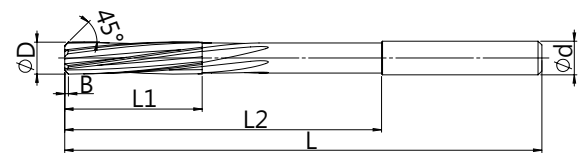


Fig.2



【特點】

- 材質為含鈷高速鋼，經濟實惠
- 刃徑公差 0~+0.005mm
- 適合通孔加工用
- 短刃結構，自動車床、CNC 加工中心機均可使用
- 尺寸可區分為整數、0.1MM、0.01MM 區間
- 可客製生產製造 0.005mm 尺寸與英制尺寸
- 加工環境不穩定情況下，或是中低轉速下使用

【Feature】

- Made of cobalt-containing high-speed steel for cost-effective performance.
- Cutting diameter tolerance: 0 to +0.005 mm.
- Suitable for through-hole machining.
- Short flute design compatible with automatic lathes and CNC machining centers.
- Available in whole number sizes, as well as 0.1mm and 0.01mm increments.
- Custom sizes available in 0.005mm increments and inch sizes.
- Suitable for use in unstable machining conditions or at low to medium spindle speeds.

規格 Spec.	刃徑範圍 D	柄徑 d	刃長 L1	有效長 L2	倒角長 B	全長 L	刃數 T	Fig.
整數尺寸區間 Size Range in Whole Numbers								
○ MRU777-1	1	3	12	-	0.2	40	4	1
○ MRU777-2	2	3	20	-	0.3	50	4	1
MRU777-3	3	3	20	30	0.4	60	6	2
MRU777-4	4	3	20	30	0.4	60	6	2
MRU777-5	5	4	25	35	0.5	65	6	2
MRU777-6	6	5	25	35	0.5	65	6	2
MRU777-7	7	6	25	40	0.5	70	6	2
MRU777-8	8	6	25	40	0.5	70	6	2
MRU777-9	9	8	25	40	0.5	70	6	2
MRU777-10	10	8	25	40	0.5	70	6	2
MRU777-11	11	10	30	45	0.5	80	6	2
MRU777-12	12	10	30	45	0.5	80	6	2
0.1mm 尺寸區間 Size Range in 0.1mm Increments								
○ MRU777-1.8~2.1	1.8~2.1	3	20	-	0.3	50	4	1
○ MRU777-2.2~2.6	2.2~2.6	3	20	-	0.3	60	4	1
○ MRU777-2.7~2.8	2.7~2.8	3	20	-	0.3	60	4	1
MRU777-2.9~3.1	2.9~3.1	3	20	30	0.4	60	6	2
MRU777-3.2~4.1	3.2~4.1	3	20	30	0.4	60	6	2
MRU777-4.2~5.1	4.2~5.1	4	25	35	0.5	65	6	2
MRU777-5.2~5.6	5.1~5.6	4	25	35	0.5	65	6	2
MRU777-5.7~6.1	5.7~6.1	5	25	35	0.5	65	6	2

○ 接單生產 Make to order.

• 長度單位 Unit of Length (mm)

# 機械鉋刀系列 MACHINE REAMER SERIES



## 高速鋼含鈷螺旋刃機械鉋刀 HSS-CO HELICAL FLUTE MACHINE REAMER

【MRU777 系列】 【MRU777 Series】



Fig.1

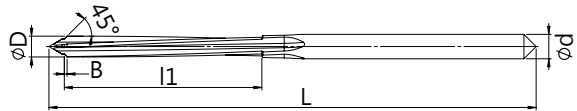
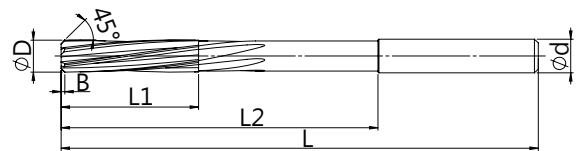


Fig.2



規格 Spec.	刃徑範圍 D	柄徑 d	刃長 L1	有效長 L2	倒角長 B	全長 L	刃數 T	Fig.
0.1mm 尺寸區間 Size Range in 0.1mm Increments								
MRU777-6.2~6.6	6.2~6.6	5	25	35	0.5	65	6	2
MRU777-6.7~7.1	6.7~7.1	6	25	40	0.5	70	6	2
MRU777-7.2~8.1	7.2~8.1	6	25	40	0.5	70	6	2
MRU777-8.2~8.6	8.2~8.6	6	25	40	0.5	70	6	2
MRU777-8.7~9.1	8.7~9.1	8	25	40	0.5	70	6	2
MRU777-9.2~10.1	9.2~10.1	8	25	40	0.5	70	6	2
MRU777-10.2~10.6	10.2~10.6	8	25	40	0.5	70	6	2
MRU777-10.7~11.1	10.7~10.9	10	30	45	0.5	80	6	2
MRU777-11.2~12.1	11.2~11.9	10	30	45	0.5	80	6	2
0.01mm 尺寸區間 Size Range in 0.01mm Increments								
○ MRU777-1.81~2.09	1.81~2.09	3	20	-	0.3	50	4	1
○ MRU777-2.11~2.89	2.11~2.89	3	20	-	0.3	60	4	1
MRU777-2.91~3.09	2.91~3.09	3	20	30	0.4	60	6	2
MRU777-3.11~4.09	3.11~4.09	3	20	30	0.4	60	6	2
MRU777-4.11~5.09	4.11~5.09	4	25	35	0.5	65	6	2
MRU777-5.11~5.59	5.11~5.59	4	25	35	0.5	65	6	2
MRU777-5.61~6.09	5.61~6.09	5	25	35	0.5	65	6	2
MRU777-6.11~6.59	6.11~6.59	5	25	35	0.5	65	6	2
MRU777-6.61~7.09	6.61~7.09	6	25	40	0.5	70	6	2
MRU777-7.11~8.09	7.11~8.09	6	25	40	0.5	70	6	2
MRU777-8.11~8.59	8.11~8.59	6	25	40	0.5	70	6	2
MRU777-8.61~9.09	8.61~9.09	8	25	40	0.5	70	6	2
MRU777-9.11~10.09	9.11~10.09	8	25	40	0.5	70	6	2
MRU777-10.11~10.59	10.11~10.59	8	25	40	0.5	70	6	2
MRU777-10.61~11.09	10.61~11.09	10	30	45	0.5	80	6	2
MRU777-11.11~12.09	11.11~12.09	10	30	45	0.5	80	6	2

○ 接單生產 Make to order.

## 鎢鋼鉸刀 建議切削數據表

Recommended Cutting Condition for Carbide Reamers

工件材質 Machining Materials	刃徑 Dia (mm)	Ø2	Ø4	Ø6	Ø8	Ø10	Ø12	Ø14	Ø16	Ø18	Ø20
	單邊預留量 Stock Amount (mm/radius)	0.05~0.10	0.05~0.10	0.1~0.15	0.1~0.15	0.1~0.15	0.12~0.17	0.12~0.17	0.15~0.20	0.15~0.20	0.15~0.25
	線速度 Vc Cutting Speed	進給 Feed (mm/rev)									
<b>P</b> 合金鋼 Alloyed Steels	9~15 m/min	0.05~0.10	0.05~0.10	0.08~0.15	0.10~0.30	0.10~0.30	0.10~0.30	0.10~0.30	0.2~0.4	0.2~0.4	0.3~0.6
<b>M</b> 不鏽鋼 Stainless Steels	5~10 m/min	0.02~0.05	0.05~0.10	0.05~0.10	0.08~0.15	0.10~0.20	0.10~0.30	0.10~0.30	0.15~0.35	0.15~0.35	0.2~0.4
<b>K</b> 鑄鐵 Cast Iron	8~15 m/min	0.05~0.10	0.05~0.10	0.08~0.15	0.10~0.20	0.10~0.30	0.10~0.30	0.10~0.30	0.2~0.4	0.2~0.4	0.3~0.5
<b>N</b> 鋁合金 Aluminum Alloys	15~22 m/min	0.10~0.30	0.10~0.30	0.10~0.30	0.20~0.40	0.20~0.40	0.30~0.50	0.30~0.50	0.30~0.50	0.30~0.50	0.5~0.6
<b>H</b> 高硬度材 Hardened Steels (HRC30~40)	5~12 m/min	0.02~0.05	0.05~0.10	0.08~0.15	0.10~0.20	0.10~0.30	0.10~0.30	0.10~0.30	0.15~0.35	0.1~0.35	0.2~0.4
	高硬度材 Hardened Steels (<HRC50)	5~10 m/min	0.02~0.05	0.05~0.10	0.08~0.15	0.08~0.15	0.10~0.20	0.10~0.25	0.1~0.25	0.1~0.3	0.1~0.35

## 高速鋼鉸刀 建議切削數據表

Recommended Cutting Condition for High Speed Steel Reamers

工件材質 Machining Materials	刃徑 Dia (mm)	Ø2~4	Ø4~20
	單邊預留量 Stock Amount (mm/radius)	0.05~0.10	0.05~0.10
	線速度 Vc Cutting Speed	進給 Feed (mm/rev)	
<b>P</b> 合金鋼 Alloyed Steels	3~6 m/min	0.1~0.2	0.1~0.3
<b>M</b> 不鏽鋼 Stainless Steels	3~4 m/min	0.1~0.2	0.1~0.3
<b>K</b> 鑄鐵 Cast Iron	4~8 m/min	0.1~0.2	0.2~0.4
<b>N</b> 銅 Copper	8~15 m/min	0.1~0.2	0.2~0.3
	鋁合金 Aluminum Alloys	10~20 m/min	0.1~0.2

依據使用機械設備與夾持情況不同，需調整切削參數使用。

The cutting parameters need to be adjusted according to the different mechanical equipment and clamping conditions.

### 鎢鋼鉋刀與高速鋼鉋刀選用條件比較表

Selection Guide: Carbide vs. HSS Reamers

工件材質 Machining Materials	加工後 孔徑尺寸變化 (預估) Hole Diameter Deviation After Machining	鎢鋼鉋刀 Carbide Reamers			高速鋼鉋刀 High Speed Steel Reamers		
		線速度 Vc Speed (m/min)	單邊預留量 Stock Amount (mm/radius)	期望表粗值 Ra(μm)	線速度 Vc Speed (m/min)	單邊預留量 Stock Amount (mm/radius)	期望表粗值 Ra(μm)
P 結構鋼 Structure Steels	放大 Widen	8~20	0.10~0.15	3.2	5~12	0.2~0.3	3.2
	合金鋼 Alloy Steel	放大 Widen	7~15	0.10~0.15	0.8	3~6	0.20~0.30
M 不鏽鋼 Stainless Steels	縮小 Narrow	5~15	0.10~0.15	0.8	3~4	0.20~0.30	0.8
K 鑄鐵 Cast Iron	放大 Widen	7~15	0.10~0.15	0.8	4~8	0.20~0.30	0.8
N 鋁合金 Aluminum Alloys	縮小 Narrow	15~30	0.10~0.15	0.4	10~20	0.20~0.30	0.8
	銅 Copper	放大 Widen	10~25	0.10~0.15	0.8	8~15	0.20~0.30
H 調質鋼 Hardened Steels (<HRC28)	放大 Widen	5~15	0.07~0.12	0.8	-	-	-
	調質鋼 Hardened Steels (<HRC40)	縮小 Narrow	5~10	0.05~0.10	0.8	-	-

加工後孔徑尺寸變化，以材料特性來參考，依據切削條件不同可能產生變化。

The change in hole size after processing is based on material properties and may vary depending on different cutting conditions.

### 鉋孔問題排除

#### Trouble shooting

問題 Problem	原因 Cause	建議措施 Recommended Action
孔徑擴大 Enlargement of hole diameter	機械主軸或刀具夾持偏擺過大 Excessive runout on spindle or tool holder.	檢查鉋刀外周是否偏擺過大。 Check reamer outer runout.
	預留切削量過大 Excessive stock allowance.	減少預留量。 Reduce the stock allowance.
	鉋刀邊緣熔着 Fused margin.	充分提供切削油，確認工件中心與鉋刀中心是否有對齊，並確認切削參數。 Ensure sufficient cutting fluid, align the workpiece and reamer properly, and check the cutting conditions.
孔徑縮小 Undersized Hole Diameter	預留切削量過小 Insufficient stock allowance.	增加預留量。 Increase the allowance.
	切削刃磨損 Worn cutting edge.	確認鉋刀刃徑盡早再研磨，或減少邊緣寬度。 Regrind promptly or reduce margin width.
	工件膨脹係數高，加工後收縮 Thermal contraction of the workpiece after machining.	選擇適合的刃徑，刀具減少圓刃寬度。 Use a reamer with appropriate cutting edge diameter and reduce the land width.
孔之真圓度不良 Poor Roundness of Hole	螺旋角不正確 Incorrect helix angle.	改變鉋刀設計（左螺旋，不等間距）。 Redesign with left-hand helix or variable pitch.
	倒角角度過大 Chamfer angle too large.	減小倒角角度。 Reduce chamfer angle.
	預留切削量過小 Stock allowance too small.	增加預留量。 Increase the allowance.
成品表面粗糙度不良 Poor Surface Finish	切入倒角部位及刀緣面熔着 Welding on chamfer or margin.	供給足量的切削油。 Supply sufficient cutting oil.
	預留切削量是否異常 Abnormal stock allowance.	預留量過多或過少均會影響表面粗糙度不良。 Both excessive or insufficient allowance can cause poor surface finish.
	切屑堵塞 Chip clogging.	改變鉋刀刃溝深度及排屑槽設計。 Redesign flute depth and chip pocket.
	切削油量不足 Insufficient cutting oil.	供給足量的切削油。 Ensure adequate lubrication.
	刀刃形狀不合適 Improper edge geometry.	檢查前角和後錐度。 Check rake and relief angles.
刀具週邊異常磨損 Abnormal Peripheral Wear	切入倒角太小 Chamfer at hole entry is too small.	增加倒角。 Increase the chamfer size.
	切削速度太快 Cutting speed too high.	降低切削速度。 Reduce speed.
	冷卻不足 Inadequate cooling.	改變切削油噴嘴位置，增加流量或選用適當的切削油。 Adjust coolant nozzle position, increase flow, or use proper coolant.
	工件材質太硬 Workpiece too hard.	重新選擇鉋刀材質。 Use a different reamer material.
刀緣部位熔著 Built-up Edge or Fusion on Cutting Edge	切削速度太快 Cutting speed too high.	降低切削速度。 Reduce cutting speed.
	進給速度過快 Feed speed too high.	降低進給速度。 Reduce feed rate.

### 鉋孔問題排除

#### Trouble shooting

問題 Problem	原因 Cause	建議措施 Recommended Action
刀緣部位熔著 Built-up Edge or Fusion on Cutting Edge	刀刃磨損·發熱 Edge wear and heating.	盡快重新研磨或更換鉋刀材質。 Promptly regrind or change reamer material.
	切削油量不足 Insufficient cutting oil.	供給足量的切削油。 Supply adequate coolant.
鉋刀斷裂、燒焦 Reamer Breakage or Burning	預留切削量過大 Excessive stock.	減少預留量。 Reduce the stock allowance.
	切屑堵塞 Chip clogging.	改變鉋刀刃溝深度及排屑槽設計。 Redesign flute and chip clearance.
	切削油量不足 Insufficient cutting oil.	供給足量的切削油。 Ensure adequate cutting oil supply.
	轉速、進給過快 Excessive spindle speed or feed rate.	降低轉速、進給速度。 Reduce cutting speed and feed rate.
	刀刃磨損 Edge wear.	盡快重新研磨 Regrind promptly.
	刀緣寬度過大 Margin too wide.	減少刀緣寬度 Narrow margin width.
	下孔徑是否歪斜或中心是否有對齊 Hole misalignment or center offset.	排除鑽孔歪斜問題·或改用右螺旋鉋刀。 Correct drilling alignment or use right-hand spiral reamer.
壽命短 Short Tool Life	切削速度太快 Excessive cutting speed.	降低切削速度。 Reduce cutting speed.
	切削油量不足 Inadequate coolant.	供給足量的切削油或選用適當的切削油。 Increase supply or choose proper fluid.
	其他因素 Other causes.	重新選擇鉋刀材質。 Select a more suitable reamer material.
		直刃改為螺旋刃。 Change from straight flute to spiral flute.
	各種因素檢視·如夾治具、刀柄選用、主軸偏擺·預留量...等。 Inspect possible factors: fixturing, holder selection, runout, stock allowance, etc.	




  
**CHAIN  
HEADWAY**  
正河源股份有限公司

 電話 TEL /  
+886-4-26265252

 傳真 FAX /  
+886-4-26267941

 地址 Address /  
台灣台中市清水區五權路232號  
No. 232, Wuquan Rd., Qingshui Dist., Taichung City 436, Taiwan

 網址 Website /  
[www.chain-headway.com](http://www.chain-headway.com)



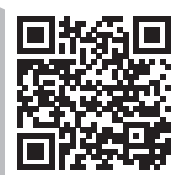
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