WINSTAR Metal Cutting Tools

萬事達切削刀具總覽

Solid Carbide Endmills

Indexable Milling Tools

Turning Tools

Holemaking Tools

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In Taiwan, WINSTAR Cutting Technologies Corp. is the most professional carbide tools manufacturer.
We command entire manufacturing processes, include Sintering, Grinding and Coating technologies. We export high quality cutting tools with sales network for more than 30 countries.
Our strength lies on our technical innovation and provides suitable production in connecting with different domains, such as Aerospace, Medical, Automotive, Mechanical, Mold & Die and Electronic Industries.

萬事達切削科技為台灣最專業鎢鋼刀具供應製造商。我們掌握全製造流程，同時包含燒結、研磨及塗層技術。我們使用最精密加工設備、品質穩定、產品行銷全球多達 30 國以上。
隨著科技與時代的進步，我們持續研發高品質、高效率及更穩定的新產品。
並可根據客戶的特殊需求，訂做各種航天、醫療、汽車、機械、模具、電子加工業用等非標刀具。

Product Selection Chart

How to choose our products 如何選擇我們的產品

Selection of Solid Endmills 全鎢銑刀的選擇

ISO Material Codes	P1 ↔ P6 Soft 軟 Hard 硬	M1 ↔ M3 Soft 軟 Hard 硬	K1 ↔ K3 Soft 軟 Hard 硬	N1 ↔ N6 Soft 軟 Hard 硬	S1 ↔ S4 Soft 軟 Hard 硬	H1 ↔ H4 Soft 軟 Hard 硬
High Performance Line 高效能型	H600 G560 M460 V470	V530 M500 V470	H600 G560 M460 V470	A200 A100	V530	H700 H680 H650
Economical Line 經濟型	G550 G450	G550 M460	G550 G450		M500	H600

Selection of Milling Insert Grades 銑削刀片材質的選擇

ISO Material Codes	P1 ↔ P6 Soft 軟 Hard 硬	M1 ↔ M3 Soft 軟 Hard 硬	K1 ↔ K3 Soft 軟 Hard 硬	N1 ↔ N6 Soft 軟 Hard 硬	S1 ↔ S4 Soft 軟 Hard 硬	H1 ↔ H4 Soft 軟 Hard 硬
High Performance Line 高效能型	CX22HS CX32HS CX42HS	CX22HS CX32HS CX33PS	CX22HS CX32HS		CX22HS CX32HS	CX22HS
Economical Line 經濟型	CX21NS CX31NA CX41NA	CX21NS CX31NA	CX21NS CX31NA			CX21NS

Selection of Solid Drills 全鎢鑽頭的選擇

ISO Material Codes	P1 ↔ P6 Soft 軟 Hard 硬	M1 ↔ M3 Soft 軟 Hard 硬	K1 ↔ K3 Soft 軟 Hard 硬	N1 ↔ N6 Soft 軟 Hard 硬	S1 ↔ S4 Soft 軟 Hard 硬	H1 ↔ H4 Soft 軟 Hard 硬
High Performance Line 高效能型	DM DP	DM	DM DP	DM (Uncoated)	DM	DH
Economical Line 經濟型	DG	DG	DG			

Selection of Turning Insert Grades 車削刀片材質的選擇

ISO Material Codes	P1 ↔ P6 Soft 軟 Hard 硬	M1 ↔ M3 Soft 軟 Hard 硬	K1 ↔ K3 Soft 軟 Hard 硬	N1 ↔ N6 Soft 軟 Hard 硬	S1 ↔ S4 Soft 軟 Hard 硬	H1 ↔ H4 Soft 軟 Hard 硬
High Performance Line 高效能型	CX2575 CX2560 CX3575 CX3560	CX2545 CX2560	CX2575 CX2560		CX2545	
Economical Line 經濟型	CX1555 CX2555 CX3555	CX1555 CX2555 CX3555	CX1555 CX2555			CX1555

Solid Carbide Endmills

for High Hardened steel 適用於高硬鋼

H700 for High Hardened steel 用於高硬鋼

- High feed milling, HRC 50~70.
  高進給側銑及面銑加工
- Low helix for face milling, multiple flutes for side milling.
  低螺旋適合面銑， 多刃適合側銑
- SICO, NACO coating.
  含矽塗層技術

H680 for High Hardened steel 用於高硬鋼

- High speed and high precision milling, HRC 50~68.
  高速和高精度加工
- Radius tolerance ±5μm.
  R 公差 ±5μm
- SICO-TH coating.
  含矽塗層技術

H650 for High Hardened steel 用於高硬鋼

- High speed milling, HRC 40~65.
  高速高硬泛用加工
- High rigidity and wear resistance design.
  高剛性和耐磨設計
- SICO, TOP ARCO coating.
  含矽或含鉻塗層技術

Winmaster Exchangeable Head Endmills 可替換式銑刀頭

- Carbide Exchangeable Head Endmill and Carbide Adapter.
  全鎢材質可替換式銑刀頭與全鎢材質抗震刀桿
- A single adapter to accommodate a wide variety of exchangeable head endmills.
  單一抗震刀桿，可組合各種不同的可替換式銑刀頭
- ISO M screw threads suitable for most adapter.
  ISO M 型螺牙，適用於大部份的抗震刀桿

Solid Carbide Endmills

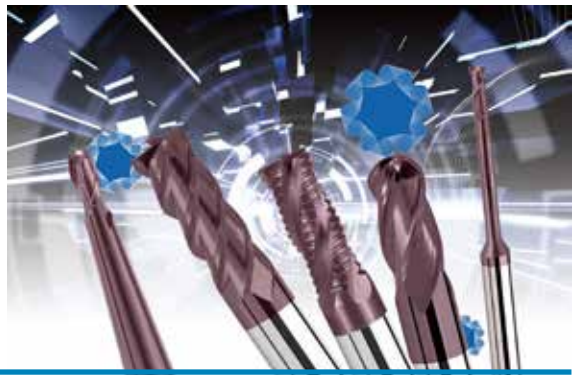
for Pre-Hardened steel 適用於預硬鋼

H600 for Pre-Hardened steel 用於預硬鋼

- General milling in hardened steel, HRC 40~58.
  適合高硬鋼料 (HRC 40~58) 泛用加工
- High speed milling in alloy steel, HRC 30~40.
  適合一般鋼料 (HRC 30~40) 高速加工
- SICO coating.
  含矽塗層技術

G550 / G560 for Pre-Hardened steel 用於預硬鋼

- G550 for general milling, HRC 30~55.
  G550 適合一般加工 (HRC 30~55)
- G560 for high speed milling, HRC 35~55.
  G560 適合高速加工 (HRC 35~55)
- UNICO coating.
  高鋁鈦塗層技術



G450 / M460 for Steel and Alloy steel 用於鋼料及合金鋼

- G450 for general milling, HRC < 45.
  G450 適合一般加工 (HRC < 45)
- M460 for high speed milling, HRC < 48.
  M460 適合高速加工 (HRC < 48)
- UNICO coating.
  高鋁鈦塗層技術

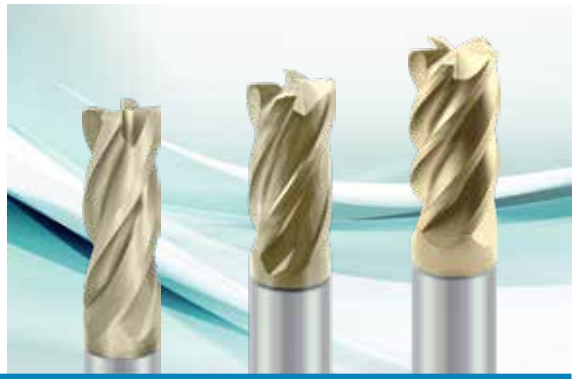
Solid Carbide Endmills

for Superalloy & Stainless steel

適用於高溫合金及不鏽鋼

V530 for Superalloy and Stainless steel 用於高溫合金及不鏽鋼

- High efficiency and anti-vibration milling.
  高效益及抗震加工
- Unequal flute spacing and variable helix.
  變導抗震不等型設計
- SICO-TH coating.
  含矽厚塗層技術

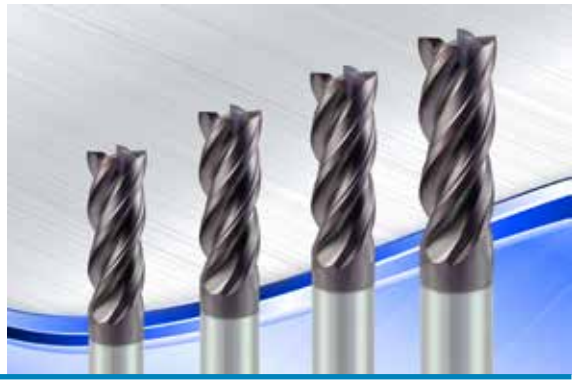


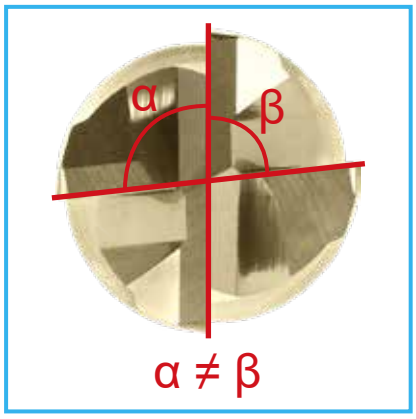
M500 for Stainless and Pre-Hardened 用於不鏽鋼及預硬鋼

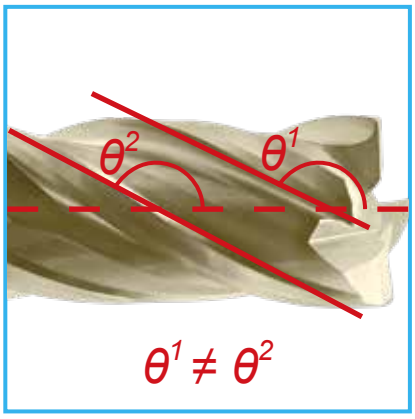
- General milling for stainless and pre-hardened, HRC < 50.
  適合不鏽鋼及預硬鋼 (HRC < 50) 泛用加工
- Finishing milling for hardened steel, HRC < 58.
  適合高硬鋼 (HRC < 58) 精加工
- ARCO coating.
  含鉻塗層技術

V470 for Steel and Stainless 用於鋼料及不鏽鋼

- High efficiency and anti-vibration milling.
  高效益及抗震加工
- Unequal flute spacing.
  抗震不等型設計
- UNICO coating.
  高鋁鈦塗層技術





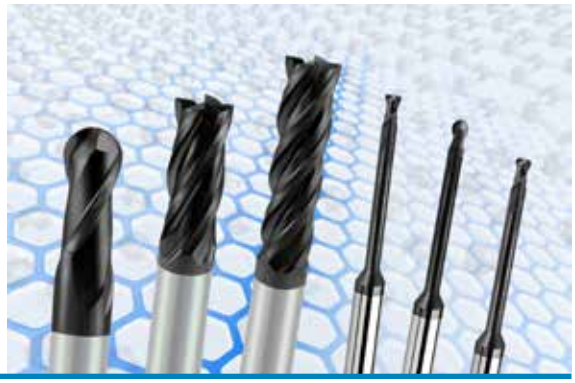


Solid Carbide Endmills

Solid Carbide Endmills for Aluminum, Graphite & Special application 適用於鋁、石墨及特殊應用

A200 for Graphite 用於石墨

- General milling.
  一般加工
- Special edge treatment.
  刀口特殊處理
- DIA diamond coating and DLC coating available.
  鑽石塗層技術



A100 for Aluminum 用於鋁

- High speed milling.
  高速加工
- Excellent chip evacuation design.
  深溝槽易排屑設計
- CDLC coating available.
  提供 CDLC 塗層可供選擇

ET for Thread milling 用於銑牙加工

- Designed to cut threads by milling.
  銑牙刀主要用途是在銑床加工牙紋
- A single tool is suitable for cutting in various sizes of ØD.
  單一銑牙刀可加工不同的外徑尺寸牙紋
- Large thread can be machined with low power machine.
  小馬力機台可加工大外徑的牙紋

Hypex for 5-Axis Machining 5 軸加工專用銑刀

- Provide larger axial depth of cut, improve cutting efficiency.
  提供更大的軸向切削深度，提高加工效率
- Optimum surface finish and tool life.
  更佳的表面光潔度和刀具壽命
- Suitable for mold & die, aerospace and impellers machining.
  適用於模具、航太和葉輪五軸加工

CXBN High Feed Face Milling 高進給平面銑削系列

- High feed inserts allow lower cutting force.
  高進給低切削阻力的刀片確保產能最大化
- Double sided insert, 4 cutting edges.
  雙面刀片 , 4 個切削角
- Use BNMX0603 or BNMX0904 insert.
  使用 BNMX0603 或 BNMX0904 雙面刀片
- Endmill, modular and face milling cutters available.
  端銑刀桿，鎖牙式銑刀頭與面銑刀盤可供選擇

CXLN High Feed Face Milling 高進給平面銑削系列

- For small milling machines.
  適合較低功率的小型機台使用
- Double sided insert, 4 cutting edges.
  雙面刀片 , 4 個切削角
- Use LNMX0303 insert.
  使用 LNMX0303 雙面刀片
- Endmill, modular and face milling cutters available.
  端銑刀桿，鎖牙式銑刀頭與面銑刀盤可供選擇

CXSN 45° Face Milling 平面銑削系列

- 2 types of double sided inserts fit in same pocket.
  兩種雙面刀片，可共用於相同刀盤
- Double sided, 8 or 16 cutting edges.
  雙面刀片 , 8 或 16 個切削角
- Use SNMX1205 or ONMX0505 insert.
  使用 SNMX1205 或 ONMX0505 雙面刀片
- Face milling cutters available.
  面銑刀盤可供選擇

CXWN High Feed Face Milling 高進給平面銑削系列

- High rigidity cutting edge design.
  雙面高剛性的切削角設計
- Double sided insert, 6 cutting edges.
  雙面刀片 , 6 個切削角
- Use WNMX09T3 or WNMX1305 insert.
  使用 WNMX09T3 或 WNMX1305 雙面刀片
- Endmil and face milling cutters available.
  端銑刀桿與面銑刀盤可供選擇

CXXN 90° Shoulder Milling 90° 方肩銑削系列

- For small and large sized milling machines.
  適用於大中小型機台
- Double sided insert, 6 cutting edges.
  雙面刀片 , 6 個切削角
- Use XNMX0403 or XNMX0806 insert.
  使用 XNMX0403 或 XNMX0806 雙面刀片
- Endmill, modular and face milling cutters available.
  端銑刀桿， 鎖牙式銑刀頭或面銑刀盤可供選擇

2019 New Milling Grade CX32HS

2019 全新材質 CX32HS 適用於銑削

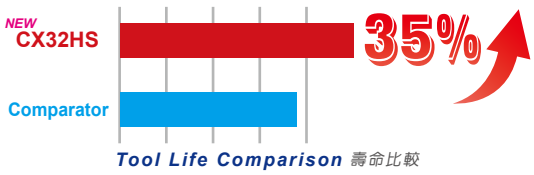
- Improve cutting edge treatment.
  - *Strengthen wear resistance capabilities.*
  - *Improve surface finishing.*
  - *Less cutting force.*
  - *Less heat transfer occurs.*
- Improve coating adherence.
  - *Improve anti-adhesive properties.*
  - *Improve heat resistance capabilities.*
  - *Wider applications for P, M, K, S, H.*
  - *Longer tool life.*

- 改進切削刀口處理
  - *加強耐磨性能*
  - *提高表面光潔度*
  - *降低切削阻力*
  - *降低熱傳導力*
- 改進塗層效能
  - *提高刀片抗沾黏特性*
  - *提高刀片耐熱特性*
  - *更廣泛的加工應用，適合 P, M, K, S, H 材質*
  - *更長的刀具壽命*

- Comparison Sample 比較範例

Insert : APMT1135PDER-RG
Cutter : 16mm / 2t
Material : S45C heat treated to HRC 50
Workpiece size : 300*200mm
Coolant:Dry

VC : 61 m/min
S : 1225 rpm
vf : 320 mm/min
fz : 0.13 mm/tooth
ap : 0.8 mm
ae : 15 mm



CAPK 90° Shoulder Milling 90° 方肩銑削系列

- Enhancement chip breaker design.
  強壯的刀口設計提供更好的刀具壽命
- 2 cutting edges, cutter range 16~100 mm.
  2 個切削角，刀具尺寸 16~100mm
- Use APKT1003 or APKT1604 insert.
  使用 APKT1003 或 APKT1604 刀片
- Endmill, modular and face milling cutters available.
  端銑刀桿，鎖牙式銑刀頭與面銑刀盤可供選擇

CART 90° Shoulder Milling 90° 方肩銑削系列

- For small sized milling machines.
  低主軸負荷，特別適用於小型機台
- 2 cutting edges.
  2 個切削角
- Mini shoulder milling use WRT0702 insert, cutter range 10~16mm.
  小徑方肩銑削使用 WRT0702 刀片，刀具尺寸 10~16mm
- General shoulder milling use WRT1003 insert, cutter range 17~21mm.
  一般方肩銑削使用 WRT1003 刀片，刀具尺寸 17~21mm

CATP 90° Shoulder Milling 90° 方肩銑削系列

- Innovative & economical shoulder milling.
  三個加工角設計帶來更大的經濟效益
- 3 cutting edges, cutter range 20~63 mm.
  3 個切削角，刀具尺寸 20~63mm
- Use TPMX1004 insert.
  使用 TPMX1004 刀片
- Endmill and face milling cutters available.
  端銑刀桿與面銑刀盤可供選擇

CAXO 90° Mini Shoulder Milling 90° 小徑多刃方肩銑削系列

- For small sized milling machines.
  低主軸負荷，特別適用於小型機台
- 2 cutting edges, cutter range 10~20 mm.
  2 個切削角，刀具尺寸 10~20mm
- Use XOMT0602 insert.
  使用 XOMT0602 刀片
- Endmill and modular cutters available.
  端銑刀桿與鎖牙式銑刀頭可供選擇

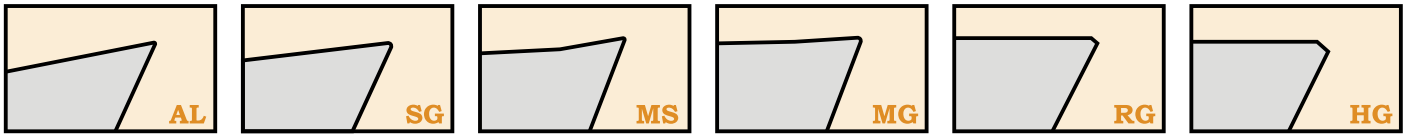
CR39 90° Shoulder Milling 90° 方肩銑削系列

- For productive milling at high speed machining.
  專為高速加工時的高效率銑削而設計
- 2 cutting edges, cutter range 16 ~ 80 mm.
  2 個切削角，刀具尺寸 16~80mm
- Use W39011T3 insert.
  使用 W39011T3 刀片
- Endmill, modular and face milling cutters available.
  端銑刀桿，鎖牙式銑刀頭與面銑刀盤可供選擇

CWEX 90° Shoulder Milling 90° 方肩銑削系列

- High efficiency and high removal rates.
  高效率和高移除率的方肩銑削
- 2 cutting edges, cutter range 16~100 mm.
  2 個切削角，刀具尺寸 16~100mm.
- Use AXMT1235 or AXMT1705 insert.
  使用 AXMT1235 或 AXMT1705 刀片
- Endmill, modular and face milling cutters available.
  端銑刀桿，鎖牙式銑刀頭與面銑刀盤可供選擇

Milling Insert Chip Breakers 銑刀片斷屑槽介紹



for Aluminum 適用於鋁	Finishing 精加工	Semi-Finishing 半精加工	Medium 中加工	Roughing 粗加工	Heavy-Roughing 重粗加工

DPC & DPN for Steel 用於鋼料

- DPC Internal coolant.
  DPC 內冷鑽
- DPN External coolant.
  DPN 外冷鑽
- Better rigidity body suitable for high feed applications.
  高剛性設計， 適用於鋼料的高進給加工
- 3 ~ 20D drills, 140° tip angle, UNIX coating.
  3~20 倍徑鑽孔深度， 140°鑽尖， 高鋁鈦塗層技術

DMC & DMN for Superalloy & Stainless steel 用於高溫合金、不鏽鋼

- DMC Internal coolant.
  DMC 內冷不鏽鋼鑽
- DMN External coolant.
  DMC 外冷不鏽鋼鑽
- Low cutting force and excellent chips controlling.
  低切削阻力與優異的切屑控制， 適用於難切材加工
- 3D, 5D drills, 140° tip angle, SINIX Coating.
  3、5 倍徑鑽孔深度， 140°鑽尖， 含矽塗層技

DHN for Superalloy Hardened steel 用於高溫合金、高硬度鋼

- External coolant.
  外冷高硬鑽
- Low helix and high rigidity design.
  低螺旋與高剛性設計， 適用於高溫合金與高硬度鋼加工
- 3D drills, 140° Tip angle, HRC 45~60.
  3 倍徑鑽孔深度， 140°鑽尖
- SINIX Coating.
  含矽塗層技術

DSP *Use SPMG insert* 捨棄式鑽頭 , SPMG 刀片

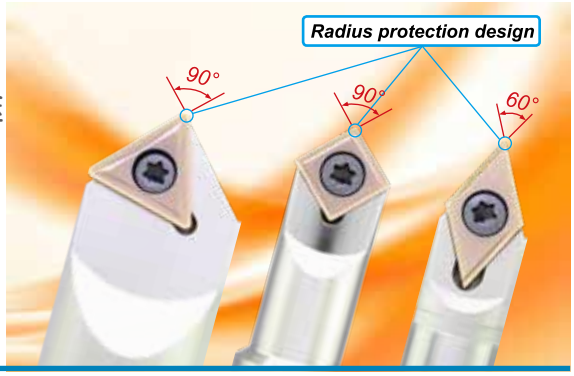
- Internal coolant.
  內冷捨棄式鑽
- 2D, 3D, 4D, 5D indexable drills.
  2、3、4、5 倍徑鑽孔深度
- Diameter 12.5 ~ 50mm.
  適用 12.5 ~ 50mm 孔徑加工
- 4 cutting edges economic insert.
  使用 4 個切削角刀片， 更加經濟

DWC *Use WCMT insert* 捨棄式鑽頭 , WCMT 刀片

- Internal coolant.
  內冷捨棄式鑽
- 2D, 3D, 4D, 5D indexable drills.
  2、3、4、5 倍徑鑽孔深度
- Diameter 14 ~ 60mm.
  適用 14 ~ 60mm 孔徑加工
- 3 cutting edges economic insert.
  使用 3 個切削角刀片， 更加經濟

DTS *for Spotting* 捨棄式定位鑽

- Multi-function : spotting, 45° chamfering, countersinking, grooving, and engraving.
  可用於定位、倒角、錐孔、V 形槽、刻字等多種加工用途
- Prevents tip cracking design.
  防止刀尖裂口設計
- Use DCEX11T3, SCMX09T3, TCMX16T3 insert.
  使用 DCEX11T3、SCMX09T3、TCMX16T3 刀片



G Class Inserts for Aluminum 適合鋁加工的研磨級車刀片

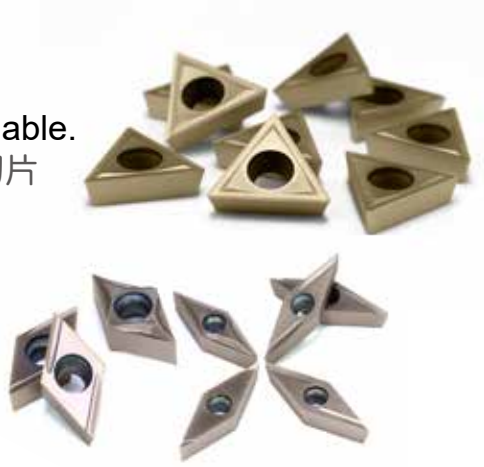
- Suitable for accurate cutting of small size workpiece.
  適用於小尺寸工件高精度加工
- Wear resistant substrate improve insert life.
  高耐磨性基材提高刀片壽命
- Sharp geometry design is suitable for Finishing.
  鋒利的幾何設計適合精加工

Negative Turning Inserts 負角車刀片

- 50+ types to choose from.
  超過 50 種刀片種類可供選擇
- Thick coating layer structure for various applications.
  針對多樣化加工提供厚塗層對應
- Longitudinal, profile and face turning machining.
  適合端面，輪廓及外徑加工應用
- Usable range cover from medium to roughing.
  加工範圍包含蓋中加工至粗加工

Positive Turning Inserts 正角車刀片

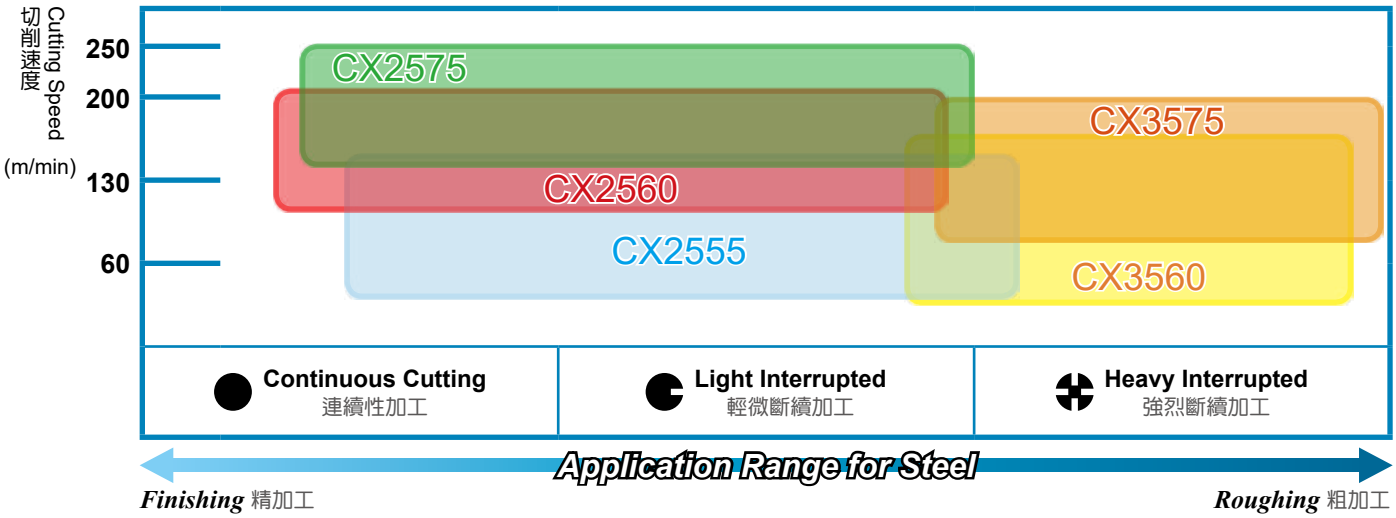
- 25+ types to choose from, E, G or M tolerance insert available.
  超過 25 種刀片種類可供選擇，可提供 E, G 或 M 級公差車刀片
- Thick or normal coating layer structure for different applications.
  針對不同加工應用面提供不同塗層對應
- Internal turning, profiling and boring machining.
  適合內孔，輪廓及鏜孔加工應用
- Usable range cover from semi-finishing to roughing.
  加工範圍包含半精加工至粗加工



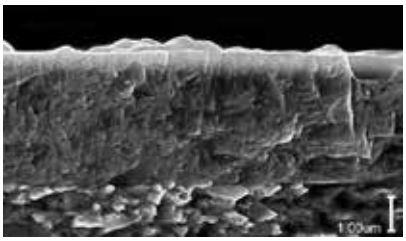
Solid Carbide Mini Boring Tools 全鎢鋼迷你搪孔刀

- Suitable for boring, internal grooving, face grooving and threading machining of small holes.
  適用於小孔徑之內部搪孔、開槽、端面開槽及螺紋加工
- Mini boring tools lineup for a wide application range.
  迷你搪孔刀系列適用於廣泛的應用

Turning Insert Grades for General Purpose 泛用車刀片材質



Turning Insert Grades for Stainless steel 不鏽鋼車刀片材質

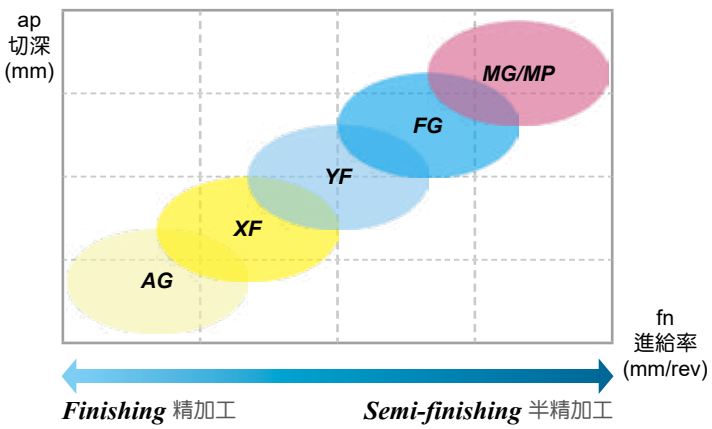


CX2545 grades with anti-sticky coating, it virtually eliminates the occurrence of built-up edge while retaining a secure cutting edge. Excellent anti-corrosive and wear resistance with higher reliability of tools, which provides users with reduced tool costs. It provides significantly longer tool life to conventional grades under the same cutting conditions. It's the first choice for Titanium and Stainless.

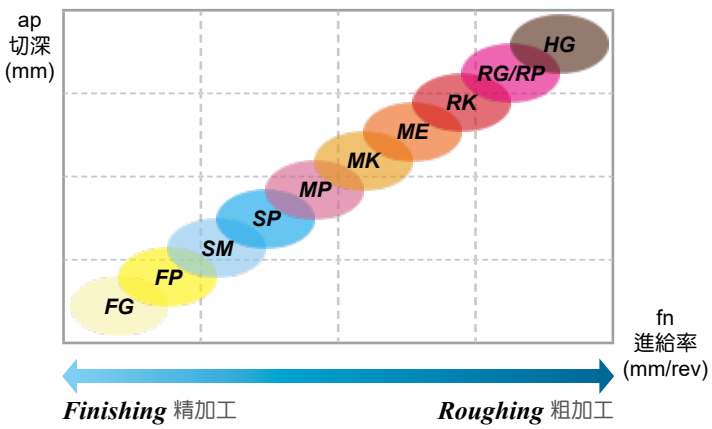
獨特的新世代材質 ***CX2545*** 擁有抗沾黏塗層，有效減少切屑堆積，保持刀口鋒利。優異的抗腐蝕性與耐磨性，提供更高的刀具可靠性，降低刀具成本。在相同的切削環境下，對刀具壽命有著顯著的提升，更適用於鈦合金與不鏽鋼加工。

Turning Insert Breakers 車刀片斷屑槽

· Positive 正角



· Negative 負角



Reference

DIN Material Chart

DIN 材料表

Material Group 材料組	Description 描述	Content 含量	Tensile Strength 抗拉強度 RM (MPa)*	Hardness 硬度 (HB)	Hardness 硬度 (HRC)	DIN Standards DIN 標準
P1	低碳鋼	C < 0.25%	< 530	< 125	-	PSt37-3, C15, GS-38, Ck10
P2	低碳鋼	C < 0.25%	< 650	< 220	< 25	33Mn6, 9SMn28, 20Mn5, 17Cr3
P3	中碳鋼，高碳鋼，普通碳鋼，低合金	C > 0.25%	600 ~ 850	< 330	< 35	C75, Ck45, C70W1, 90MnCrV8, 42CrMo416MnCr5, ST52
P4	合金調質碳鋼，工具鋼	C > 0.25%	800 ~ 1000	350 ~ 450	35 ~ 48	100Cr6, 105MnCr4, 51CrMnV4, 105WCr6, 100Cr2
P5	鐵素體鋼，馬氏體鋼，PH 不鏽鋼	C = 0~0.4%	600 ~ 850	< 330	< 35	X6Cr13, X10Cr13, X20Cr13, X12CrMoS17, X20CrMo13
P6	高強度鐵素體鋼，馬氏體鋼，PH 不鏽鋼	C = 0.1~0.6%	900 ~ 1350	350 ~ 450	35 ~ 48	X40CrMoV51, H1, X155CrVMo121, S6-5-2-5, X45Cr13, X120Mn12
M1	奧氏體不鏽鋼	C = 0.05~0.15%	< 650	130 ~ 200	-	X5CrNi1810, GX6CrNiMo1810, X6CrNiMoTi17122, X8CrNiMoAl1572
M2	高強度奧氏體不鏽鋼，鑄造不鏽鋼	C = 0.05~0.15%	500 ~ 700	150 ~ 230	< 25	X2CrNiMo134, X10CrNi189, X5CrNiCuNb1744
M3	雙相不鏽鋼	C = 0.05~0.2%	< 900	135 ~ 275	< 30	X2CrNiMoN2315, X20CrNiSi254, GX40CrNiSi274, X2CrNiMoN2253
K1	灰鑄鐵，低強度球墨鑄鐵	-	150 ~ 400	120 ~ 290	< 32	GG-10, GG-15, GG-20, GG-25, GG-40
K2	中低強度的 CGI 鑄鐵和球墨鑄鐵	-	400 ~ 600	130 ~ 260	< 28	GGG-35.3, GGG-40.3, GGG-70
K3	高強度的球墨鑄鐵和奧貝球墨鑄鐵	-	600 ~ 900	180 ~ 350	< 38	GTW-35-04, GTW-65, GTS-35-10, GTS-45-06
N1	鍛造鋁合金	-	< 520	60 ~ 90	-	Al99.5, AlCuMgPb, AlMg1, SG-AlMg5
N2	鑄鋁	Si < 12.2%	< 350	70 ~ 120	-	G-AlSi9Mg, G-AlSi10Mg, G-AlSi10Mg(Cu), SG-AlSi12, G-AlSi7Mg
N3	鑄鋁	Si > 12.2%	200 ~ 320	60 ~ 120	-	G-AlSi17Cu4Mg, GK-AlSi18CuNiMg, GK-AlSi21CuNiMg
N4	鋁基複合材料 (MMCs)	-	< 700	210	-	-
N5	銅，銅合金	-	200 ~ 650	60 ~ 200	-	CuZn20, CuSn2, CuNi18Zn19Pb
N6	碳、石墨、玻璃複合材	-	600 ~ 1500	-	-	CFRP, GFK, CFK
S1	鐵基耐熱合金	-	500 ~ 1200	160 ~ 260	-	X2NiCrAlTi3220, X1NiCrMoCu32287, X12NiCr3618, x12NiCrSi3516
S2	鎳基或鈷基耐熱合金	-	1000 ~ 1450	250 ~ 450	25 ~ 48	X12CrNiMn1888, Alloy222(Ni99,7Mg0,07), NiCr20Mo, NiCr19FeNbMo
S3	鈦	-	900 ~ 1600	300 ~ 400	33 ~ 43	Ti3, Ti4, TiAl3V2.5
S4	鈦合金	-	900 ~ 1600	300 ~ 400	33 ~ 43	TiAl5Fe2, 5, TiAl6V4, TiAl4Mo4Sn2
H1	淬硬鋼，鐵	-	-	< 460	< 48	-
H2	淬硬鋼，鐵	-	-	460 ~ 560	48 ~ 55	-
H3	淬硬鋼，鐵	-	-	560 ~ 650	56 ~ 60	-
H4	淬硬鋼，鐵	-	-	> 650	> 60	-

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