KORLOY Hightlight Products

EMO2019

KORLOY NEW &
STEADY SELLING PRODUCTS

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UNC805 new
UNC840 new

Features

- CVD S05 UNC805 New Turning Grade/S40 UNC840 New Milling Grade
- CVD turning/milling grade series dedicated to machining of HRSA such as Inconel (Waspaloy, Rene) and titanium alloy
- Applied super toughness substrate design, maximized resistance to chipping and breakage to improve stability of hard-to-cut materials machining
- Providing stable tool life due to New Ultra-CVD coating which not only enhances resistance to chipping and wear, but also inhibiting unexpected tool breakage
- Minimized build-up edge issues and improved surface finish due to optimized cutting edge of the insert

Stronger wear resistance

Competitor | **UNC805**

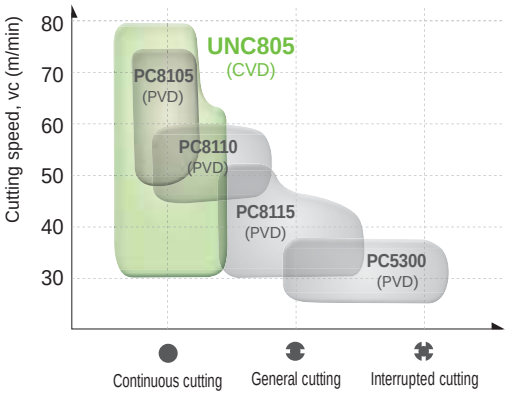
Increased chipping resistance

Competitor | **UNC840**

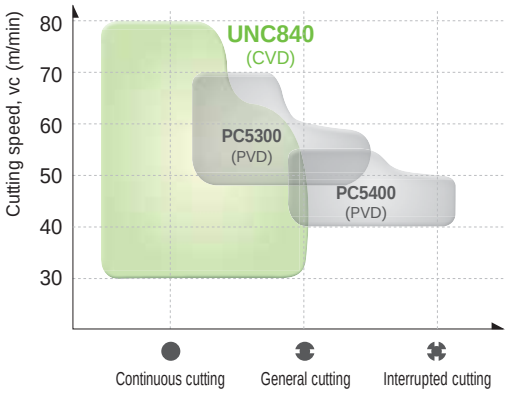
- Enhanced substrate in order to minimize thermal crack resistance at high temperature and prevent unexpected tool breakage
- Increased chip removal volume due to Ultra Coating technology with high hardness & lubrication
- Minimized build-up edge issues due to optimized cutting edge of the insert

Grades Line up

UNC805 (Turning HRSA)



UNC840 (Milling HRSA)



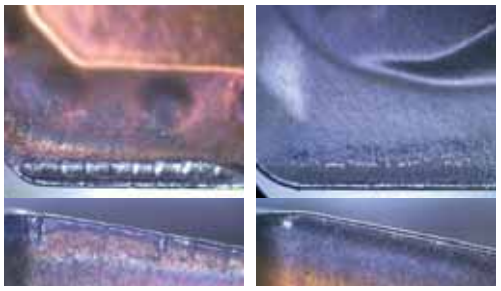
NCM535 new
NCM545 new

Features

- CVD P35, K25 New milling grade
- Next generation CVD milling series designed to improve productivity and optimized to heavy/ roughing/high-speed machining conditions of steel and cast iron
- NCM535 features great wear resistance and properties at high temperature due to CVD high-performance coating technology. Under high speed or continuous machining condition, it minimizes damage of coating and ensures satisfactory wear resistance.
- Application of the high-tough substrate which has high heat conductivity improved its breakage resistance and toughness
- Powerful after-treatment improves machining stability and minimizes micro chipping and build-up edge of workpiece due to its ceramic coating finishing effect

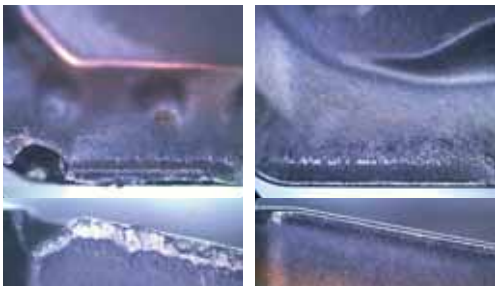
- Application of the high-tough substrate which has increased thermal conductivity and toughness
- High-performance CVD Coating with outstanding wear resistance and properties at high temperature
- Excellent chipping and welding resistance due to powerful after-treatment

Stronger wear resistance



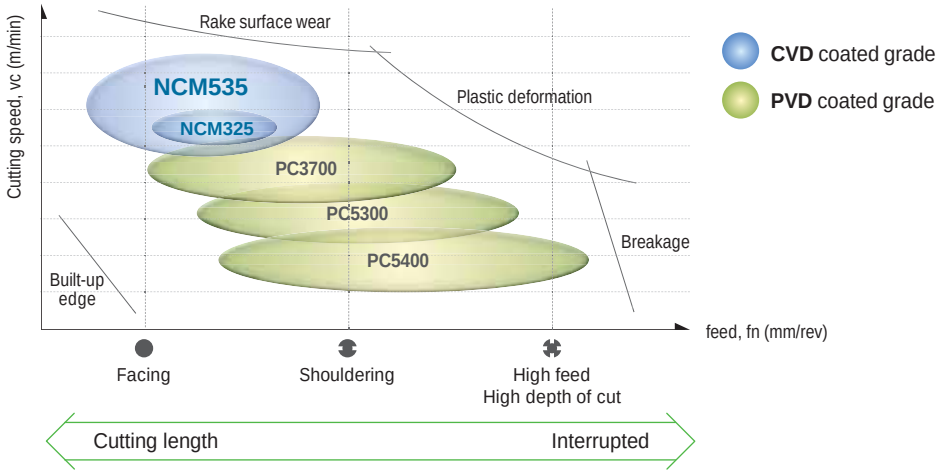
Competitor NCM535

Increased chipping resistance



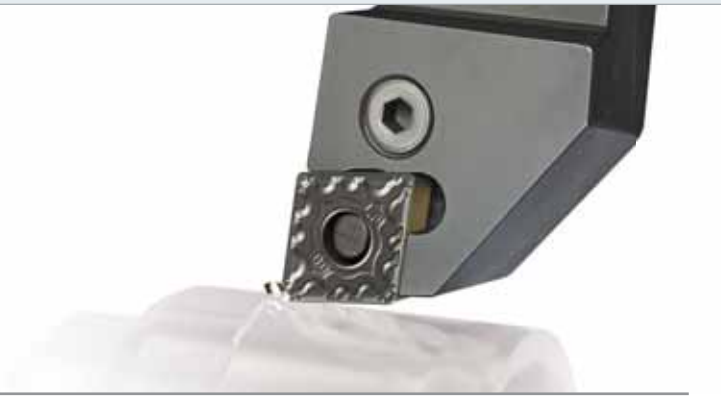
Competitor NCM535

Grades Line up



GRADES

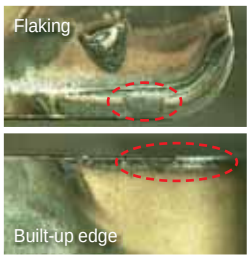
NC3215
NC3225



Features

- Universal grade especially for machining forged automobile components and bearing steel both in continuous and interrupted cutting
- Available for all kinds of steels - carbon steel, alloy steel, rolled steel, tool steel, mild steel, bearing steel and other special kinds of steel
- New coating technology increases welding resistance and chipping resistance, which leads to longer tool life

Unstable tool life



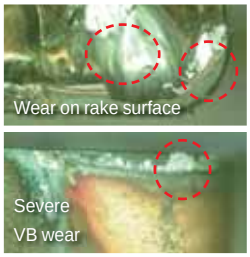
Competitor

Reduced flaking

NC3215 / NC3225

- **Stable tool life**
  - Higher production stability
- **Longer tool life & Higher removal rate**
  - High cutting conditions and shorter cutting time available

Poor wear resistance



Competitor

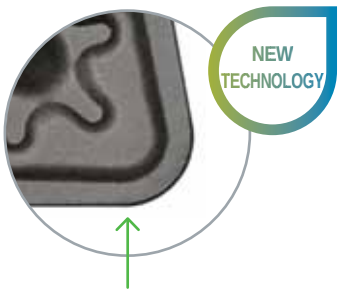
Increased wear resistance

NC3215 / NC3225

- **Ideal combination of a grade and chip breakers**
  - Prolongs tool life
  - Wide applications ranging from roughing to finishing

Previous coating

New coating



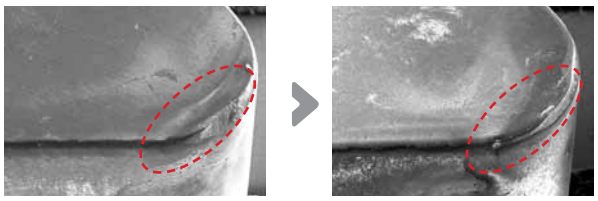
Disperse cutting force → Reduce chipping → Increase tool life → Improved productivity

NC6310 new
NC6315

Features

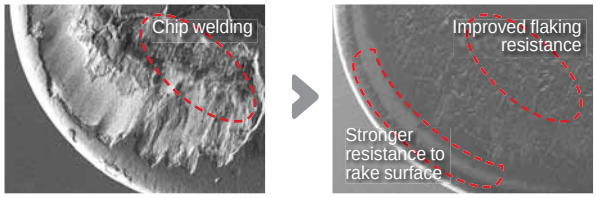
- CVD turning grade series optimized to machining of gray cast iron and ductile cast iron
- Cast iron grades line up dedicated to various cast iron machining from high speeds and feeds to continuous or dry conditions
- Providing stable tool life when machining at high speed and feed or dry machining due to CVD coating with outstanding heat resistance
- Optimized grade and chip breaker to maximize machinability and tool life

Increased resistance to wear and fracture



K10 (Existing product) → **NC6310**

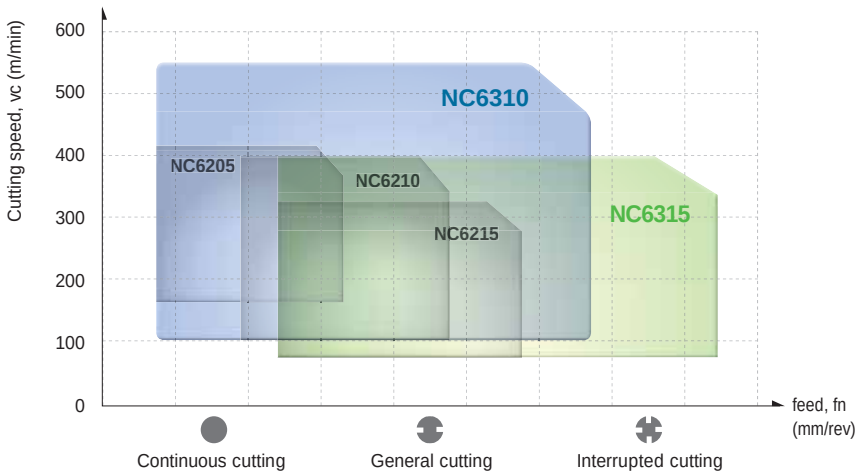
Enhanced resistance to flaking and wear



K15 (Existing product) → **NC6315**

- **High performance substrate optimized to machining at higher speed and feed**
  - Applied CVD coating with excellent heat resistance

Grades Line up

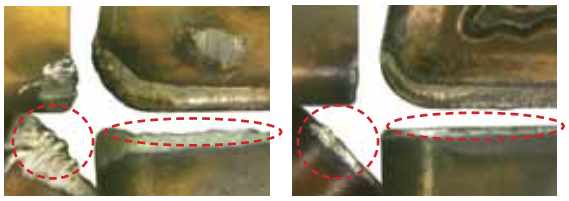


NC9115/NC9125
NC9135

Features

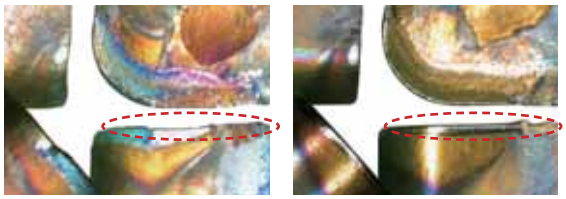
- Optimized for reducing built-up edges, notch wear, plastic deformation and burrs, and for machining stainless steel
- Ideal combination of a grade and MM/RM chip breakers for stable tool life and wide applications ranging from roughing to finishing
- Stable tool life even at high speeds, feeds and depth of cuts (for STS316, vc over 150m/min available), shortening cutting time
- Excellent versatility responding to workpiece change, covering the austenite, the martensite and the ferrite

Inhibited built-up edge and blade damage



Competitor (M25) | **NC9125 (M25)**

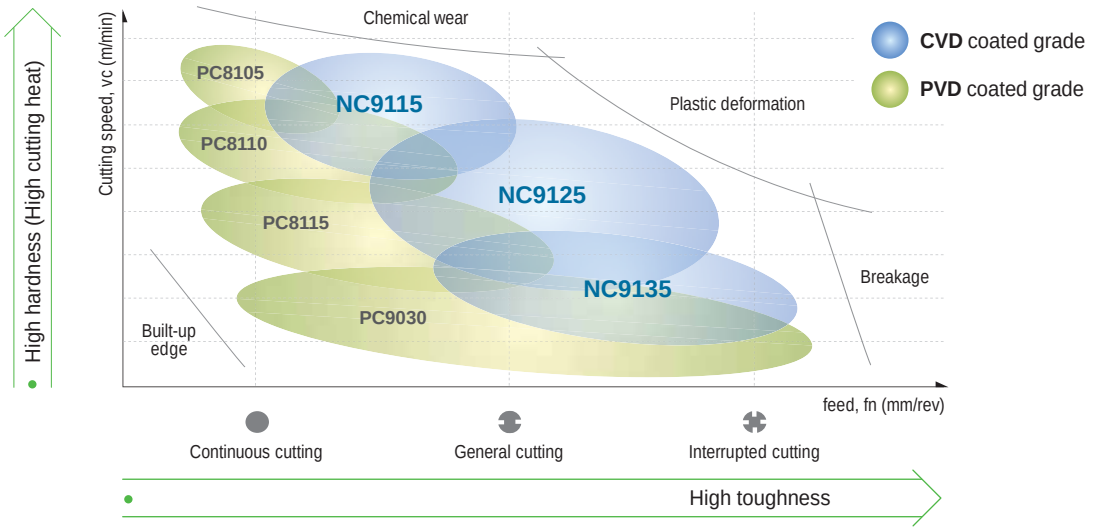
Inhibited wear on notch and relief surface



Competitor (M25) | **NC9135 (M35)**

- Coated layers of stronger chipping resistance and the substrate of high toughness
  → Inhibited notch wear creation
- Lubricative coating layers
  → Improves welding resistance

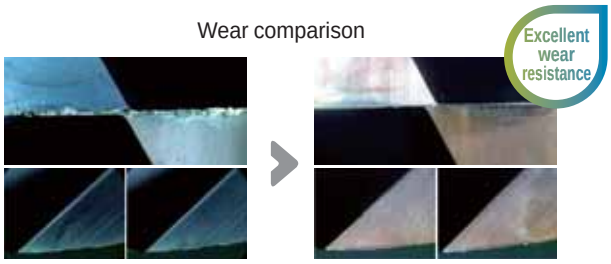
Grades Line up

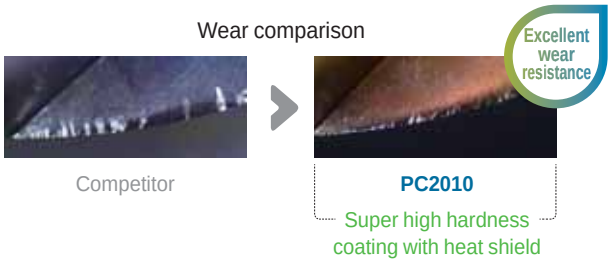


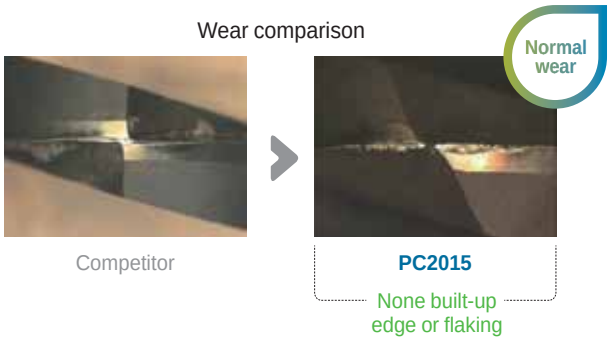
PC2005/PC2010
PC2015

Features

- Finishing grade lineup for tool steel and plastic die steel
- PC2005 with extremely hard substrate and coatings
- PC2010 with high hardened cutting edges, ideally suited for pre-hardened steel and interrupted cutting
- PC2015 for carbon steel and casting machining, demonstrating excellent performance in hard-to-cut materials







PC2005
(For high hardness workpiece and press die steel)

- Super high hardness substrate and coating improve wear resistance dramatically.
  - High hardness substrate prevents chipping and wear on relief surface.

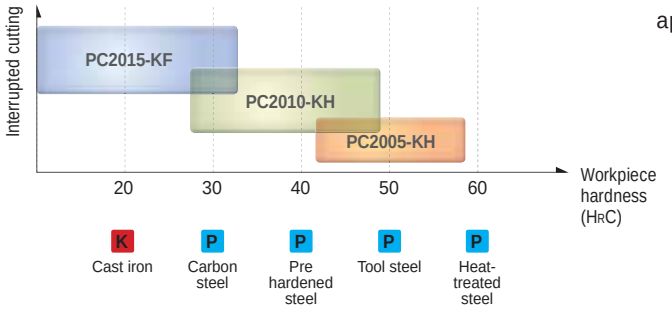
PC2010
(For pre hardened steel and plastic die steel)

- Ultra fine WC and high contents cobalt were applied to the substrate to expand application range to high hardness steel and pre hardened steel.
  - Heat shield coating was applied to prevent thermal crack.

PC2015
(Exclusive for Laser Mill for machining cast iron and carbon steel)

- High toughness substrate based grade for general cutting of cast iron and HRSA with the use of lubricative coating layer.
  - High toughness substrate and coating layer less responsive to workpiece applied.

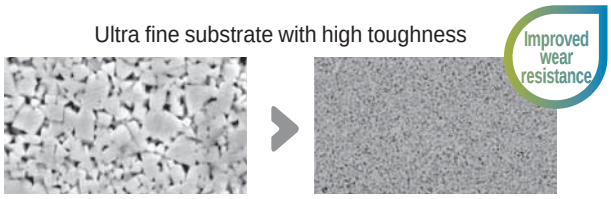
Recommended grade and chip breaker

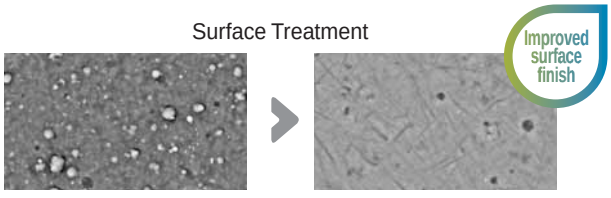


PC2505
PC2510

Features

- Roughing grade series for high hardened steel
- PC2505 with excellent wear resistance, ideal for machining die steel and high hardened steels over HRC50
- PC2510 with stabilized toughness, ideal for interrupted cutting of high hardened steel and wet cutting accompanied by massive thermal shock





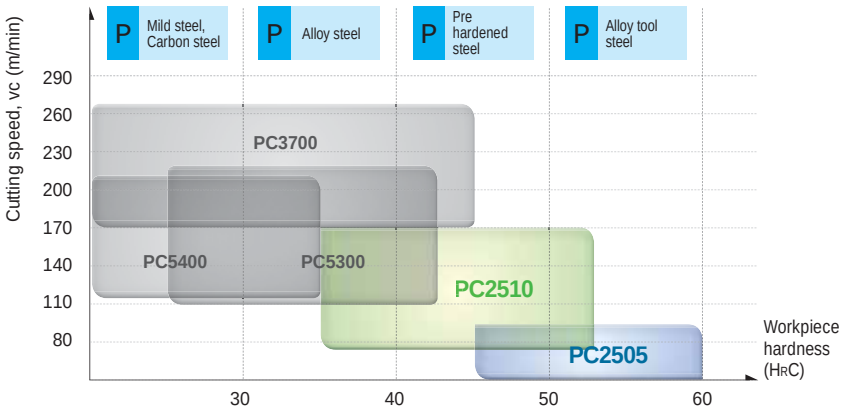
PC2505

• Ideal for heat treated steel and high hardened steel due to excellent wear resistance

PC2510

• Ideal for high hardened steel and pre-hardened steel thanks to excellent impact resistance

Application guideline per workpiece



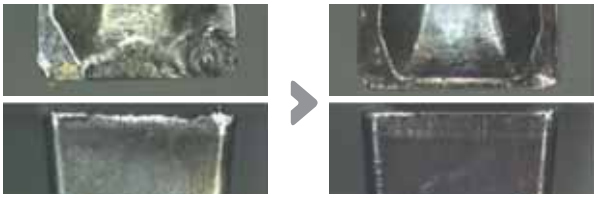
PC3035

new COMING SOON 09.2019

Features

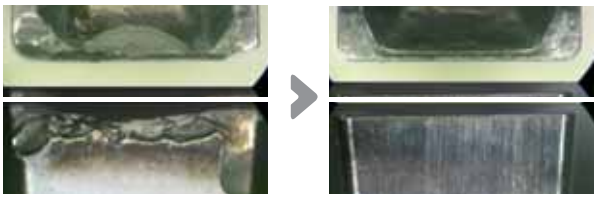
- New PVD Grooving (Turning) P35 grade
- Next generation PVD Grooving (Turning) series specialized to steel in order to improve productivity of grooving / parting conditions
- Applied high-tough substrate dedicated for steel with enhanced breakage resistance and inhibited unexpected tool breakage in order to provide stable tool life
- Advanced wear resistance and longer tool life when it comes to alloy steel machining or at high speed
- Increased resistance to welding and chipping due to lubricating after-treatment in order to improve stability when bearing steel machining or at low speed

Increased chipping resistance



Competitor PC3035

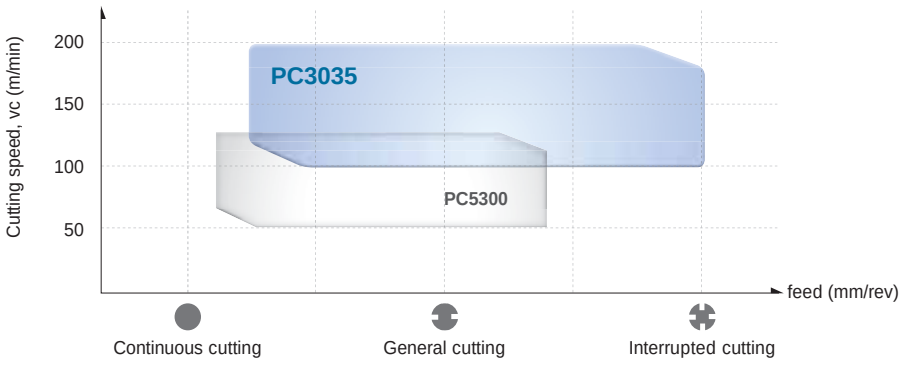
Improved breakage resistance



Competitor PC3035

- Applied high-tough substrate dedicated for steel with advanced breakage resistance
- Excellent resistance to welding and chipping due to lubricating after-treatment
- PVD high-hardness coating with outstanding wear resistance

Grades Line up



GRADES

PC3700 new

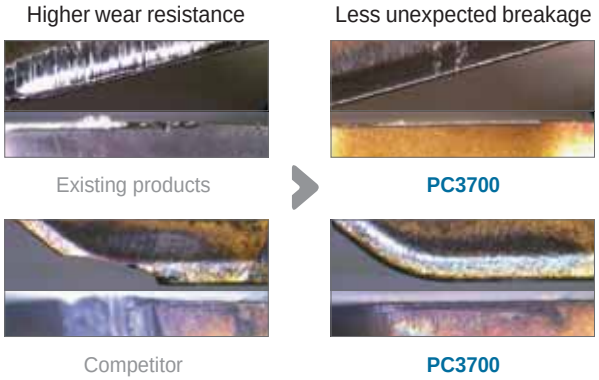
Features

High Feed and Speed Capability for Increased Productivity

- Excellent chip removal rate due to a tough substrate specialized for steel, and lubricative PVD coating of high-hardness

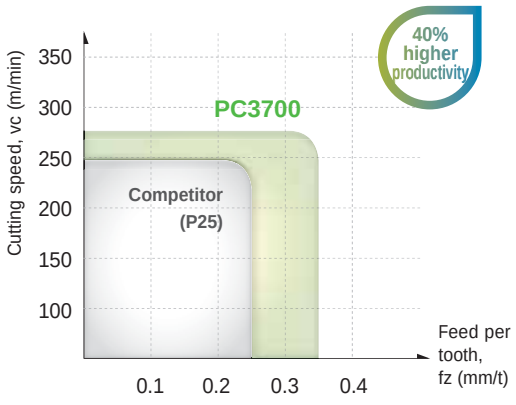
Excellent Tool Life

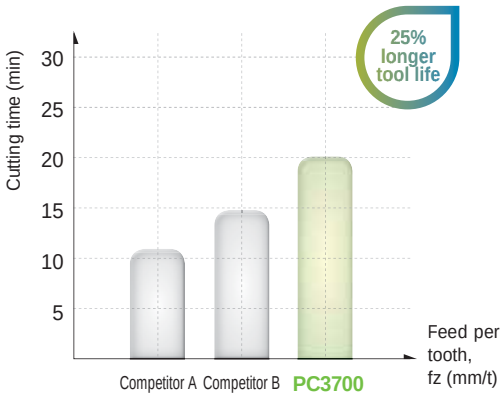
- A highly chipping-resistant grade for minimized deviation and extended tool life under various cutting conditions
- A dual land achieves sharp cutting performance and insert toughness



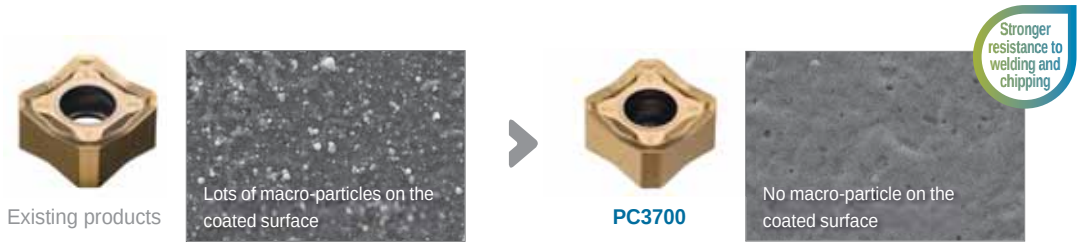
- Longer tool life and high chip removal rate → High cutting conditions and shorter cutting time available
- Stable tool life → Higher production stability
- Universal use for steel milling → A wide selection of workpiece materials and applications

Grades Line up





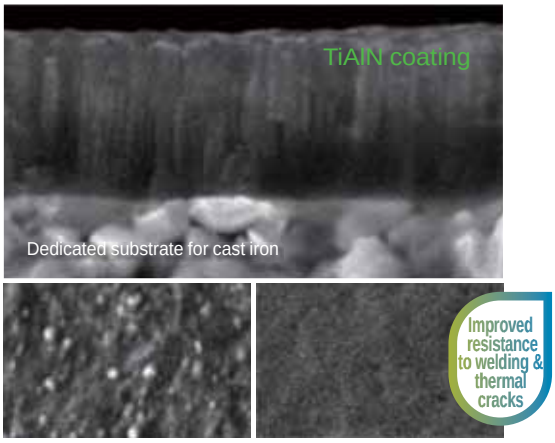
Special coating surface treatment



PC6510

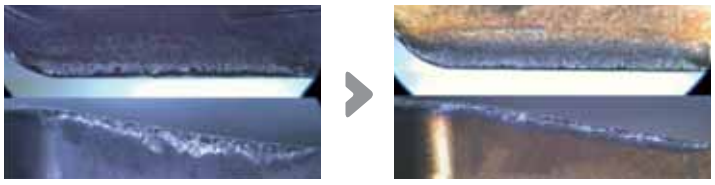
Features

- PVD-coated grade specialized for milling applications of cast iron
- Stable tool life due to the minimized life deviation between inserts



General coating | **Surface treatment applied**

- Extended cutting time due to the highly wear-resistant TiAlN coating
- Stable performance due to the highly wear-resistant and anti-fracture substrate for general cutting of cast iron
- Flaking and thermal cracks inhibited by the coating surface treatment



Competitor | **NEW PC6510**

⇒ Improved wear resistance

Competitor | **NEW PC6510**

⇒ Inhibited flaking and thermal cracks

GRADES

PC8105/PC8110 PC8115

Features

- Turning grade for heat resistant alloy and stainless steel
- Latest PVD coating technology with high hardness and high temperature oxidation resistance

PC8105

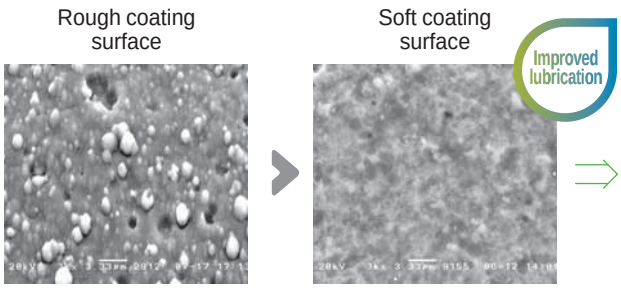
- Micro grain carbide minimizes chipping of cutting edge due to enhanced edge strength
- Excellent tool life when finishing heat resistant alloys and stainless steels at high speeds

PC8110

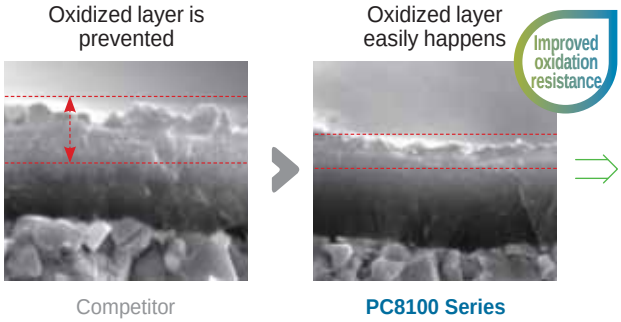
- Substrate with superior wear resistance and plastic deformation resistance at high temperature
- Long tool life when machining heat resistant alloy and stainless steel at high speed

PC8115

- Ultra fine matrix technology increases wear resistance and chipping resistance.
- Strong cutting edge and excellent chipping resistance guarantees stable machining
- Long tool life when machining heat resistant alloy and stainless steel at middle to low speed and medium cutting to roughing



Coating surface treatment technology
(Pictures of coating layer)

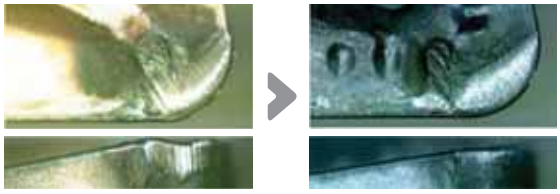


Oxidation resistant coating technology
(Pictures of coating layer heat-treated at 900°C)

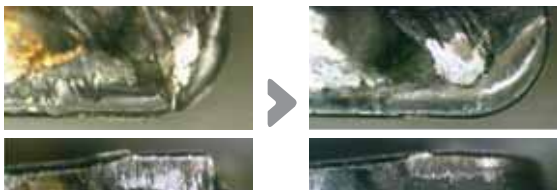
CC1500
CC2500

Features

- High Performance Coated Cermet Grade for Machining Carbon Steel, Alloy Steel and Sintered Ferrous Alloy



Competitor　　CC1500



Competitor　　CC2500

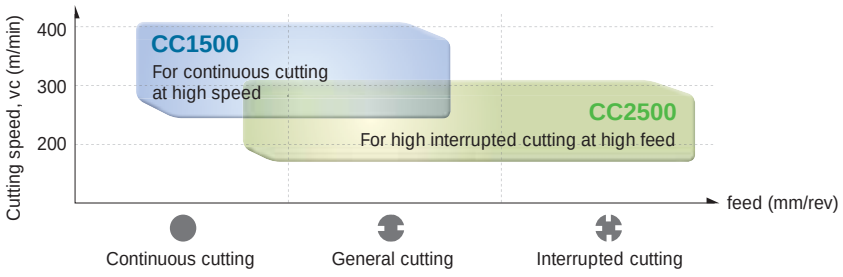
CC1500

- Maximized resistance to built-up edge and oxidation in continuous cutting at high speeds and low depth of cuts
- Superior wear resistance vs. existing tools in continuous cutting of carbon steel and alloy steelalloy steel

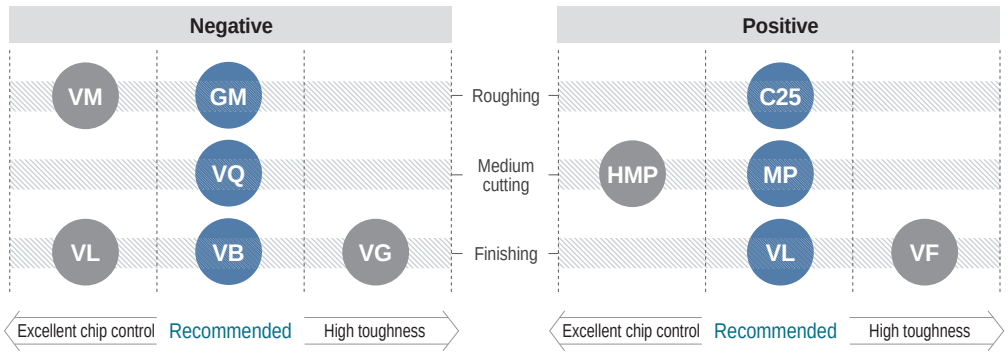
CC2500

- Maximized resistance to built-up edge and oxidation in interrupted cutting at high feeds and high depth of cuts
- Superior impact resistance vs. existing tools in interrupted cutting of carbon steel and alloy steel

Grades Line up



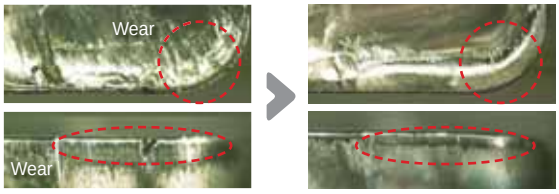
Chip breakers Line up



CN1500
CN2500

Features

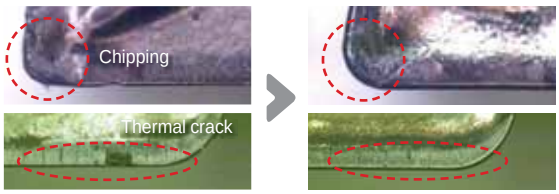
- High Performance Cermet Grade for Machining Forged Steel and Sintered Ferrous Alloy



Competitor CN1500

CN1500

- For continuous machining of cold/hot forged steel and Sintered ferrous alloy at high speed and low depth of cut
- Excellent wear resistance and crater resistance

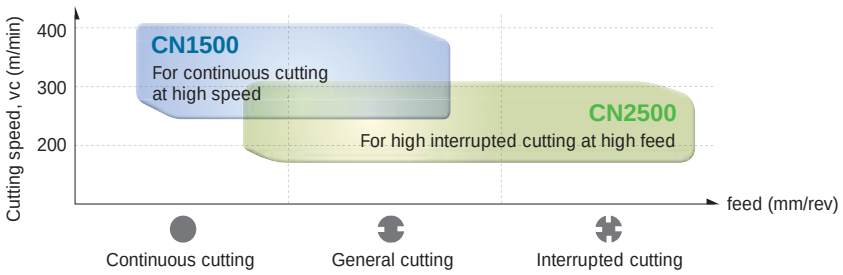


Competitor CN1500

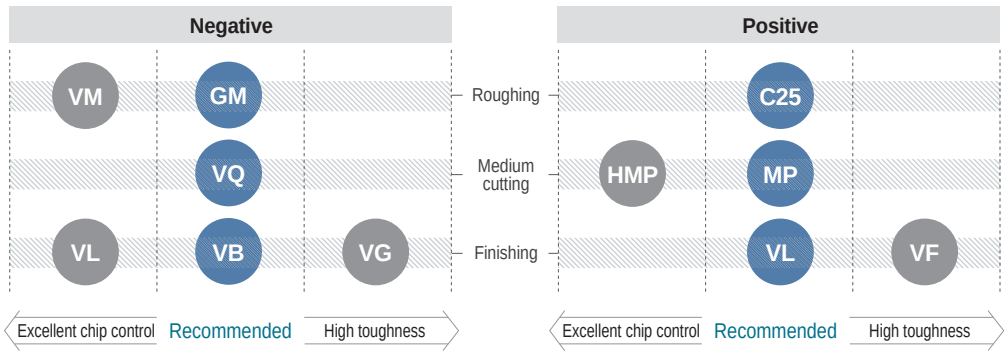
CN2500

- For high interrupted machining of cold/hot forged steel and Sintered ferrous alloy at high feed and high depth of cut
- Excellent resistance against chipping, fracture and thermal crack

Grades Line up



Chip breakers Line up



PD1005
PD1010

Features

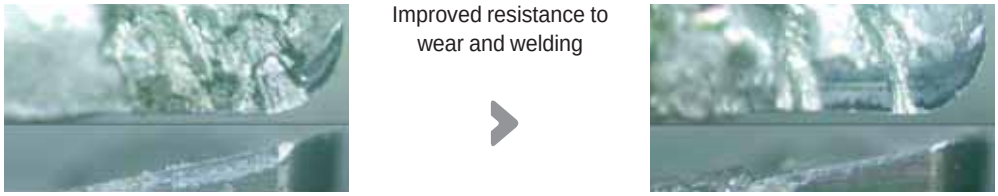
- DLC-coated grades for high speed and quality machining of non-ferrous metals such as aluminum and copper
- Maximized resistance to chipping and welding due to the dedicated grades and advanced DLC coating

PD1005

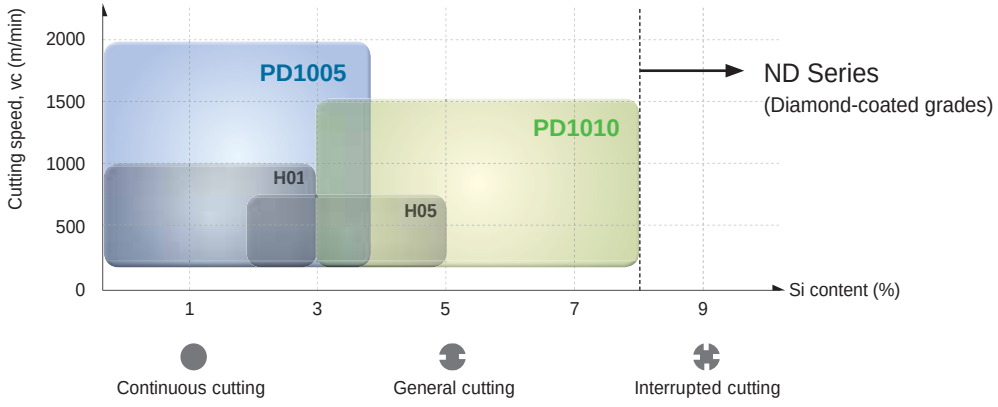
• Excellent surface finish when machining general non-ferrous metals (Al, Cu) at high speeds

PD1010

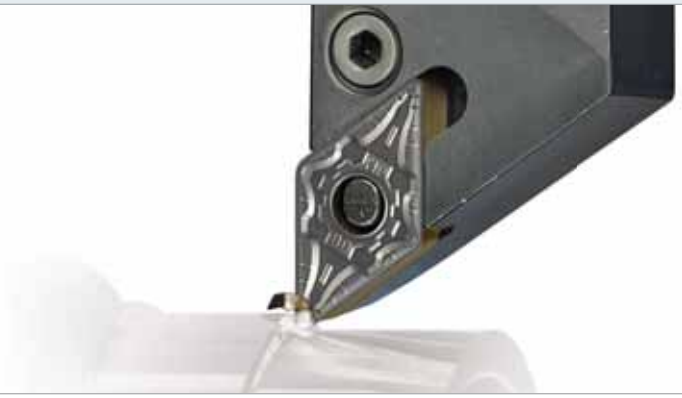
• Stable tool life when machining hard non-ferrous metals (Al, Cu) or under interruptions



Guideline for grades application



LP/MP
Chip Breaker



Features

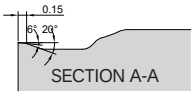
- Chip breaker for forged steel of automobile parts and normal steel
- Quad dots improve productivity through efficient chip control at high feed
- Angle land minimizes cutting force

LP chip breaker

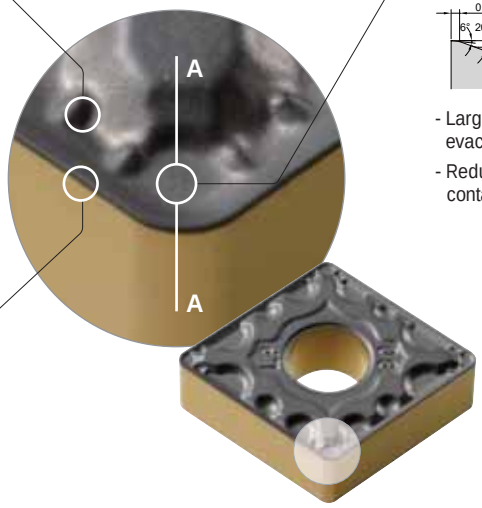
Front dot

- Higher stability of chip curls at high feed
- Excellent chip control when copying
- Lower cutting force at low depth of cut and high feed

Flat zone



- Larger chip pocket for better chip evacuation at high feed
- Reduced cutting force with larger contact surface of chips



Variable land

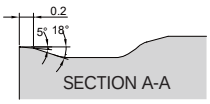
- Less crater wear
- Prevents chipping on minor cutting edge

MP chip breaker

Front two step dot

- Higher stability of chip curls at high feed
- Excellent chip control when copying
- Lower cutting force at high depth of cut

Flat zone



- Larger chip pocket for better chip evacuation at high feed
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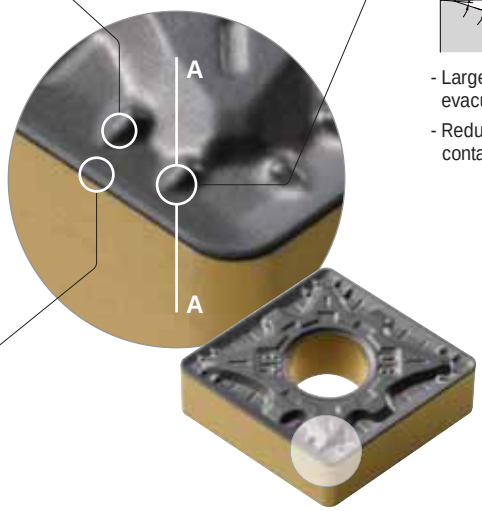
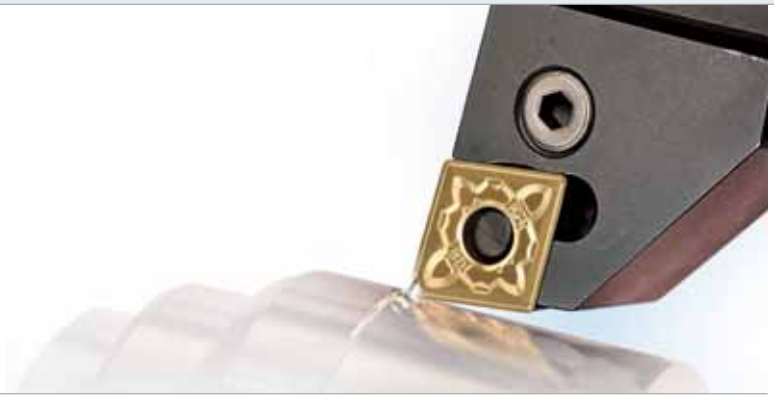


Variable land

- Less crater wear
- Prevents chipping on minor cutting edge
- Higher toughness at high depth of cut and interrupted cutting

MM/RM
Chip Breaker



Features

MM chip breaker

- The 1st recommended chip breaker for stainless steel machining
- A dual land achieves sharp cutting performance and insert toughness

RM chip breaker

- Prevents notch wear and burrs at high feeds and depths of cut
- Reduced cutting force extends tool life in high feed machining

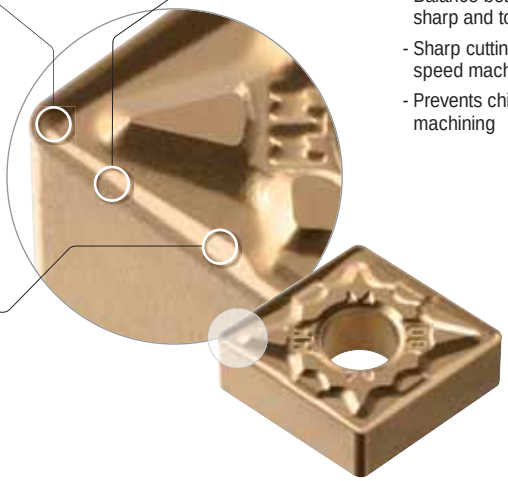
MM chip breaker

Variable land

- Excellent chip control and sharp cutting at low depths of cut
- Delays crater wear
- Prevents plastic deformation

Dual land

- Balance between requirements of sharp and tough cutting edges
- Sharp cutting edge for high speed machining
- Prevents chipping in interrupted machining



Wide chip pocket

- Stable chip evacuation at high speeds/feeds
- Improved surface finishes by reduced workpiece scratches caused by work-hardened chips at high depths of cut
- Prevents built-up edge

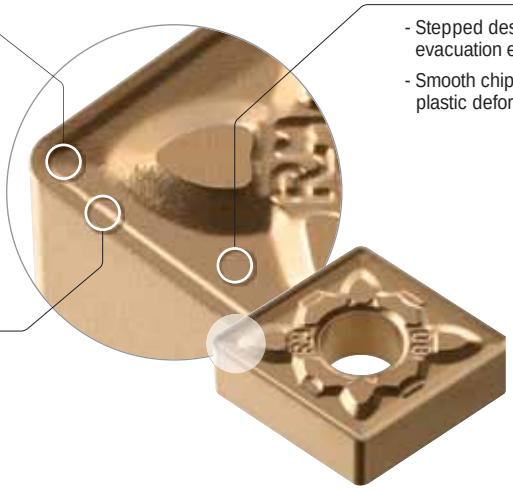
RM chip breaker

Variable land

- Excellent chip control and sharp cutting at low depths of cut
- Delays crater wear
- Prevents plastic deformation

Stepped design

- Stepped design makes chip evacuation easier
- Smooth chip evacuation prevents plastic deformation



Wide land & Gentle front angle

- Sharp cutting edges and a wide land reduce cutting force
- Reduced burrs
- Dispersed cutting load enables higher toughness

MK/RK
Chip Breaker

Features

MK chip breaker

- Angle lands provide upgraded surface finish

RK chip breaker

- Ideally suited for high speed / high feed cutting of ductile cast iron and gray cast iron
- Flat lands provide upgraded toughness and chipping resistance

MK chip breaker

Angle land

- Angle lands provide sharper cutting performance
- Maximized wear resistance in continuous cutting
- High quality results in surface finish

Wide supporting area

- Higher clamping stability
- Prevents chipping at vibrations during operation

RK chip breaker

Flat land

- Flat lands provide upgraded toughness and chipping resistance
- Stable machining availability under high cutting loads at high depth of cuts or interrupted cutting
- Optimized land width for high feed machining

Wide supporting area

- Higher clamping stability
- Minimizes vibration and chipping

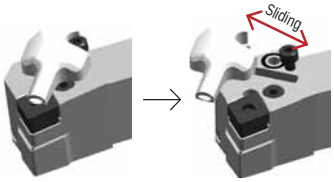
KHP new
(KORLOY High Pressure Coolant)

Features

- Direct spray cooling to cutting blades by internal coolant system using high pressure
- Spraying a large volume of cutting fluids by vertical movement in order to improve cooling efficiency
- Enhanced chip control of hard-to-cut materials for machining at high feed and high depth of cut

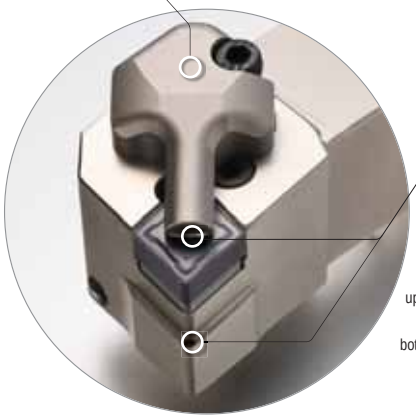
Water Clamp

- Improved chip control by high-pressure spraying to chip and cutting edge
- Preventing chipping by lower cutting load of insert edges when machining
- Convenient clamping/unclamping of insert using sliding

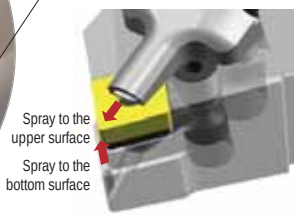


Right position of water clamp

Insert clamping position



Direction of spray



Processing characteristic

- Increase machining life by direct injection at insert edge
- Prevent chipping and notch wear in insert during machining
- Noser can be transferred with a high concentration injection
- Improved chip control effect using high

chip-processing improvement effect

- vc 50 (m/min) fn 0.2 (mm/rev) ap 2 (mm)
- W.P ⇒ Inconel 718 (Hrc 42)

Type

PCLNR2525-M12-KHP

PDJNR2525-M1506-KHP

PWLNR2525-M08-KHP

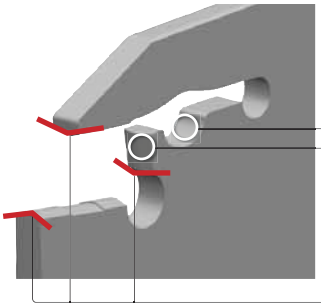
SVJBR2525-M16-KHP

SAW MAN X

new COMING SOON 10.2019

Features

- Minimized insert vibrations in machining process due to 3-dimensional V shaped groove design
- Enhanced surface finish due to minimized vibrations and chattering issue during machining
- Extended tool life due to the application of brand-new edge preparation
- Improved chip control performance of heavy workpiece
- Using exclusive wrench for convenient clamping



Application of exclusive wrench

- Easy change of insert

Stopper at the back

- Preventing inserts from slipping and improving precision of position

3-Dimensional V shaped groove

- Maximized clamping stability, reduced chattering

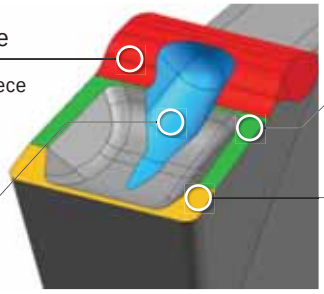
Chipbreaker Features

Extra chip breaker at the rear face

- Improved chip control of heavy workpiece
- Preventing holder damage

Coolant system & chip evacuation guide

- Able to use a through coolant holder
- Working as a guide when evacuating chips



Increased height of side land

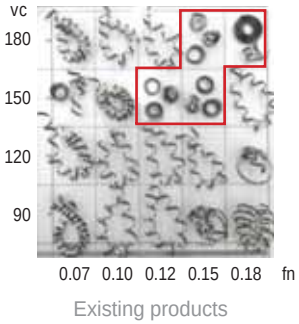
- Maximized chip control
- Enhanced insert toughness

Negative land

- Stable performance when interrupted machining
- Ensuring machining stability at high depth of cut

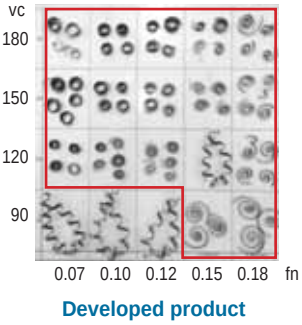
Enhanced chip control

(SCM440 - Ø100mm chip control area of workpiece)



Existing products

Heavy workpiece Chip control
Advanced performance



Developed product

Line up

Insert

Cutting edge width: 2, 3, 4, 5, 6mm

Blade

26, 32 size per cutting edge width

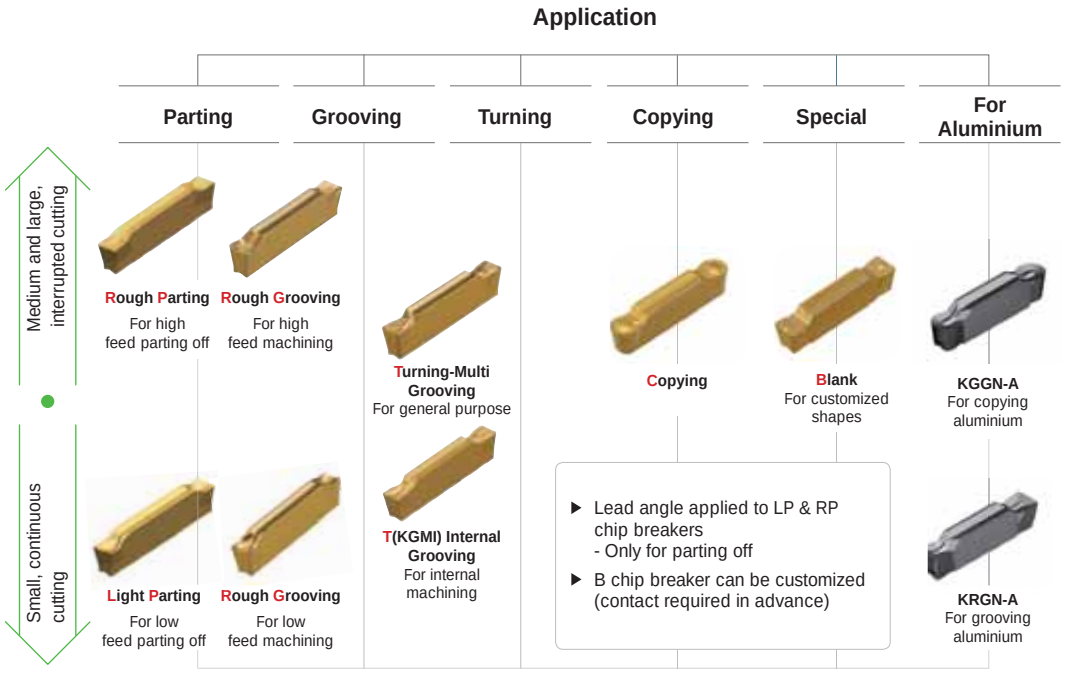
KGT

Features

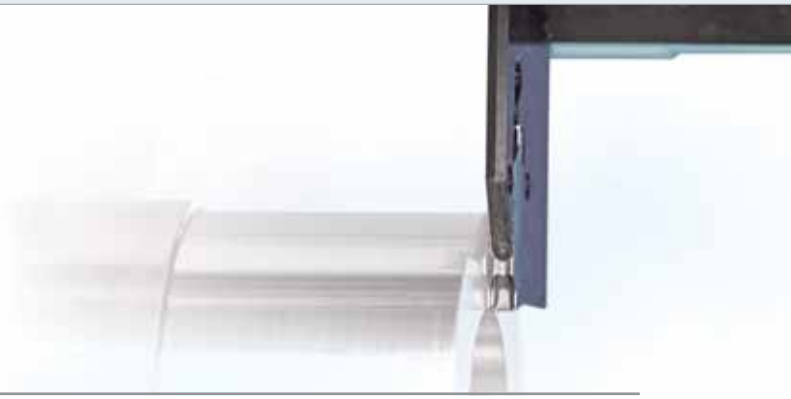
- Double-sided inserts of KGT reduces machining cost
- Strong clamping system ensures stable and accurate machining
- The foreside and clearance face of the KGT insert having cutting edges are optimal for grooving, parting-off, turning and facing with reducing processing time
- Three-dimensional chip breaker ensures excellent chip control in various applications

- Strong clamping → Higher machining reliability
- Self-centering → Higher accuracy
- Anti-chattering design → Fine surface finish

Line up

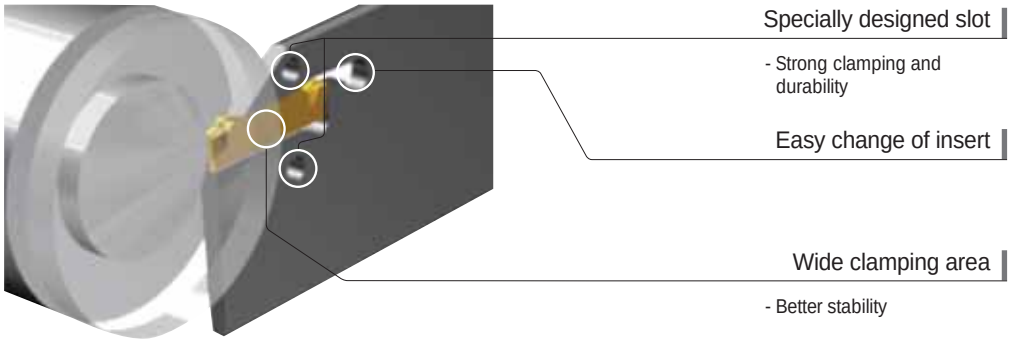


KGT Blade



Features

- Parting application with the use of existing KGT inserts
- Economical machining with a double sided insert
- Specially designed slot for strong and stable clamping
- Easy change of insert with the use of exclusive wrench



How to clamp insert

Insert the pin of wrench into the hole of blade.

Clamp the insert on its seat after turning the handle to 45˚~160˚ for loosening the seat.

Finish clamp by removing the wrench after moving it back to its original state.

① ⇒ ② Rotation: Release
② ⇒ ① Rotation: Conclusion

Line up

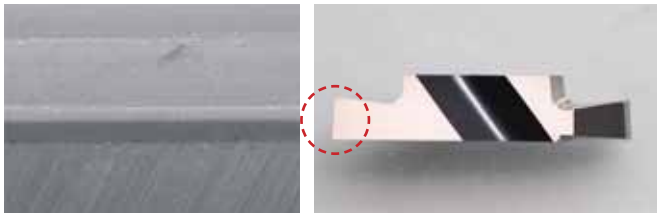
Range of cutting edge width: 1.5 ~ 8.0mm

1.5mm type | 2.0mm type | 3.0mm type | 4.0mm type | 5.0mm type | 6.0mm type | 8.0mm type

K Notch new

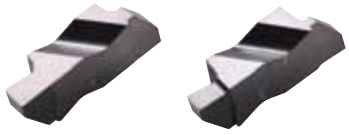
Features

- Strong clamping force for grooving highly hard workpieces or hard-to-cut materials
- Excellent surface finish and tool life due to the lubricative cutting edges in uniformly high quality
- Grooving applications available in extra high precision
- A wide selection provided including a coated grade



Excellent surface finish due to cutting edges in uniformly high quality

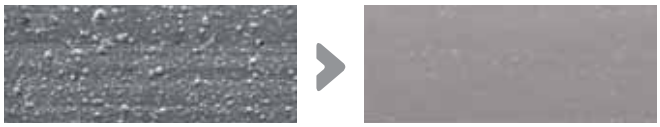
Product range



KNG KNGP

PC8110 (Coated insert)

Competitor's coating → **KORLOY's coating**



Lower cutting load due to the lubricating treatment

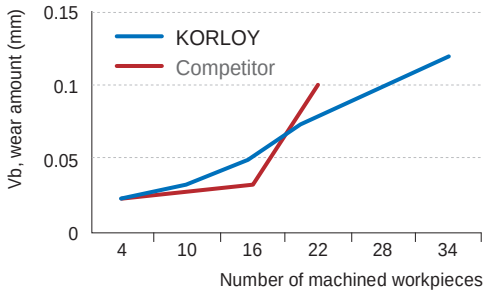
Performance evaluation

· Workpiece	Ti6AL4V, external grooving
· Cutting conditions	vc (m/min) = 80, ap (mm) = 3, fn (mm/rev) = 0.1, wet
	154% longer tool life compared to the competitor's

Number of machined workpieces

Competitor

KGNP3M300R (PC8110)



Auto Tools

Features

- High precision machining of small parts and complex forms, etc.
- High quality products through stable machining
- Exclusive insert for automatic lathes

E class tolerance / G class tolerance

(KF/KM type) – Fully ground high precision Insert

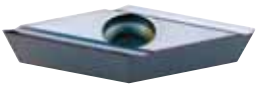
(VP1 type)

KF type

For finishing

- Sharp edges for low cutting load
- Smooth chip flow and excellent surface finish when finishing

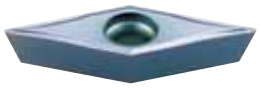
KM type



For medium to finishing

- Wide chip pocket for wide range machining
- Improved chip flow for longer tool life and cutting performance

VP1 type

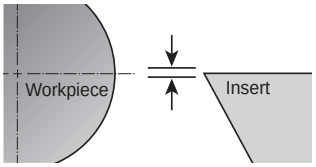


For medium to finishing

- Three dimensional C/B for stable chip control
- Sharp edges for low cutting load and heat

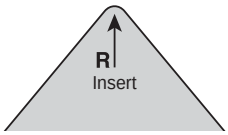
Insert tolerance

Precise tolerance



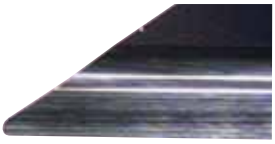
- E class: ±0.025mm

True R formation / Minus tolerance



- Existing one: ±0.02mm
- Minus tolerance: 0 ~ -0.02mm

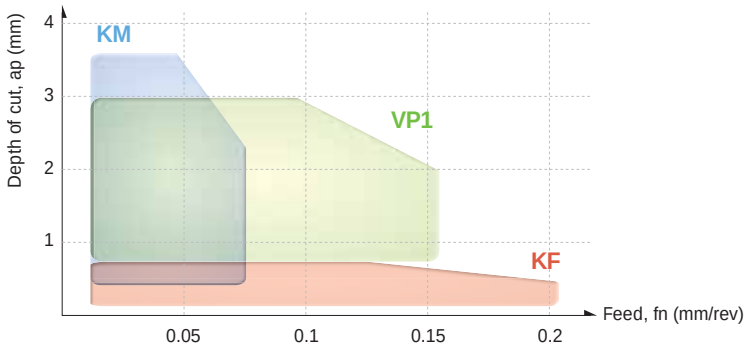
High surface quality



- Precise machining: High quality and precision

Offset adjustment is not required by insert change, due to the same insert height → **Increased productivity**

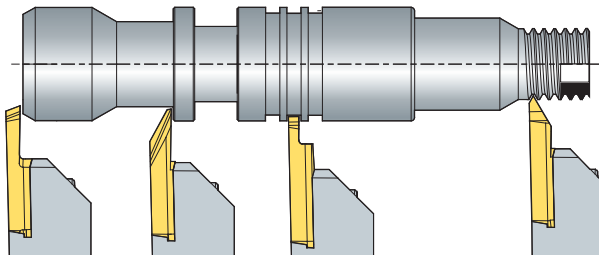
Cutting range



Auto Tools Blade

Features

- Blade insert for automatic lathes
- For external machining of precise small parts
- 4 types - SSB (for back turning), SGB (for grooving), SBT (for threading), SBC (for parting off)
- Convenient use of one holder to all blade inserts



SBC (For cut off/Parting) **SBB** (For back turning) **SBG** (For grooving) **SBT** (For threading)

Types of blade insert

SBC (For cut off/Parting)

- Cutting width: 0.7~2.0
- D Max.: 16mm
- Nose R: 0.05mm

SBB (For back turning)

- Approach angle: 59°
- Max. cutting depth: 4mm
- Nose R: 0.05, 0.1, 0.2mm

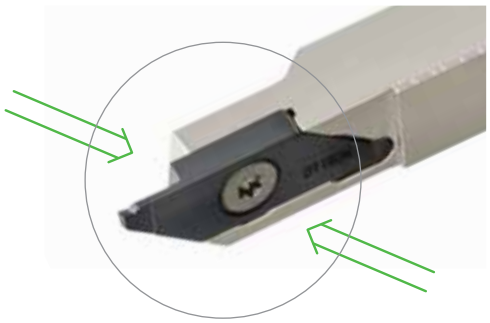
SBG (For grooving)

- Width: 0.5~2.5mm
- Nose R: 0.05mm

SBT (For threading)

- V profile: 60°
- Pitch: 0.2~1.0mm
- Nose R: 0.05mm

Blade holder



Screw holes on both sides
- Easy to exchange inserts →
  Improved productivity

Insert corner change
- Tolerance repetition ±0.001 Within →
  Save setting time

TB-M

Features

- Minimized cutting force at high speed and high feed → Smooth chip evacuation outside each groove
- High precision cutting performance → Exceptional surface finish and accurate dimensions
- Excellent chip flow and cutting results → Ideal for automated and unmanned production

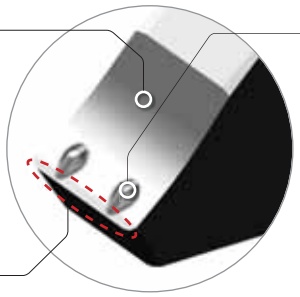
TB5-M chip breaker

Lowered back area

- Minimizes chip frictions to prevent overload when evacuating chips

Beveled protruding dots

- Facilitate smooth chip evacuation outside each groove. Minimize chip control work load at high depth of cuts. Form chip curls at regular intervals



Cutting edge land

- Prevents chipping and improves machining stability in interrupted cutting

Designation	TB5O5ON-M ~ TB512ON-M	TB514ON-M ~ TB5178N-M	TB5196N-M ~ TB5239N-M	TB5247N-M ~ TB5287N-M	TB53OON-M ~ TB5318N-M
					
Cutting edge width (b)	0.5 ~ 1.2mm	1.40 ~ 1.78mm	1.96 ~ 2.39mm	2.47 ~ 2.87mm	3.0 ~ 3.18mm

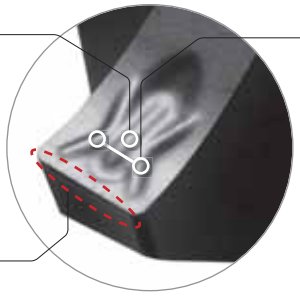
TB4-M chip breaker

Sub dots

- Control stability of chip curls at high feed

Main dots

- Show exceptional chip control in turning and chamfering applications. Facilitate smooth chip evacuation outside each groove . Form chip curls at regular intervals



Sharp cutting edges

- Deliver sharp cutting performance

Designation	TB415OR-M ~ TB4185R-M	TB42OOR-M ~ TB4228R-M	TB43OOR-M ~ TB435OR-M	TB44OOR-M ~ TB445OR-M
				
Cutting edge width (b)	1.5 ~ 1.85mm	2.0 ~ 2.8mm	3.0 ~ 3.5mm	4.0 ~ 4.5mm

Pro-V Mill new

Features

- Enhanced Productivity → Increased productivity due to high speed capability
- Improved Surface Finish → Excellent surface finish and perpendicularity with high-precision products
- Excellent chip control → Possible to use for various types of workpieces
- Excellent Clamping Stability → Satisfactory clamping force of inserts by the use of the key shape

• The combined clamping system of the key to key slot structure and simple screw-on type ensures strong clamping force
→ Stable Machining / Prevention of insert breakage

• Avoiding uplifting problems of insert due to axial acute-angle clamping of cutters
→ Reduced vibrations and excellent surface finish

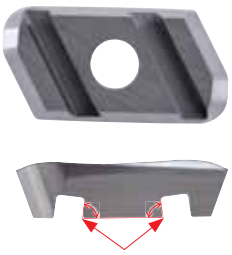
Screw-on clamping
- New screw shape

Insert clamping area
- Stable clamping force due to the key to key slot structure

Axial acute-angle clamping
- Inhibition of the axial force

Wide minor cutting edges
- Improved surface finish

Mirror-like finish of the rake surface of insert
- Avoiding build-up edges through smooth chip flow



High-rake chip breaker and helix cutting edges
- High rake and lower cutting load

Application of the key slot design
- The bottom key of insert and the key slot in an acute angle
- High clamping stability of the holder contact area → Improved clamping force

Type

Cutter
Ø40~ Ø125

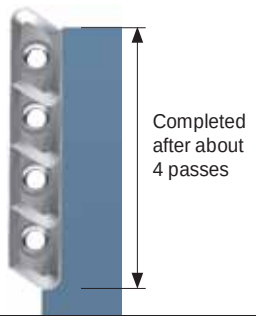
Shank
Ø25 ~ Ø40

Tooling System
Ø32~ Ø50

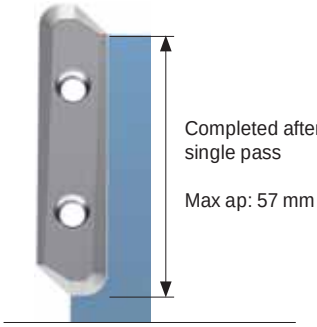
Pro-XL Mill

Features

- Cutting time is shortened by finishing the process with a single pass of deep shouldering in aluminum machining
- The single pass of shouldering enables perpendicular side faces without unevenness
- Two-Screw On system secures clamping stability



Existing cutters



Pro-XL Mill

- 4 times shorter cutting time
- Satisfactory surface finish of side faces with no need for further processing

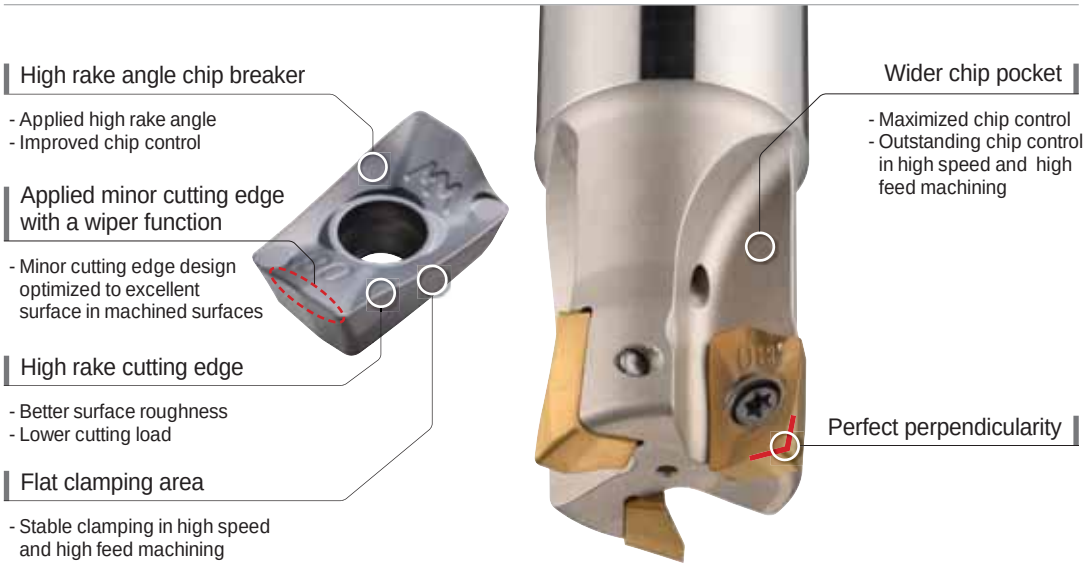
Type

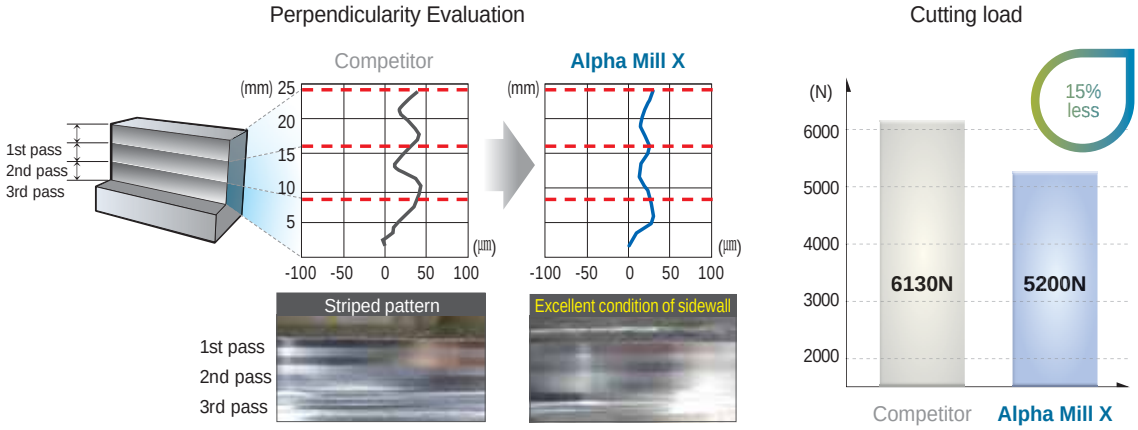
Shank
Ø40 ~ Ø50

Alpha Mill X new

Features

- Superior perpendicularity is achieved by its design and optimized for high quality surface finish.
- Lower cutting load and minimized burr due to high rake angle cutting edge
- Improved productivity due to high-speed capability and high feed machining (Compared to existing tools, cutting speed and feed per tooth are improved by 15%)





Type

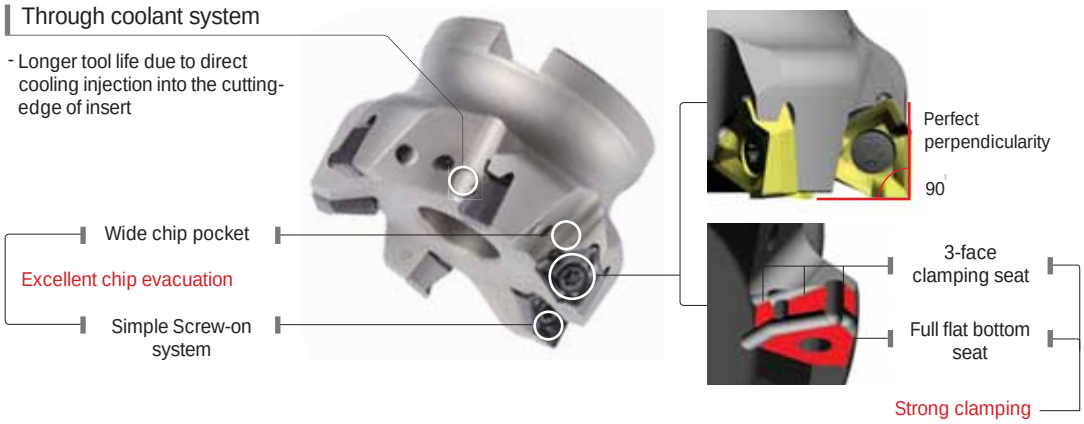
Cutter
Ø40~ Ø80

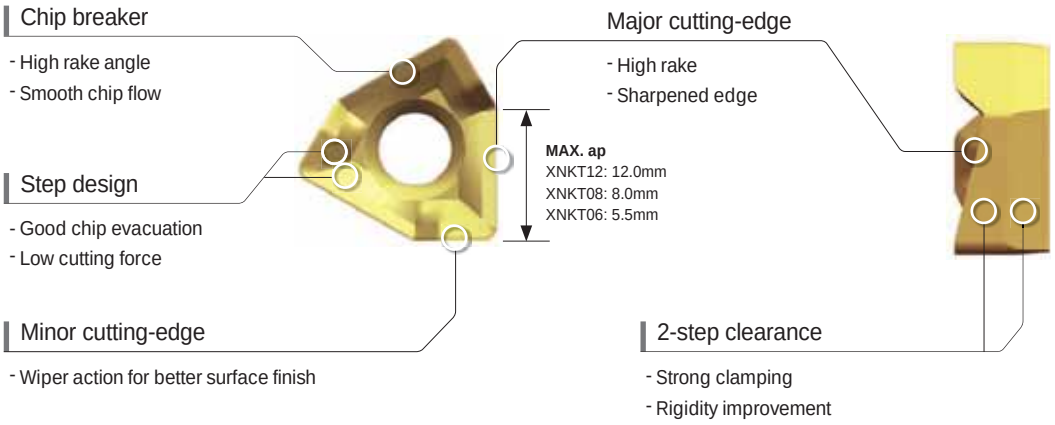
Shank
Ø32 ~ Ø40

RM3
(Rich Mill)

Features

- True 90° shouldering operation
- Strong thick insert and 3-face clamping ensure stable operation even tough condition.
- Long tool life due to optimized manufacturing process





Type

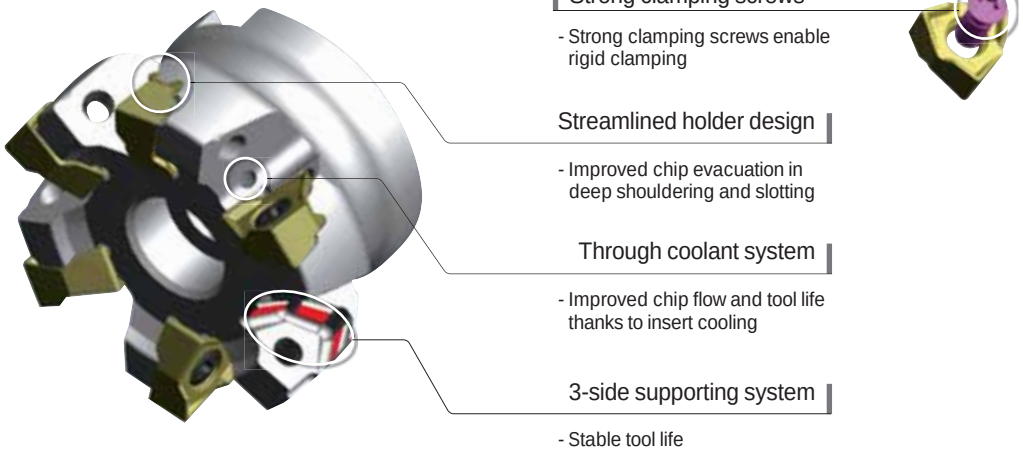
Cutter
Ø40 ~ Ø125

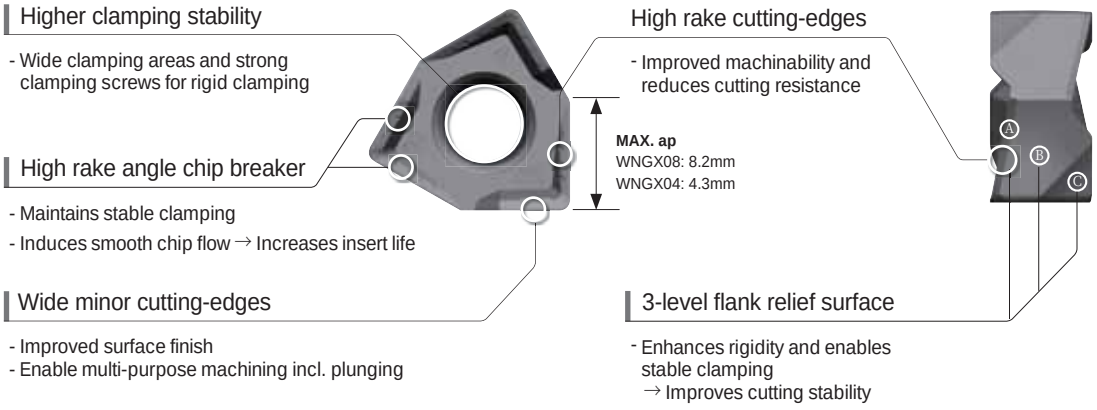
Shank
Ø20 ~ Ø63

RM6
(Rich Mill)

Features

- 3 clamping surfaces on the side and strong clamping screws
- High precision, excellent perpendicularity, outstanding surface finish on the flank, accurate tolerance
- High rake angle and sharp cutting-edges for lower cutting resistance





Type

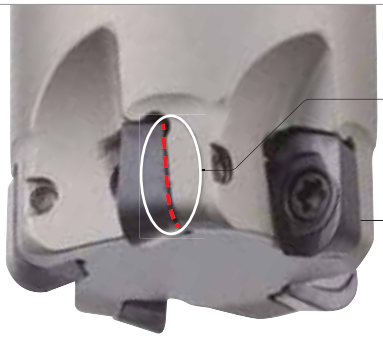
Cutter
Ø40 ~ Ø125

Shank
Ø20 ~ Ø50

HFM

Features

- Apply helix cutting edge on insert, low cutting load and reinforce toughness on corner
- Increased rigidity with double relief angle (11°, 13°), prevent interference with high feed
- To apply the negative axial rake angle when set up the holder, increased chipping resistance
- Tool life is increased with suitable C/B and grade for every material



Holder Setup

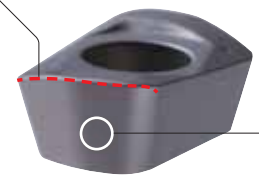
- To set up the negative axial rake angle, increased chipping resistance

No. of tooth

- Increased Tool life with increased flutes
- HRM (D) Ø20 (2 flutes) → HFM Ø20 (5 flutes)

Major cutting edge

- Apply helix cutting edge
  - Improved sharpness of principle edge
  - Improved toughness of corner edge

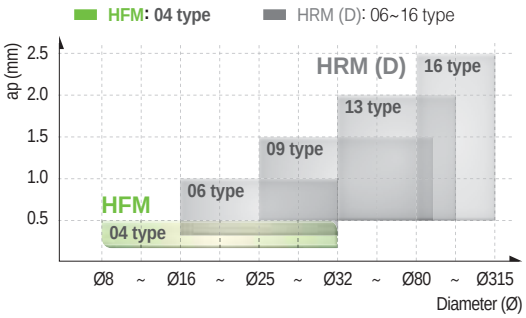


Relief angle

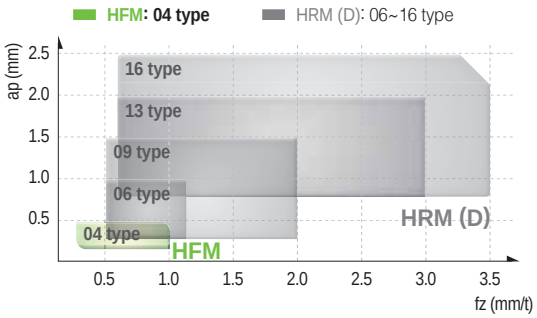
- 11, 13 double relief angle increase rigidity and prevent interference

Application Area

Application area (ap & Diameter)



Application area (ap & fz)



Type

Shank
Ø8 ~ Ø21

Modular
Ø8 ~ Ø33

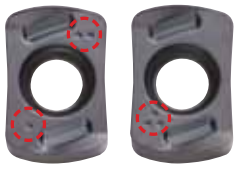
HFMD new

Features

- Economical 4-corner insert using double sides of insert
- Increased productivity due to elongated shape of insert which makes fine pitch available
- Insert designed for low cutting resistance with high rake angle and helix angle which reduces cutting load
- Inhibiting chipping and breakage due to wedge type clamping system and stronger screw

Economical 4-corner insert

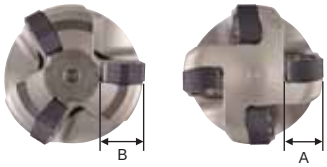
- Applicable 4 corner of one insert utilizing front/back face, and higher feed due to fine pitch



Exceptional efficiency of insert due to fine pitch

- Able to use fine pitch at the same machining diameter due to smaller inscribed circle (A < B)

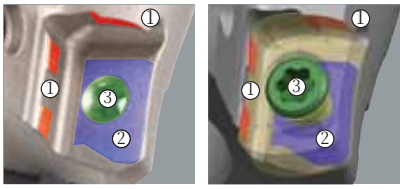
※ Tool diameter: Ø25



HRMD **HFMD**

Insert with strong clamping force

① Wedge type clamping system
② Wider bottom clamping area
③ Applied a larger size of screw



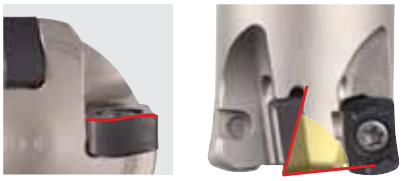
Competitor **HFMD**

→ Ehanced HFMD clamping force ensures stable tool life in high feed machining.

→ Competitor's unstable clamping causes fracture.

Insert designed for low cutting resistance

- High rake angle and helix angle minimize cutting resistance compared to the competitor and positive type of inserts



Competitor **HFMD**

→ Able to check reduced cutting resistance with bright colored chips

Type

Cutter
Ø16 ~ Ø40

Shank
Ø32 ~ Ø66

Modular
Ø16 ~ Ø42

FMR P-positive

Features

- Stable clamping system enables stable machining and productivity
- Varied product line-up ensures wide application range
- Optimal shape and grade with high hardness for hard-to-cut material machining

- P-positive relief angle (11˚) ensures high rigidity and high machinability in die steel and high-resistant alloy machining
- Flat clearance face of insert prevents interference and revolution while machining
- Optimal grades and chip breakers for various workpieces

Chip breaker
- Concave shape ensures wide chip pocket and lowers cutting temperature

Through-coolant system
- Superb chip evacuation
- Low cutting heat ensures long tool life

Clearance face for preventing rotation
- Prevents rotation in machining
- Divides corners
- Prevents interference in high-feed machining
- Ensures stable clamping

Type

Cutter
Ø40 ~ Ø250

Shank
Ø17 ~ Ø50

Modular
Ø17 ~ Ø42

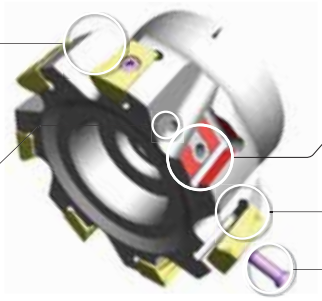
TP2P
(Tangen-Pro)

Features

- Clamping stability gained through tangential clamping system and wedge-shaped inserts
- Excellent surface finish nearly perfect perpendicularity, and highly even flank surface compared to competitors' designs
- Improved productivity due to High-rake angles and sharp cutting-edges which lead to lower cutting resistance (Ideally suited for high speed and high feed machining)

• Tangential clamping system, wedge-shaped inserts and wide seat area
→ Higher clamping stability (Lower vibrations and cutting resistance during machining)

• Optimized H/D design with curved surface for smooth chip flow
→ Excellent chip evacuation in ramping or deep shouldering



Efficient holder design
- Smoother chip evacuation in slotting or deep shouldering

Through coolant system
- Improved chip evacuation
- Longer tool life due to insert cooling

Wide seat area
- Strong clamping force

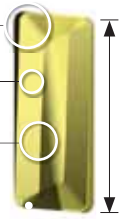
Wedge type clamping
- Stable insert life

Tangential clamping
- Multi-corner use → High feed machining availability

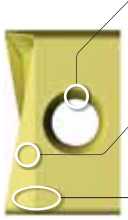
Wedge type clamping area
- Clamping in wedge form on seats → Creates strong clamping force

High-rake angle chip breaker
- High-rake angle applied
- Produces smooth chip flow → Extended insert life

Convex projection
- Improved chip evacuation
- Enhances rigidity



MAX. ap
LNKT17:
16.5mm



Side hole (tangential type)
- Higher clamping stability

High-rake angle cutting-edges
- Improves cutting performance while reducing cutting load

2-level flank relief surface
- 1st reverse positive relief surface enhances rigidity
- 2nd negative relief surface enables stable clamping
- Improved chipping resistance and surface finish

Type

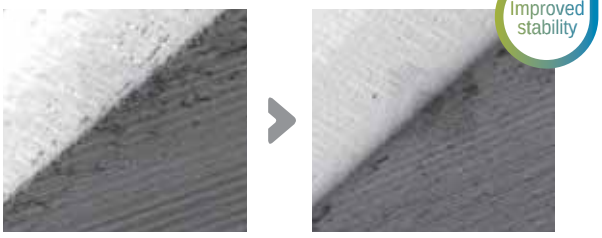
Cutter
Ø40 ~ Ø125

Shank
Ø32 ~ Ø50

H Endmill

Features

- For cutting high hardened and heat-treated steel under HRC70
- New coating technology improves wear resistance
- A new shape improves machinability
- High speed and highly accurate machining available



before

After special edge treatment

- New grade (PC303S, PC310U)
  Ultra fine substrate and AlTiSiN coating guarantee excellent wear resistance
- Special edge treatment
  Special cutting edge design was applied for less chipping and longer tool life
- High accuracy with tolerance h5
  High quality production system enables tolerance-h5 throughout the whole series

PBE (Ball)

S shape of ball

⇒ • The S shape of ball disperses cutting loads
• The tolerance of ball R is under ±0.005mm

PRE (Radius)

H Endmill radius | New shape of corner R | Measurement result of tolerance of corner R

⇒ • The new shape of corner R reduces cutting loads
• The tolerance of corner R is under ±0.005mm

Type

Ball type
PBE2000
Ø0.5 ~ Ø12

Radius type
PRE4000
Ø3 ~ Ø12

Z Endmill

Features

- Endmill for general cutting of various workpieces under HRC45 (carbon steel, alloy steel, cast iron, pre-hardened steel, etc.)
- New shape and coating improves performance and tool life
- Optimized blade design for less chipping and stable machining

before

After special edge treatment

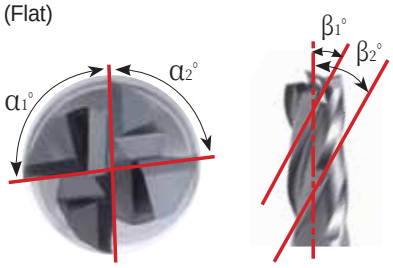
- New grade (PC315E)
  Fine substrate and lubricative coating guarantee excellent performance at high speed and high temperature
- Special edge treatment
  Special cutting-edge design was applied for less chipping and longer tool life
- High accuracy with tolerance-h5
  High quality production system enables tolerance-h5 throughout the whole series

ZBE (Ball)

S shape of ball

⇒ • The S shape of ball disperses cutting loads
• The tolerance of ball R is under ±0.005mm

ZFE (Flat)



α1°≠α2°, β1°≠β2° Irregular indexing & helix

⇒ • Irregular indexing & helix prevent chattering and improve surface

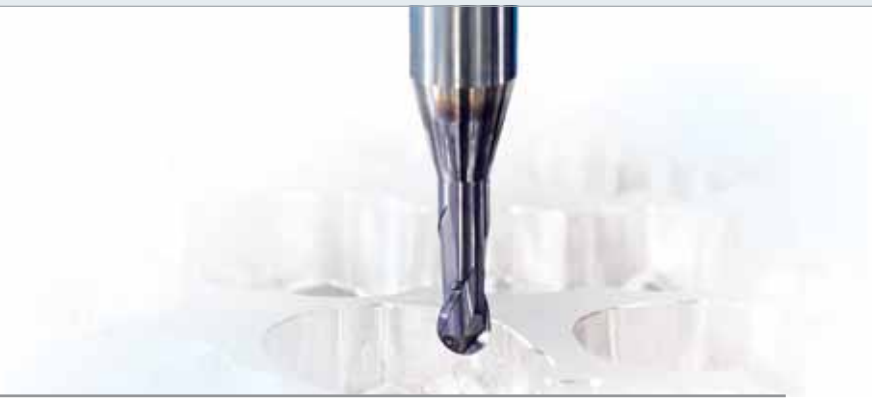
Type

Flat type
ZPE2000/4000
Ø1 ~ Ø16

Short flat type
ZSFE2000/4000
Ø1 ~ Ø12

Ball type
ZBE2000
Ø1 ~ Ø12

T Endmill



Features

- For machining dental prostheses made of zirconia, titanium, Co-Cr, wax, PMMA, etc
- Optimized cutting performance by matching a proper grade with each type of materials
- Inhibited unevenness and excellent finish in machined surfaces due to the optimized cutting-edge design
- Specialized tool shape for each machine type

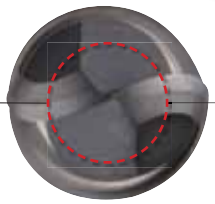
- A dedicated tool for each machine - Meets marketplace demands
- A specialized grade for each workpiece - Provides optimized performance for various materials of implants
- Optimized cutting-edge design - Enables excellent machinability

Tangential cutting-edge shape

- One-Pass Grinding applied
- Inhibited unevenness and excellent finish in machined surfaces

Center-Matched ball shape

- Optimized center shape ensures relief angle at the ball point
- Cutting edges of the ball point shape provide excellent wear resistance and cutting performance

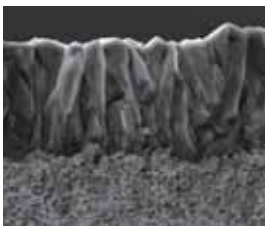


Grade solution for Zirconia

Surface of ND3000

High hardness diamond coating (Hv 10,000) provides excellent wear resistance

Cross section of coated layers

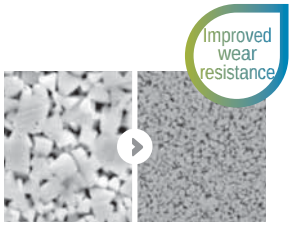


Specialized grade for Zirconia provides excellent adhesion

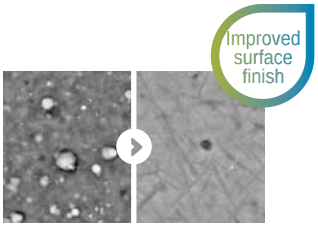
Development of ND3000 (Diamond-coated grade)

- High hardness diamond coating that is excellent in machining graphite and ceramic
- Optimized for high speed and medium duty cutting thanks to its excellent grip to coated layers

Grade solution for Titanium



Fine grade **Ultrafine grade**



Conventional coating **Post-coating treatment**

Development of PC2510 (Coated grade for high hardened steel)

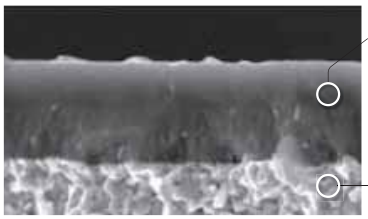
- Post-coating treatment was applied to improve surface finish
- A grade optimized for interrupted machining of high hardness steels and wet treatment accompanying high thermal shock. Its ultrafine substrate features high toughness which allows stable performance

Z+ Endmill

Features

- Wide range of workpiece materials up to HRC47
- Wide application range from roughing to finishing
- Increased tool life thanks to a new substrate and advanced coating layers
- Prevented chipping and extended cutting time thanks to its optimized blade design

- Wide range of workpiece materials - Carbon steel, alloy steel, cast iron, etc
- Extended tool life - Newly invented substrate and high-tech coating layers applied
- Higher productivity - Wide application range from roughing to finishing



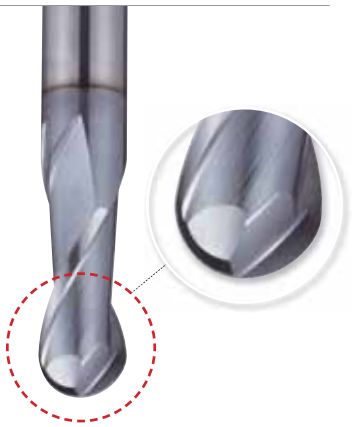
PC320U

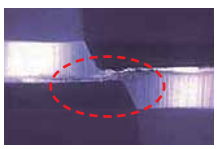
AlCrSiN coating layer

- Coating lubrication making possible high temperature/ high speed machining

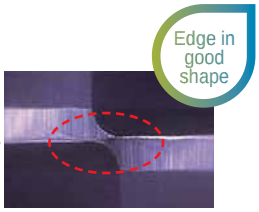
Ultra-fine substrate

- Substrate with excellent wear resistance applied



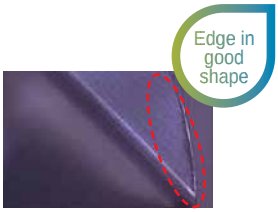


Competitor



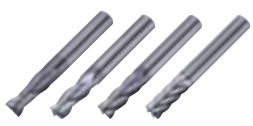
Z+ Endmill

Competitor



Z+ Endmill

Type



Flat type
ZPFE2000/3000/4000/6000
Ø1 ~ Ø25

Short flat type
ZPSFE2000/4000
Ø1 ~ Ø16

Long flat type
ZPLFE2000/4000
Ø2 ~ Ø20

Long flute type
ZPLFE2000/4000
Ø1 ~ Ø20

Ball type
ZPBE2000/4000
Ø0.8 ~ Ø20

Long ball type
ZPLBE2000
Ø2 ~ Ø12

Radius type
ZPRE2000/4000
Ø1 ~ Ø16

Long radius type
ZPRE2000/4000
Ø6 ~ Ø16

R+ Endmill

Features

- Cost-effective cutting-edge design for rough machining
- Specifically designed corners as irregular flute spacing and lead angle

- Excellent machining efficiency - Special design for medium to rough cutting
- Longer cutting life - Extended tool cost due to newly applied grades
- Higher cutting performance - Blade design ideal for roughing

Lower cutting

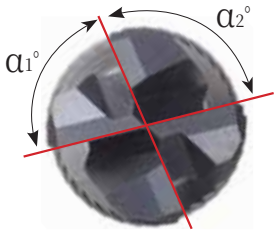
- Ideal for medium to rough cutting
- Special edge design

Soft cutting

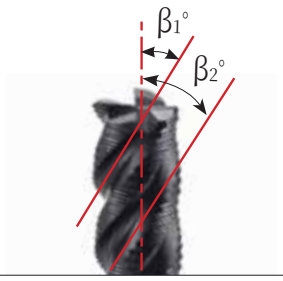
- Serrated cutting edges
- 3 Combo R

High quality results

Irregular flute spacing to prevent chattering
(α1° ≠ α2°)



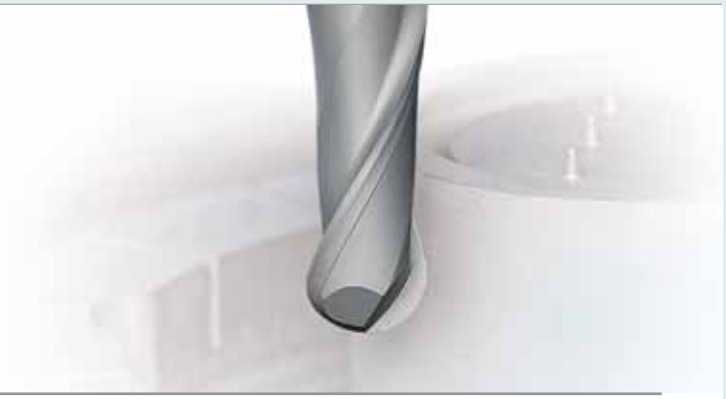
Irregular lead angles to disperse cutting force
(β1° ≠ β2°)



Type

RPE-XG/RPAE	RPLE-FP-H/RPE-FP-L	RPE-RG/RPE-FP-H	RPE-RG/RPE-FF/ RPE-FP	RPE-RG
Ø6 ~ Ø20 / Ø6 ~ Ø25	Ø5 ~ Ø20	Ø5 ~ Ø20	Ø6 ~ Ø20	Ø6 ~ Ø50

D Endmill

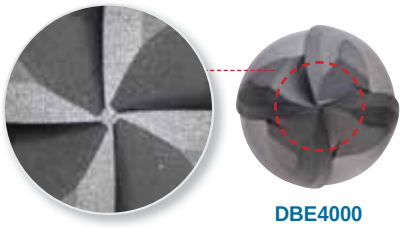


Features

- Tangential cutting-edge geometries for excellent surface finish
- Excellent wear resistance due to high hardness and high purity diamond coating
- Advanced surface finish and cutting performance due to sharp edges and tangential tool geometries

• Center-matched ball shape (4-flutes)

- Ball point shape for high feed machining
- Improved rigidity and excellent surface finish



DBE4000

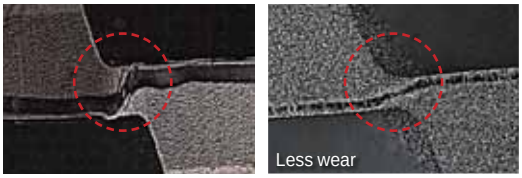
• Tangential cutting-edge geometries

- One-Pass grinding system
- Prevents stepped cone on the machined surface
- 2-flutes and 4-flutes tooling with a ball nose

ND3000
(Diamond Coated Grade)

- High hardness diamond coating for machining graphite and ceramics
- Good adhesion strength for high speed and heavy duty machining

Less flank wear



Competitor ND3000

⇒ Reduced creation of massive flank wear on the relief surface due to excellent wear resistance

Less edge flaking

Competitor ND3000

⇒ Reduced coating delamination due to excellent adhesion between coating and substrate

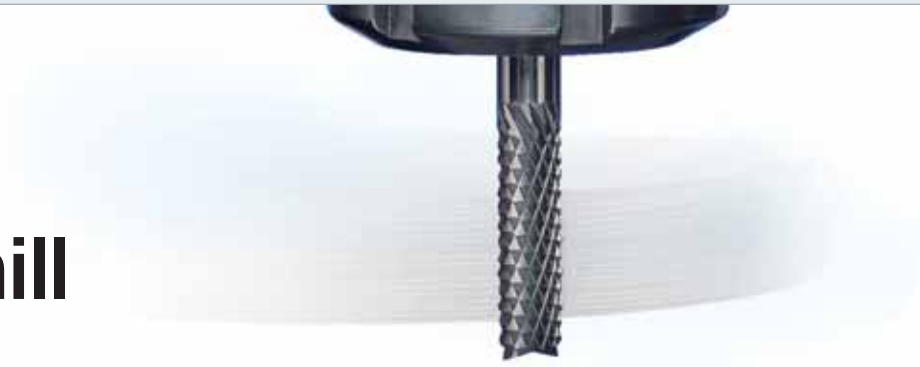
Type

Flat type
DFE2000/4000
Ø1 ~ Ø12

Ball type
DBE2000/4000
Ø0.6 ~ Ø12

Radius type
DRE2000/4000
Ø0.5 ~ Ø12

Composite Router Endmill

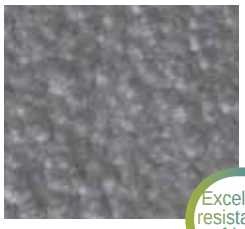


Features

- Router endmills optimized for machining composite materials (CFRP/GFRP)
- Excellent tool life thanks to nano-crystal diamond coating
- Blade design for reducing flaking and burrs
- Improved productivity through high efficiency machining

Existing diamond coating

Nano-diamond coating



- Diamond-coated grade ND2110 for machining composite materials
- High hardness diamond coating (over Hv 8,000)
- Nano-diamond coating with excellent resistance to friction and welding
- Improved resistance to flaking remove by applying the specialized grade for diamond coating

CCDR (Dual Helix Router Endmill)

- Dual helix design to inhibit flaking on upper and lower faces of workpieces
- Endmill for finishing, profiling, and grooving

CCHR (High-performance Router Endmill)

- Applied multi flute Nick design for higher machining efficiency
- Endmill for roughing, profiling, and grooving

CCR (Router Endmill)

- Down cut design for low vibrations and cutting force
- Endmill for roughing, profiling, and grooving

CCLR (Low Helix Router Endmill)

- Fewer burrs due to the low axial cutting force
- Endmill for finishing, profiling, and blind groove making

CCRR (Reverse Helix Router Endmill)

- Reverse helix design to inhibit a drift in the workpiece's course
- Endmill for finishing, profiling, and through groove making

Type

Flat type
CCDR4000/6000
Ø6 ~ Ø12

Flat type
CCHR4000/6000
Ø6 ~ Ø12

Flat type
CCR2000
Ø4 ~ Ø12

Flat type
CCLR4000
Ø4 ~ Ø12

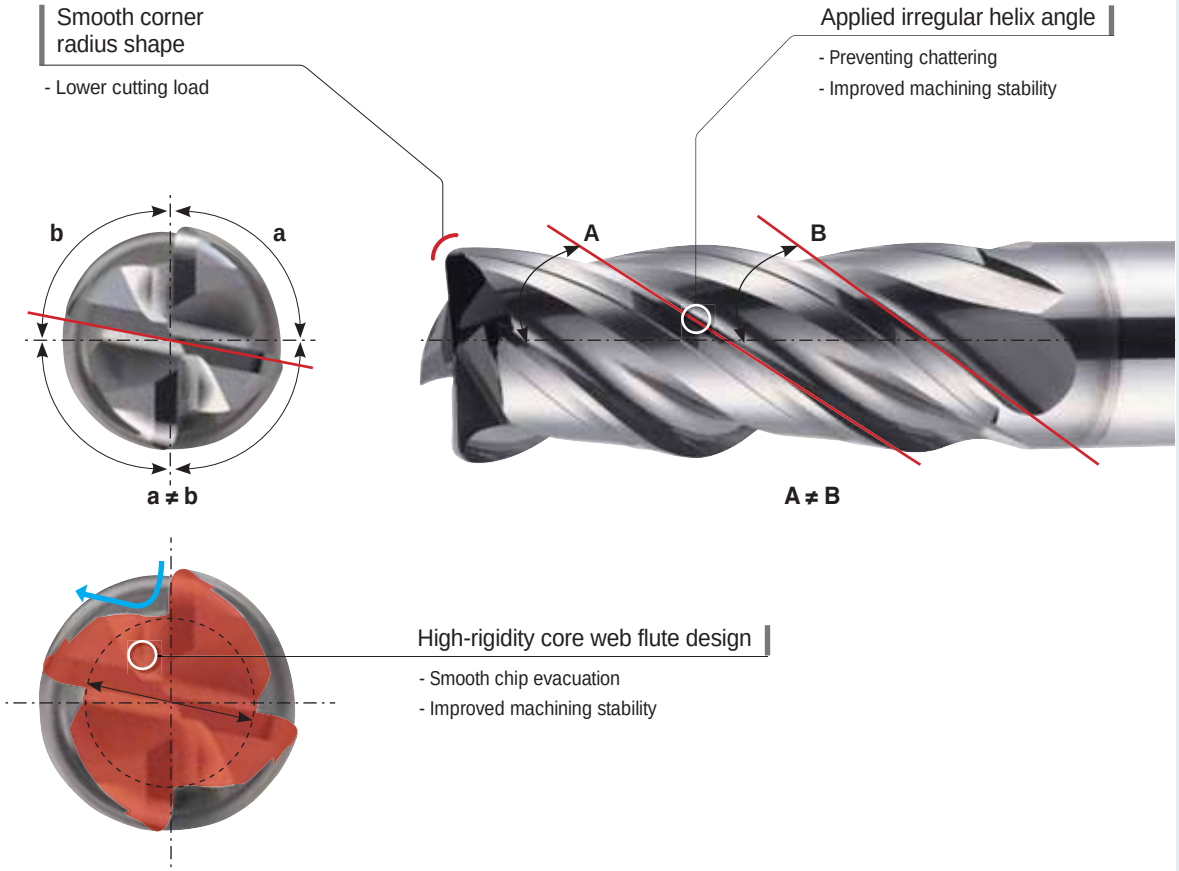
Flat type
CCRR6000/8000
Ø6 ~ Ø12

Super Endmill for HRSA

new COMING SOON 09.2019

Features

- Radius endmill for machining of aerospace structural components made of Ni-based HRSA
- Improved machining stability due to irregular flute spacing and high-rigidity core design
- Extended tool life due to tough substrate and application of AlCrN coating layer

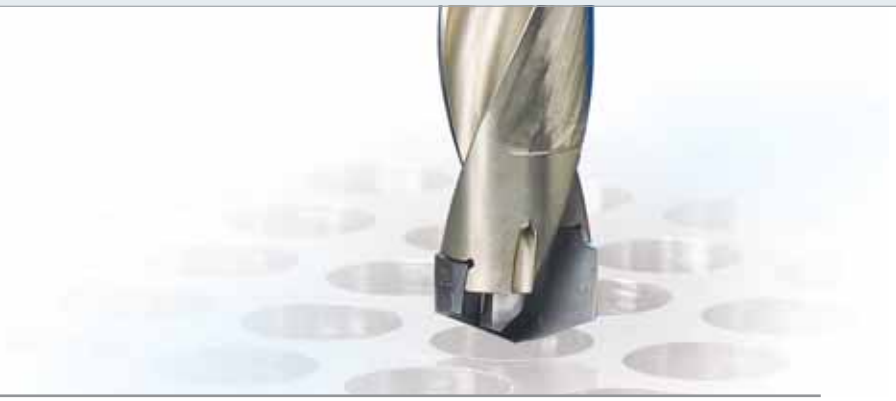


Type

Radius type
SRE4000
Ø3 ~ Ø20

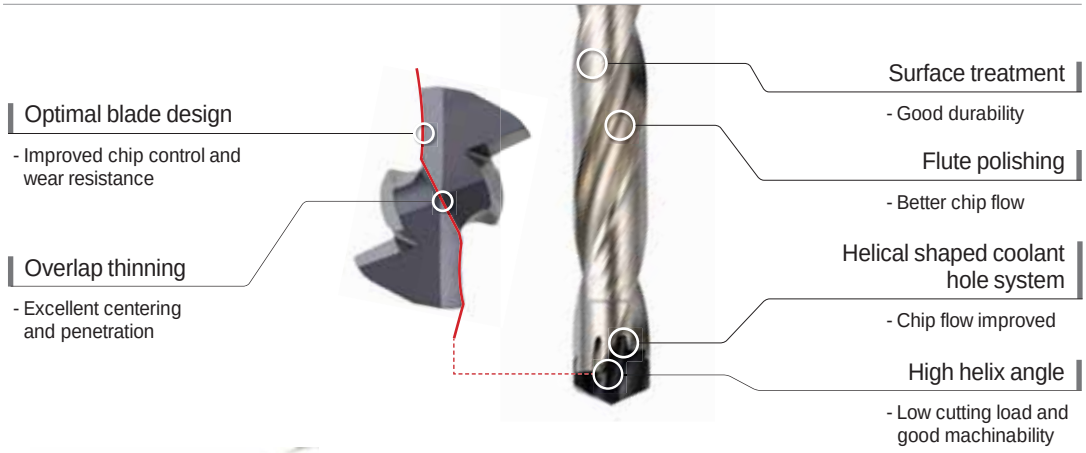
TPDC

new COMING SOON 09.2019

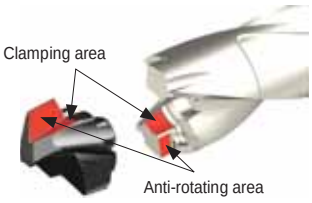


Features

- One step clamp system → Increased stability
- Clamping system allowing to change inserts while the holder is attached on the machine → Shortened setting time
- Excellent chip control → Possible to use for various types of workpieces
- Wide chip pocket area secured → Better lubrication + chip flow improved
- Ultra-fine substrate + Multi-layer coating applied → Excellent anti chipping & wear resistance
- Expanded designations of I/S and H/D → Ensuring optimized machining per workpiece and meet the customer demand

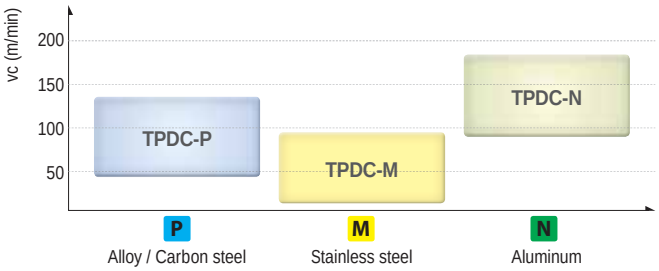


Features of Clamping system



One step clamp system
- Easy and quick tool change with good repeatability
- Clamping area: Easy and fast tool change
- Anti-rotating area: Performs as a stopper
- Clamping and anti-rotating area make an acute angle to prevent insert rotation while machining

Application Area



Type

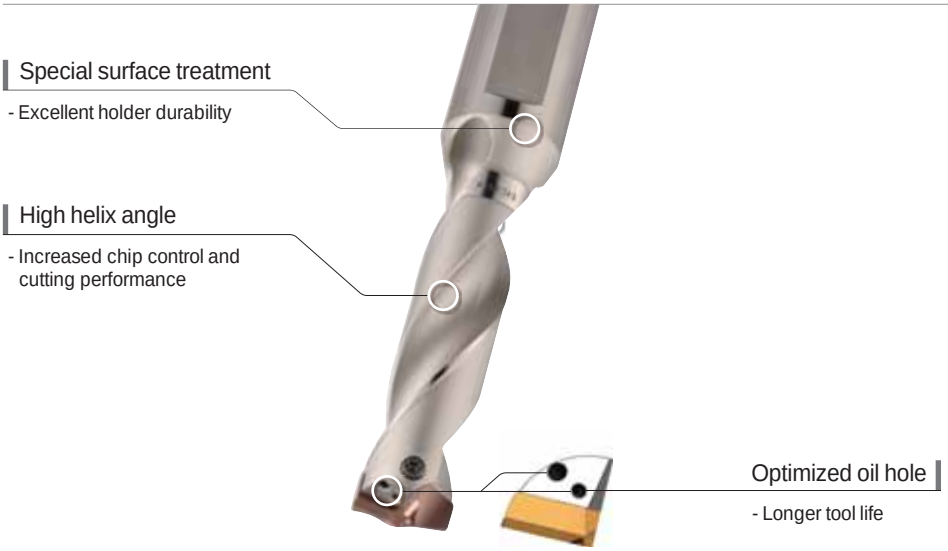
TPDC-3D	TPDC-5D	TPDC-8D	TPDC-10D	TPDC-12D
Ø12 ~ Ø30.99	Ø12 ~ Ø30.99	Ø12 ~ Ø30.99	Ø12 ~ Ø30.99	Ø12 ~ Ø30.99

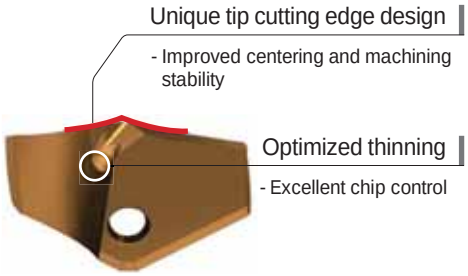
TPDB-H

new COMING SOON 09.2019

Features

- High performance indexable drill dedicated for hole machining of the steel-frame structure (H-Beam) in construction industry
- Ensuring great centering and hole quality due to optimized insert tip shape when machining holes
- Extended life due to the brand-new coating





Chip control

SM490A

SS400

Cutting conditions
- Workpiece: SM490A, SS400
- vc: 80m/min
- fn: 0.2mm/rev
- ap: 20mm
- Cutting fluids: wet

Type

TPDB-H_3D
Ø14 ~ Ø30

TPDB-H_4D
Ø14 ~ Ø30

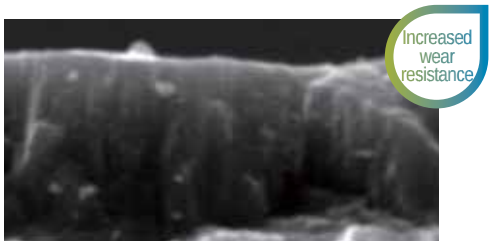
MSD Plus

Features

- Highly efficient hole making for various workpieces including automobile components
- Excellent chip evacuation thanks to wider chip pockets.
- Strong wear resistance thanks to our new PC325U grade

• New grade (PC325U)

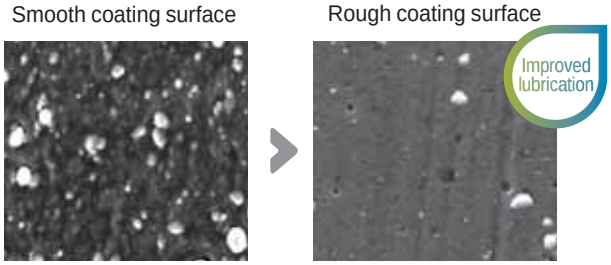
- Lubricative coating layer improves welding resistance at middle to high speed.
- Increase wear resistance in machining carbon steel



PC325U

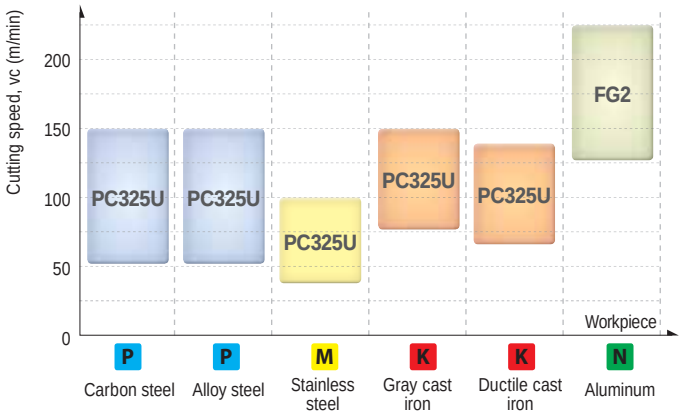
• Surface of coating layer

- Increased welding resistance and lower cutting load
- Reduced frictional resistance at cutting edges and on the flute

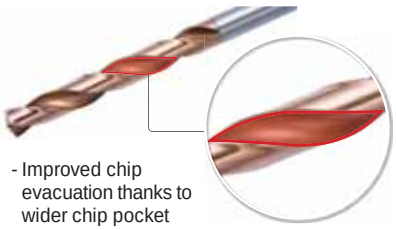


Competitor PC325U

Application area



Flute shape



- Improved chip evacuation thanks to wider chip pocket

Type

MSDP-☐ (P/M/K/N)
Ø1 ~ Ø2.4

MSDPH-☐ (P/M/K/N)
Ø2.5 ~ Ø20

MSD Plus-S

Features

Specialized for heat-resistant alloys used in the aerospace, energy, power generation and automotive industries

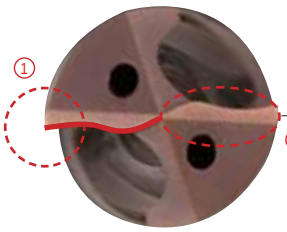
- Ensuring machinability with optimized blade design and chip pockets
- Extended tool life due to excellent high temp resistance to chipping

Flute design

- Wider chip pockets improve chip evacuation

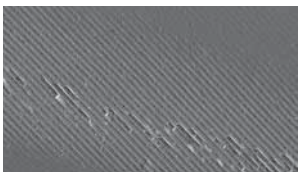
Optimized margin and back-tapered design

- Reduced friction resistance and cutting temperature

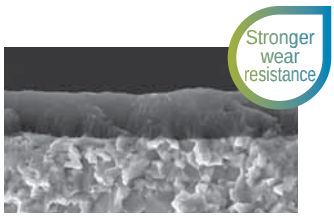


Cutting-edge design

- Notch-controlled blade design and specially treated cutting edges prevent chipping and breakage
  - ① Cutting edges designed for low cutting resistance
  - ② Tip relief angle and shape optimized for heat evacuation



Smooth coating surface



PC325T

- Reduced friction resistance and improved chip evacuation due to excellent surface finish
- Exceptional wear resistance when machining heat-resistant alloys at high temperatures

Type

MSDPH-S
Ø3.0 ~ Ø16

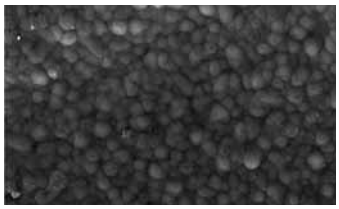
MSD Plus CFRP

Features

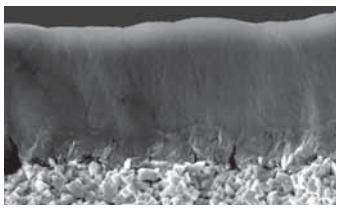
- Excellent wear resistance remove due to the new diamond-coated grade, ND2100
- Reduced burrs when machining CFRP due to high rake cutting edges

- Reduced thrust around corners due to the 2-step point angle
- Reduced burrs when drilling CFRP due to high rake cutting edges

High hardness diamond coating maintains well-cut shapes



Diamond coating's strong grip to the substrate



- Diamond Coating specialized in CFRP machining
- Diamond-coated substrate optimized for CFRP cutting

Less wear and flaking on the rake surface

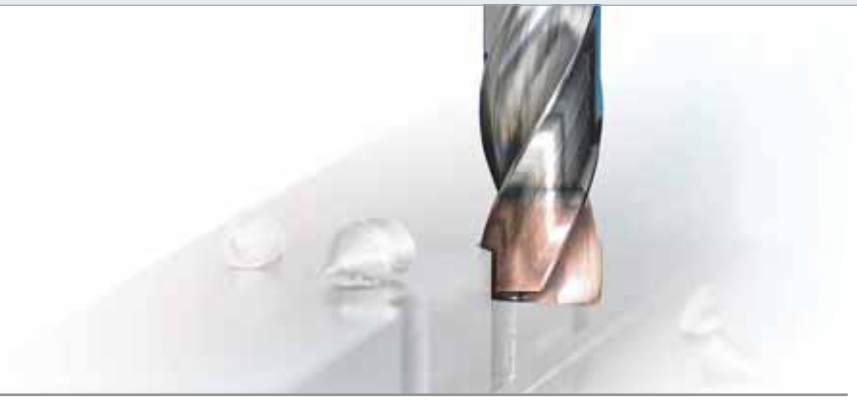
Fewer burrs on workpieces

- Inhibited burr creation by keeping cutting edges in good shape

Type

MSDP-5C
Ø3 ~ Ø12.7

MSFD

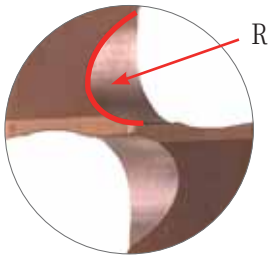


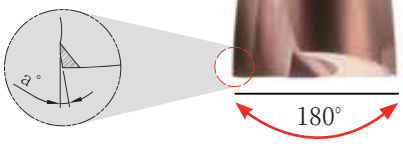
Features

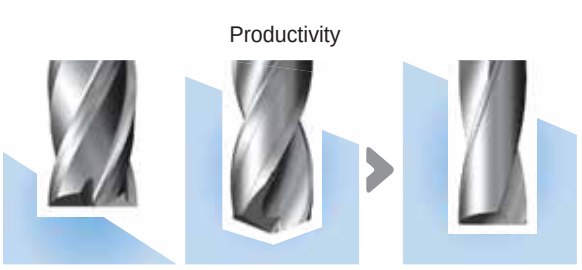
- High quality hole making capability with 180°-point angle
- Improved anti chipping and welding resistance by edge honing and chamfering which minimized the creation of burrs compared to general drills

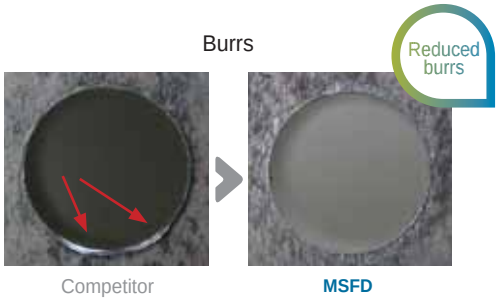
Cutting edge design

- Excellent straightness with its 180° -point angle when drilling on ramped surface
- Stronger resistance to chipping through corner chamfering
- Widened chip pockets by the use of 'R' shape on the thinning part







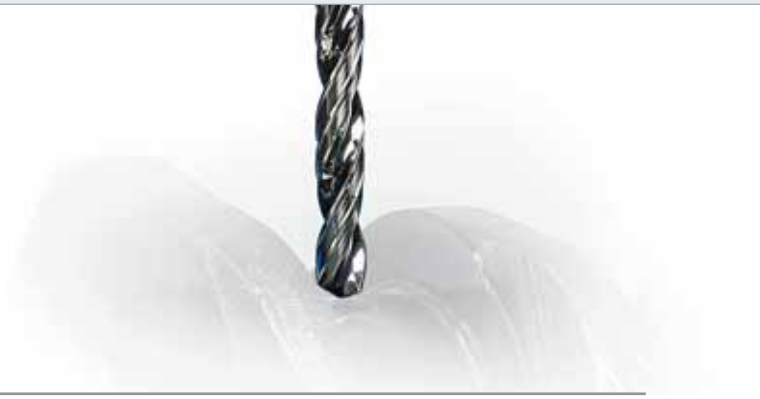


Type

MSFD-2P
Ø2.5 ~ Ø12

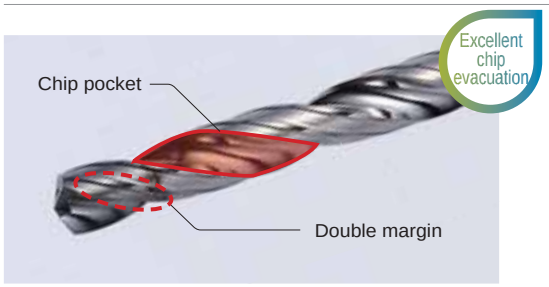
MSFDH-3P
Ø2.5 ~ Ø12

MLD Plus

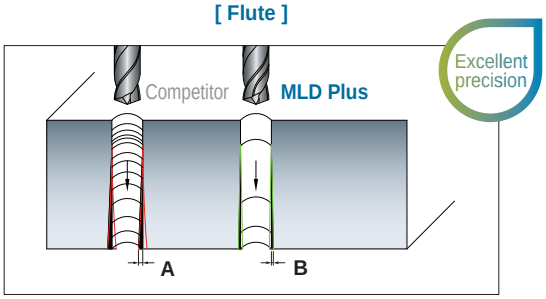


Features

- Excellent stability due to new guide margin added
- Strong wear resistance due to our new PC315G grade



[Flute]



Reduced bent holes compared to competitors (a > b)

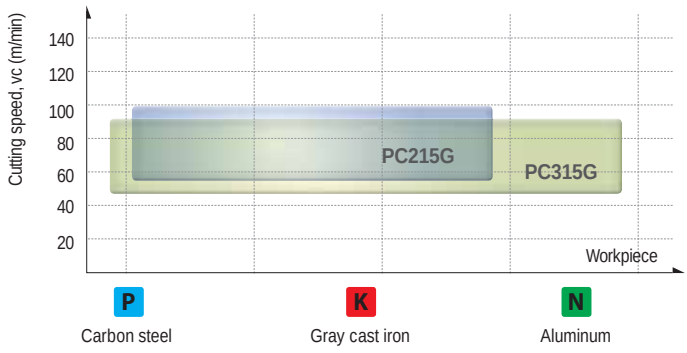
Cutting edge and flute shape

- Straight cutting edge provides better rigidity
- Excellent chip evacuation due to wider chip pocket and improved flute surface roughness
  - Double margin secures machining stability

Degree of machining precision

- Improved machining precision
  - Bent holes reduced, Inside hole surface roughness improved
  - Hole size uniformity increased
- Improved point shape
  - Precise location secured

Application area



PC215G

Excellent performance when machining cast iron and alloy steel at high speed

PC315G

Universal grade excellent when machining carbon steel, cast iron, etc. at middle to low cutting speed

Type

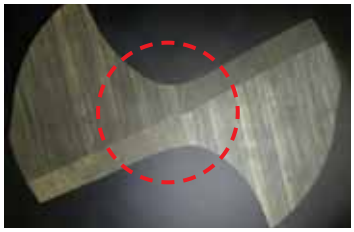
MLD-☐☐(P/K/N)
Ø3 ~ Ø10

SSD Plus

Features

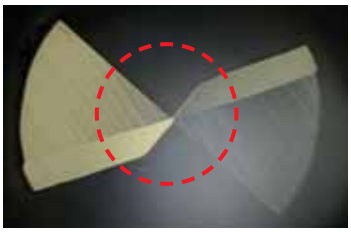
- Improved chip control due to the new flute design
- Higher quality machining achieved from improved surface finish and forming
- Increased productivity due to stable tool life
- A variety of workpiece materials available including mild steel and non-ferrous

Existing SSD



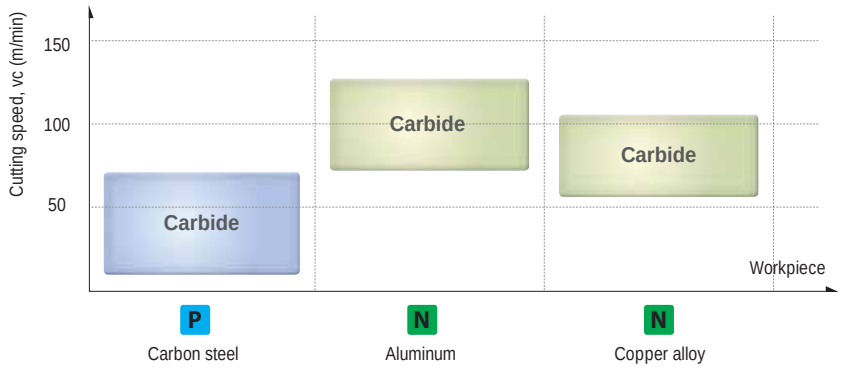
Application area : N

SSD Plus (SSDP)



Application area : P, N

Application area



Type

SSDP
Ø1 ~ Ø15

www.korloy.com

KORLOY

Holystar B/D, 1350, Nambusunhwan-ro, Geumcheon-gu, Seoul, 08536, Korea
Tel : +82-2-522-3181 Fax : +82-2-522-3184, +82-2-3474-4744 Web : www.korloy.com E-mail : export@korloy.com

KORLOY AMERICA
620 Maple Avenue, Torrance, CA 90503, USA
Tel : +1-310-782-3800 Toll Free : +1-888-711-0001 Fax : +1-310-782-3885
E-mail : sales.kai@korloy.com

KORLOY EUROPE
Gablonzer Str. 25-27, 61440 Oberursel, Germany
Tel : +49-6171-277-83-0 Fax : +49-6171-277-83-59
E-mail : sales.keg@korloy.com

KORLOY INDIA
Plot NO.415, Sector 8, IMT Manesar, Gurgaon 122051, Haryana, India
Tel : +91-124-4391790 Fax : +91-124-4050032
E-mail : sales.kip@korloy.com

KORLOY BRASIL
Av. Aruana 280, conj.12, WLC, Alphaville, Barueri,
CEP06460-010, SP, Brasil
Tel : +55-11-4193-3810 E-mail : sales.kbl@korloy.com

KORLOY VIETNAM
No. 133, Le Loi street, Hoa Phu ward, Thu Dau Mot city,
Binh Duong, Vietnam
Tel : +84-96-856-1230 E-mail : sales.kvc@korloy.com

KORLOY TURKEY
Orucreis Mah. Vadi Cad. No: 108 Istanbul Ticaret Sarayi
Kat 5 No: 318 Giyimkent Sitesi-Esenler/Istanbul, Turkey
Tel : +90-212-438-5197 E-mail : service@korloy.com.tr

KORLOY CHILE
Av. Providencia 1650, Office 1009, 7500027
Providencia-Santiago, Chile
Tel : +56-229-295-490 E-mail : sales.kcs@korloy.com

KORLOY FACTORY QINGDAO
Ground Dongjing Road 56(B) District Free Trade Zone. Qingdao, China
Tel : +86-532-86959880 Fax : +86-532-86760651
E-mail : pro.kfq@korloy.com

KORLOY FACTORY INDIA
Plot No. 415, Sector 8, IMT Manesar, Gurgaon 122051, Haryana, India
Tel : +91-124-4391790 Fax : +91-124-4050032
E-mail : pro.kim@korloy.com

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