



WRH

Indexable Ball-Nose End Mill for Efficient Machining
高效捨棄式球刀片

Multi-Purpose, Stable Machining of High Hardness Steel, Stainless Steel, and General Purpose by ONE Tool.

實現了單一刀具可穩定加工於高硬度、不銹鋼、和一般鋼材的通用性。

- Class H high accuracy H 級高精度
- New ultra-toughened carbide UF1025 新超強韌鎢鋼母材
- Nano composite, super high hardness SH coating 奈米級 SH 超硬塗層
- S-Shaped design lower cutting resistance S 球頭低切削阻力設計
- Wide range, Screw-in holder is available 規格齊全，鎖牙式刀架可選購



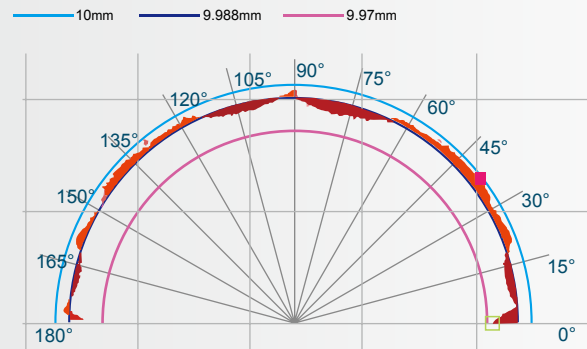
WRH - Indexable Ball-nose Insert

高效捨棄式球刀片

Features 特色

High accuracy indexable Insert 高精度捨棄式銑刀片

Tolerance grade H. Accurate radius tolerance
研磨公差 H 級



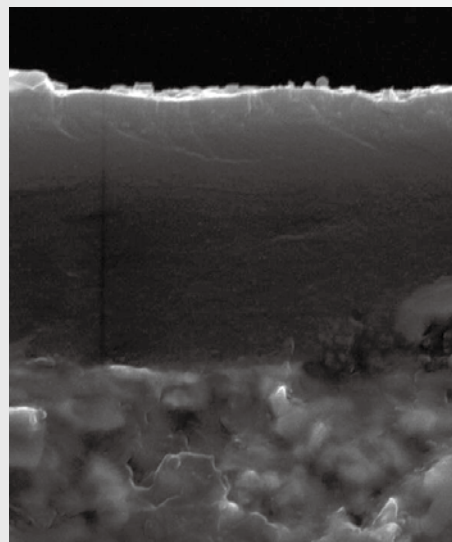
S-Shaped design for lowering cutting resistance S 球頭低切削阻力設計

Improve chip removal performance, reduce edge wear,
extend tool life and enhance the quality of processing.
提高排屑效能，減小刃口磨損，大幅提高刀具壽命及加工品質



New ultra toughened micro-grain solid carbide UF1025 Super high hardness nano composite SH coating 新型超強韌的微晶硬質合金 UF1025，奈米級超高硬度 SH 塗層

- Achieve stable machining of high hardness steel, stainless steel, and general purpose by ONE tool.
- Super high hardness and superior adhesion; also be good at high feed machining of hard materials application.
- 實現了單一刀具可穩定加工於高硬度、不銹鋼、和一般鋼材的通用性。
- 超高塗層硬度、超強附著力，適用於高硬度材質與高進給加工。



Super high hardness nano composite SH coating

New ultra toughened micro-grain solid carbide UF1025



WRH - Indexable Ball-nose Insert

高效捨棄式球刀片

Cutting Performance 切削效能

WRHS0162-Hardened steel milling 預硬鋼切削 SKD61-HRC55°

Excellent wear resistance when machining high hardness materials, and the tool life is prolonged by **20%** than the conventional.

於高硬度材料加工，展現優異的耐磨性，壽命超出一般刀具達到 **20%**。



Wear after milling 30m

Wear after milling 150m

Wear after milling 420m

Conventional 他社同級產品

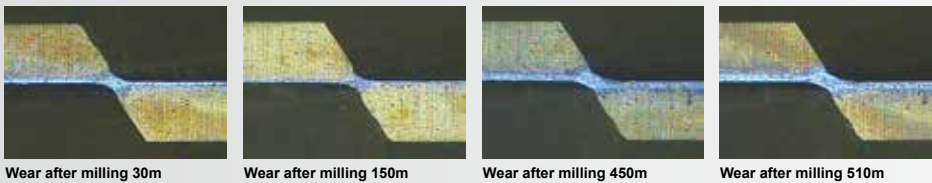
Chipping 破損

420mm

ST WRHS016

510mm

Continuous Machining Feasible 可持續加工



Wear after milling 30m

Wear after milling 150m

Wear after milling 450m

Wear after milling 510m

Cutting Conditions 切削條件

Work Material 工件 : Pre-Hardened SKD61 (HRC55)	fz 每刃進給 : 0.2 mm/rev
Tool Holder 刀架 : WGR16-S16-150	Feed 進給速度 : 1200mm/min
Insert 刀片 : WRHS016	Ap : 0.15 mm
Vc 切削速度 : 151mm/min	Ae : 0.5 mm

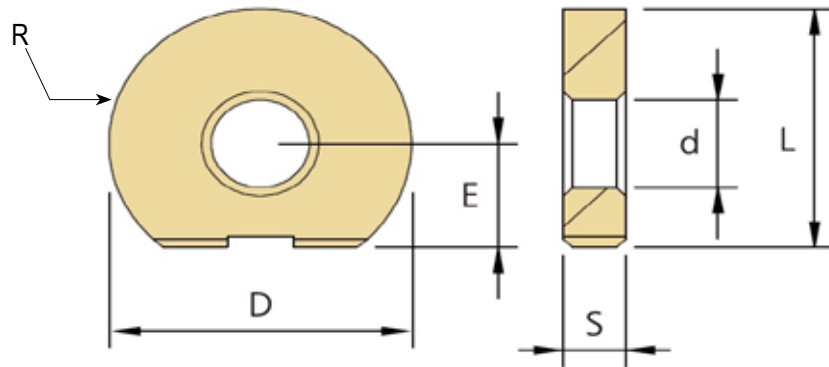


WRH - Indexable Ball-nose Insert 高效捨棄式球刀片

WRH INSERTS 刀片

H級
精度 ±0.013
研磨級

H CLASS
TOLERANCE: ±0.013



Shape 外觀	Order No. 品號	Item code 規格碼	Dimensions(mm)規格						Holder 刀架	Shank Type 直柄式 Page	Screw in Type 鎖牙式 Page
			D	R	S	d	L	E			
	JFWR2002-1	WRHS010-3225	10	5R	2.5	4	11.5	5	WGR10	4	5
	JFWR2003-1	WRHS012-3225	12	6R	2.5	5	12	6	WGR12		
	JFWR2004-1	WRHS016-3225	16	8R	3	5	14	6	WGR16		
	JFWR2005-1	WRHS020-3225	20	10R	3	5	16	6	WGR20		
	JFWR2006-1	WRHS025-3225	25	12.5R	4	6	21.5	9	WGR25		

Application 適用材質：

◎ Recommend 最適合 ○ Suitable 適合 X Not Recommend 不建議

carbon steel, Alloy steel 炭素鋼,合金鋼	Pre-harden steel 預硬鋼	High-hardened 高硬度鋼				Stainless steel 不銹鋼	Copper alloy 銅合金,銅	Aluminun alloy 鋁合金
	~45HRC	~50HRC	~55HRC	~60HRC	~65HRC			
◎	◎	◎	◎	○		◎		



WRH - Ball Nose End Mill, Radius Precision Cutters

高精度捨棄式球刀、圓鼻刀桿

WGR SHANK TYPE 直柄式

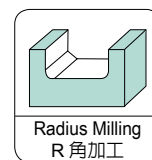
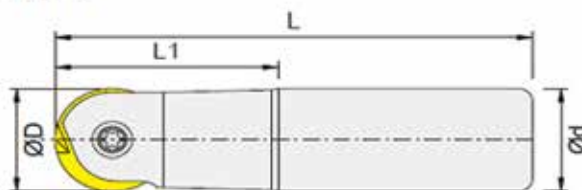


FIG-1



Item code 品名	Dimensions(mm) 規格				Teeth 刃數	Insert 刀片	Page 頁碼
	D	d	L	L1			
WGR10-S10-100	10	10	100	25	1	WRH010	3
WGR10-S12-150		12	150	36			
WGR12-S12-150	12	12	150	32	1	WRH012	
WGR12-S16-200		16	200	58			
WGR16-S16-150	16	16	150	36	1	WRH016	
WGR16-S16-200			200				
WGR20-S20-150	20	20	150	45	1	WRH020	
WGR20-S20-200			200				
WGR20-S25-200		25	200	76			
WGR20-S25-250			250				
WGR25-S25-200	25	25	200	45	1	WRH025	
WGR25-S25-250			250				
WGR25-S32-200		32	200	98			
WGR25-S32-300			300				



WRH - WGR Ball Nose Milling Cutter, Radius Precision Cutters
 高精度捨棄式球刀、圓鼻刀桿

WGR-MD SCREW-IN TYPE 鎖牙式

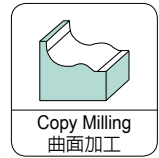
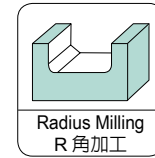
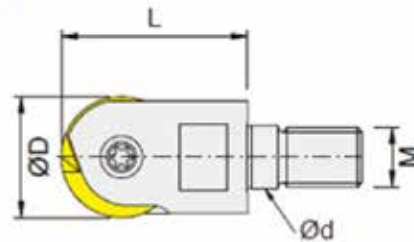


FIG-2

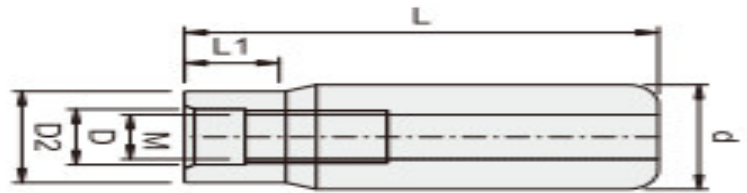


Item code 品名	Dimensions(mm) 規格				Teeth 刃數	Insert 刀片	Page 頁碼
	D	d	L	L1			
WGR12-MD11	12	8.5	22	M6	1	WRH012	3
WGR12-MD14		8.5	30	M8	1		
WGR16-MD14	16	8.5	28	M8	1	WRH016	
WGR20-MD18	20	10.5	30	M10	1	WRH020	
WGR25-MD23	25	12.5	40	M12	1	WRH025	

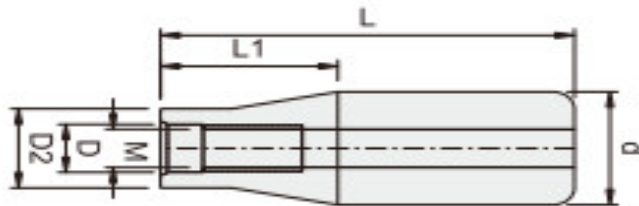


WRH - Indexable Extension Shank 替換式延長桿

MD SHANK FOR SCREW-IN HEAD 鎖牙式刀桿



Item code 品名	Dimensions(mm) 規格						Screw-In Holder 鎖牙式刀架 Page
	d	L	M	D	D2	L1	
MD11-A12-120K	12	120	M6	6.5	11	10	5
MD14-A16-150K	16	150	M8	8.5	14	10	
MD14-A16-200K		200					
MD18-A20-150K	20	150	M10	10.5	18	12	
MD18-A20-250K		250					
MD23-A25-200K	25	200	M12	12.5	23	15	
MD23-A25-300K		300					



Item code 品名	Dimensions(mm) 規格						Screw-In Holder 鎖牙式刀架 Page
	d	L	M	D	D2	L1	
MD11-A16-150K	16	150	M6	6.5	11	32	5
MD11-A16-200K		200					
MD14-A20-200K	20	200	M8	8.5	14	50	
MD14-A20-250K		250					
MD18-A25-200K	25	200	M10	10.5	18	60	
MD18-A25-250K		250					



WRH - Cutting CONDITION

切削條件表

	Hardness 硬度	Cutting Speed 切削速度 (m/min)	Feed per Tooth 進給 fz(mm /tooth)						
			Diameter 直徑 ØD (mm)						
			10	12	16	20	25	30	32
Carbon Steel 碳素鋼	HB 180~280	160~280	0.3~0.4	0.3~0.5	0.3~0.6	0.35~0.7	0.4~0.8	0.5~0.8	0.5~0.8
Alloy Steel 低合金鋼	HB 180~280	200~320	0.3~0.4	0.3~0.5	0.3~0.6	0.35~0.7	0.4~0.8	0.5~0.8	0.5~0.8
Pre-Hardened Steel 預硬鋼	HB 280~400	180~300	0.2~0.4	0.3~0.5	0.3~0.6	0.35~0.7	0.4~0.8	0.5~0.8	0.5~0.8
Die Steel 模具鋼	HB 180~250	160~250	0.2~0.4	0.3~0.5	0.3~0.6	0.35~0.7	0.4~0.8	0.5~0.8	0.5~0.8
Hardened steel 淬火鋼	HRC 40~55	140~220	0.15~0.35	0.2~0.4	0.2~0.5	0.25~0.6	0.25~0.6	0.3~0.8	0.3~0.8
	HRC 56~63	120~180	0.15~0.3	0.2~0.4	0.2~0.5	0.35~0.7	0.25~0.5	0.3~0.6	0.3~0.6
Stainless Steel 不銹鋼	HB 150~250	100~220	0.3~0.4	0.2~0.4	0.25~0.5	0.35~0.7	0.4~0.8	0.5~0.8	0.5~0.8
Gray Cast Iron 灰口鑄鐵	HB 160~260	300~400	0.3~0.5	0.4~0.6	0.5~0.7	0.5~0.8	0.6~0.8	0.8~1.	0.8~1.
Ductile Cast Iron 球墨鑄鐵	HB 170~300	240~300	0.3~0.4	0.3~0.4	0.3~0.6	0.5~0.8	0.5~0.8	0.6~0.8	0.6~0.8
Copper Alloy 銅合金	HB 80~150	220~320	0.3~0.5	0.4~0.5	0.4~0.6	0.35~0.7	0.4~0.8	0.5~0.8	0.5~0.8
Aluminum Alloy 鋁合金	HB 30~100	300~400	0.3~0.5	0.4~0.6	0.4~0.7	0.35~0.7	0.4~0.8	0.5~1.	0.5~1.
Graphite 石墨	-	400~550	0.3~0.5	0.4~0.6	0.4~0.8	0.35~0.7	0.4~0.8	0.5~1.	0.5~1.

Cutting Condition Method 球刀片計算圖

轉速

Rotation speed

$$N = \frac{V \times 1000}{\pi \times D_e} \text{ (min)}^{-1}$$

$$D_e = 2 \times \sqrt{A_p \times (D - A_p)} \text{ (mm)}$$

進給

Feed rate

$$F = N \times f_z \text{ (mm/min)}$$

$$f_z = h_{\max} \times \frac{D}{\sqrt{A_p \times (D - A_p)}} \text{ (mm/rev)}$$

N = 轉速 (min)⁻¹
Rotation speed

V = 切削速度 (mm/min)
Cutting speed

D_e = 有效刀具直徑 (mm)
Cutting length of diameter

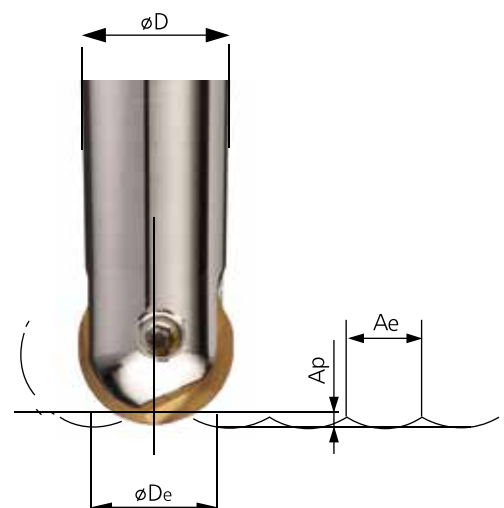
A_p = 軸向切深 (mm)
Depth of cut (ap)

A_e = 步距/徑向切深 (mm)
Depth of cut (ae)

F = 進給速度 (mm/min)
Feed rate

f_z = 每轉進給 (mm/rev)
Feed rate of rotation speed

h_{max} = 有效刀具直徑 (mm/min)
Cutting length of diameter





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