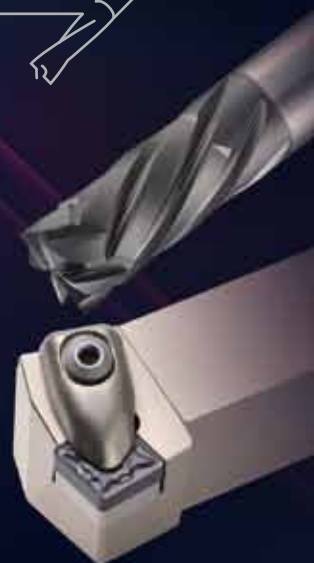


HIGHEST  
QUALITY  
TOTAL  
SOLUTION

# New Product

Korloy's New And  
Best-Selling Products



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Korloy's New And  
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# NEW PRODUCTS



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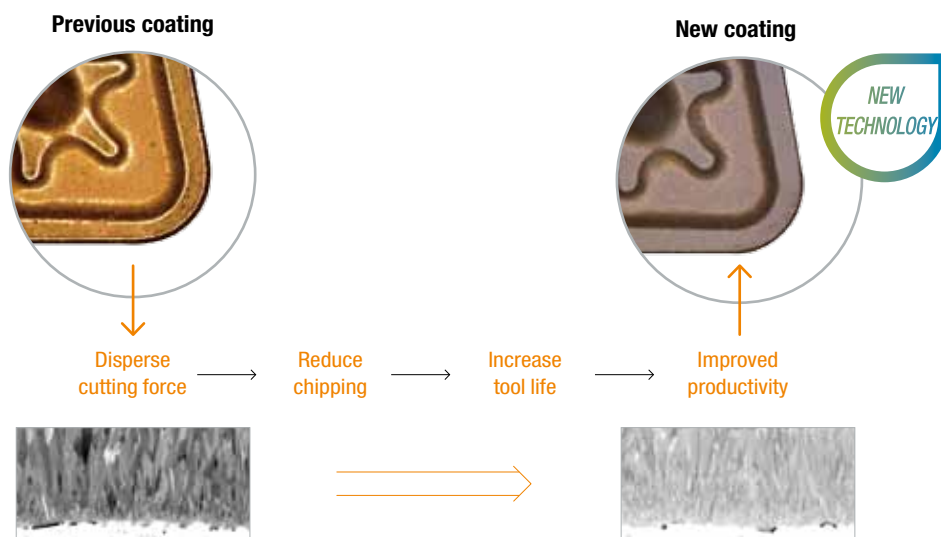
# NC3215 NC3225

## 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

### Features

- **Stable tool life**
  - Higher production stability
- **Longer tool life & Higher removal rate**
  - High cutting conditions and shorter cutting time available
- **Ideal combination of a grade and chip breakers**
  - Prolongs tool life
  - Wide applications ranging from roughing to finishing

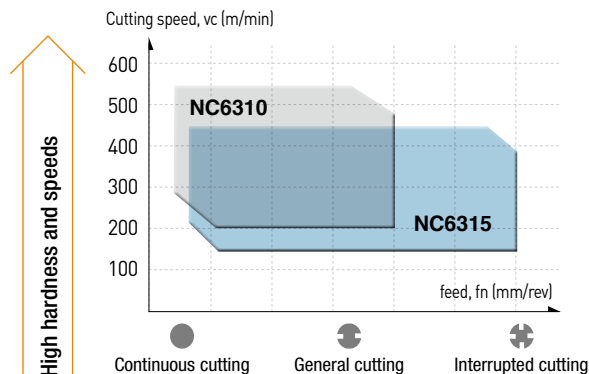
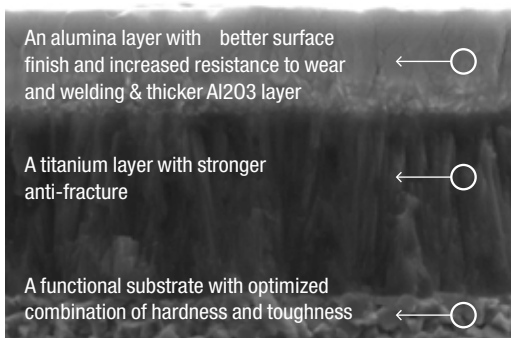






- Boosted productivity due to K10 & K15, the CVD-coated grades optimized for high speed and feed turning applications of cast iron
- MK chip breaker for medium cutting and RK chip breaker for roughing cast iron at high speeds and high feeds, wet or dry

**Features**

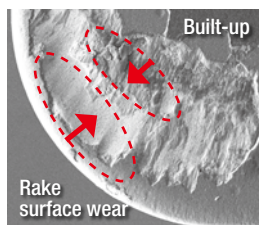


**MK**  
(For medium cutting)

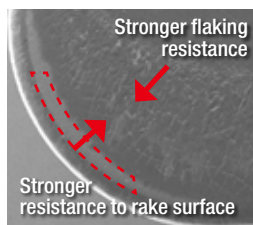


**RK**  
(For rough cutting)

High toughness and interruptions



Improved resistance to wear and flaking



Enhanced wear resistance



# NC9115/NC9125 NC9135

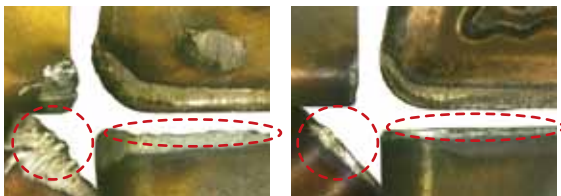
## Features

- 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

## Features

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

### Inhibited built-up edge and blade damage



Competitor (M25)

NC9125 (M25)

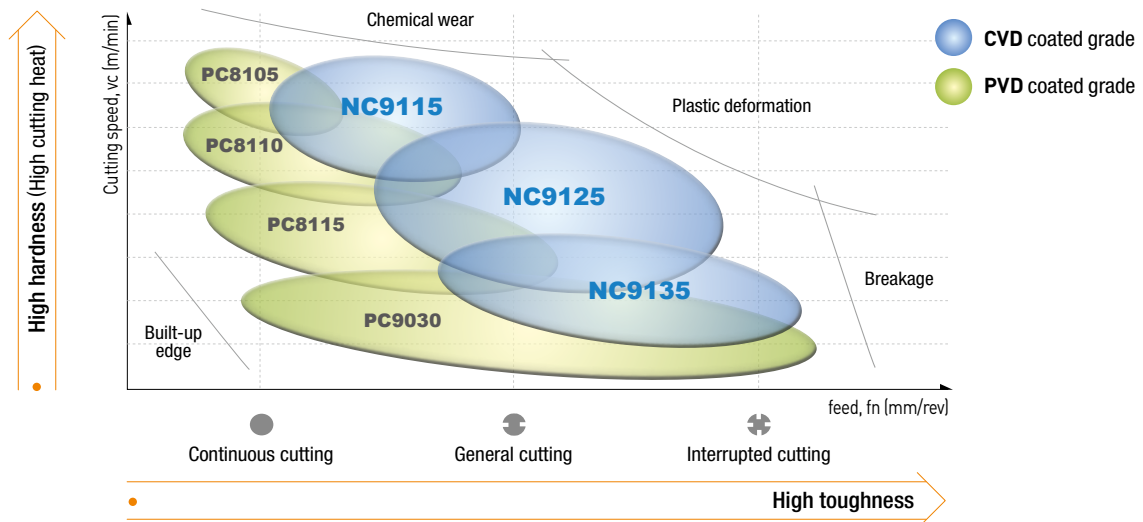
### Inhibited wear on notch and relief surface



Competitor (M25)

NC9135 (M35)

## Grades lineup





# PC2005/PC2010 PC2015

## Features

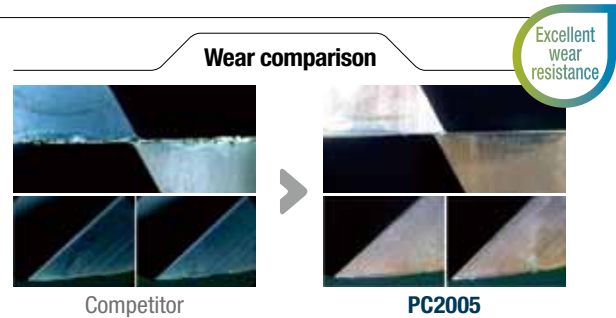
- Finishing grade lineup for tool steel and plastic die steel
- PC2005 with extremely hard substrate and coatings
- PC2010 with high hardened cutting edges, ideally suited for pre-hardened steel and interrupted cutting
- PC2015 for carbon steel and casting machining, demonstrating excellent performance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

## Features

### • 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.

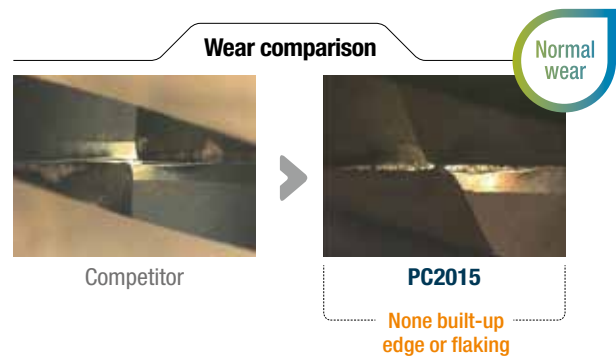
→ Heat shield coating was applied to prevent thermal crack.



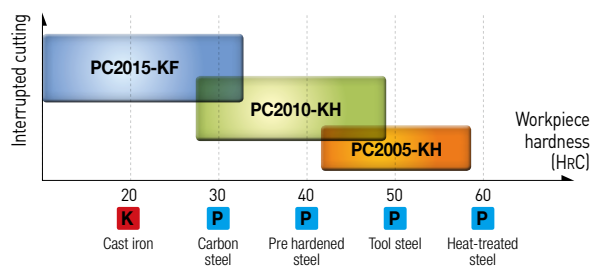
### • PC2015 (Exclusive for Laser Mill for machining cast iron and carbon steel)

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



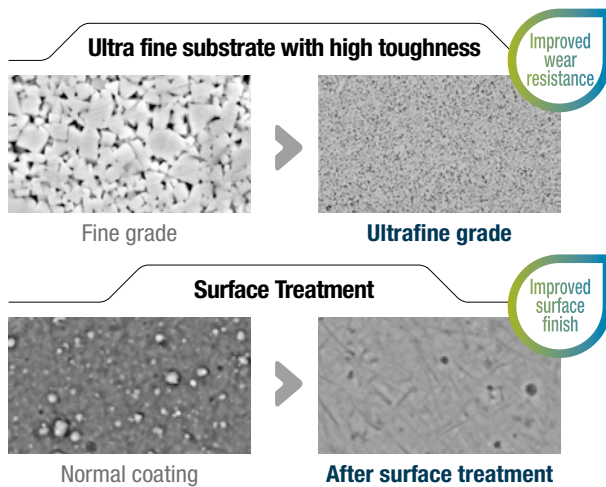
# PC2505 PC2510

## Features

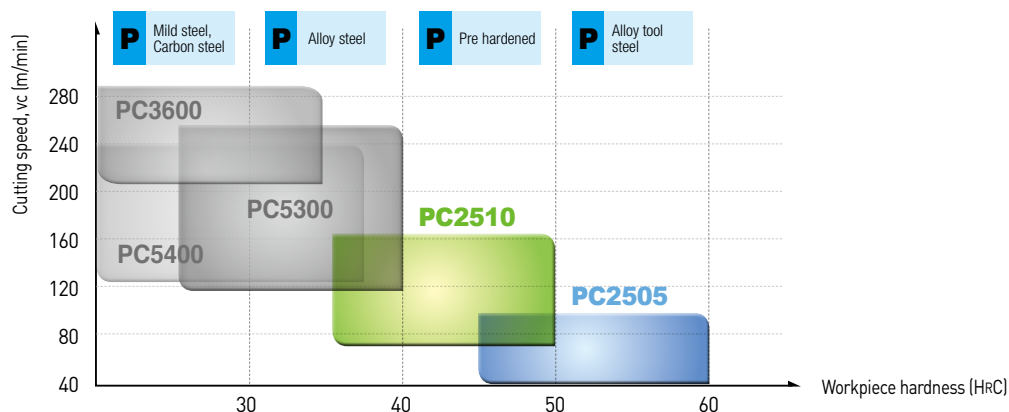
- Roughing grade series for high hardened steel
- PC2505 with excellent wear resistance, ideal for machining die steel and high hardened steels over HRC50
- PC2510 with stabilized toughness, ideal for interrupted cutting of high hardened steel and wet cutting accompanied by massive thermal shock

## Features

- **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







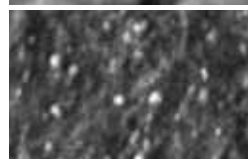
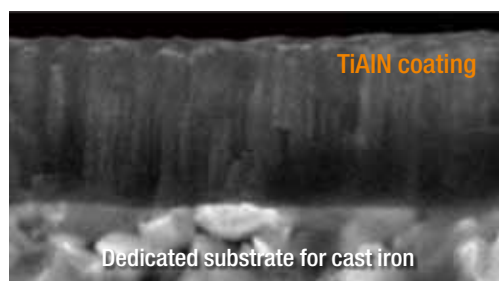
# PC6510

## Features

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

### Features

- 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

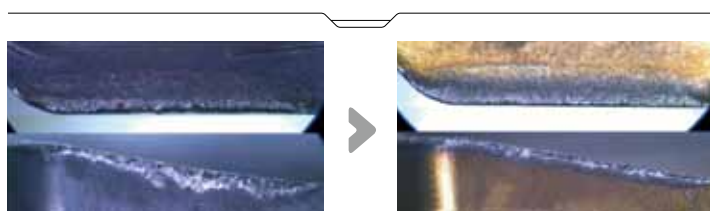


General coating



Surface treatment applied

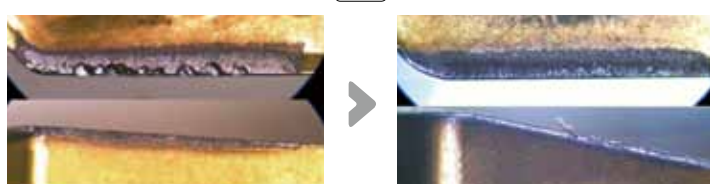
Improved resistance to welding & thermal cracks



Competitor

NEW PC6510

⇒ Improved wear resistance



Competitor

NEW PC6510

⇒ Inhibited flaking and thermal cracks



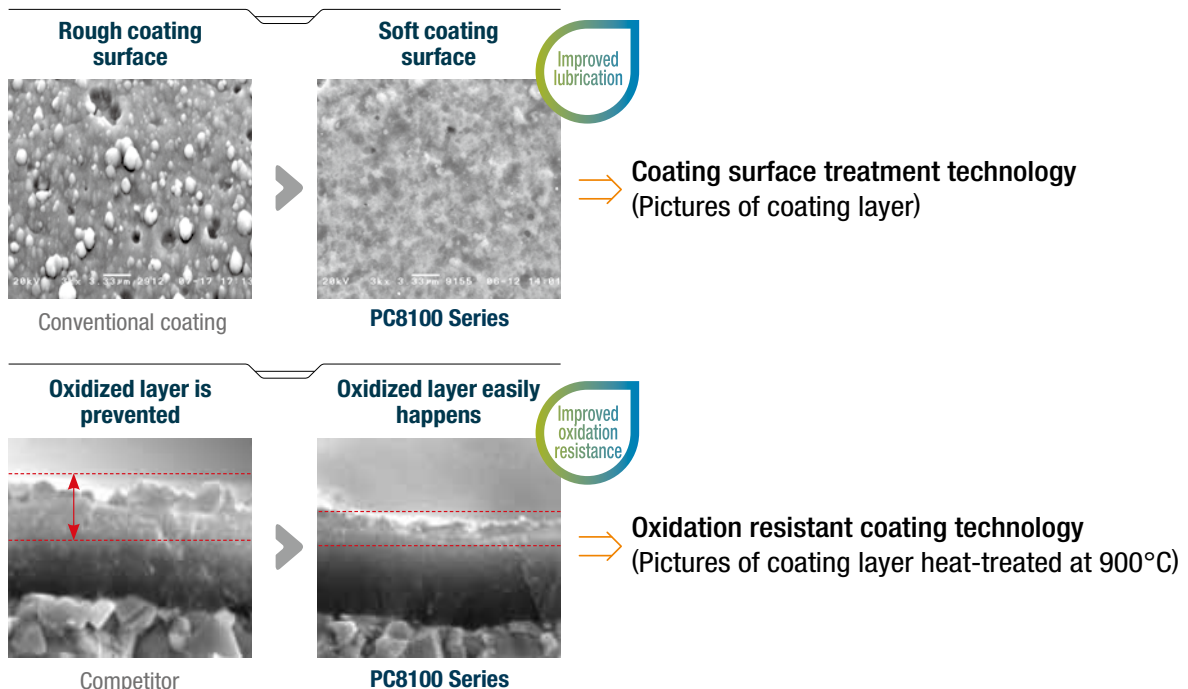
# PC8105/PC8110 PC8115

## Features

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

### Features

- **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





# CC1500 CC2500

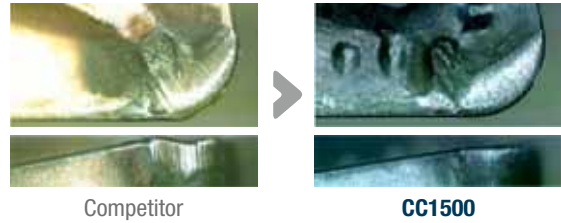
## Features

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

### Features

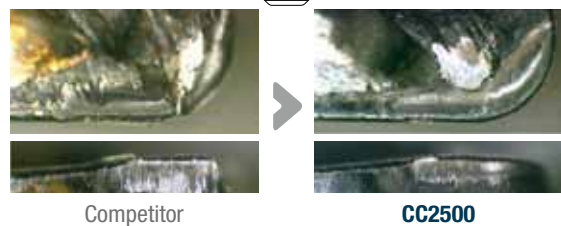
#### • CC1500

- 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 steel

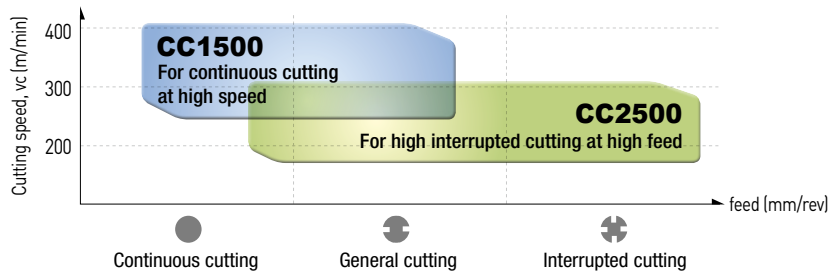


#### • CC2500

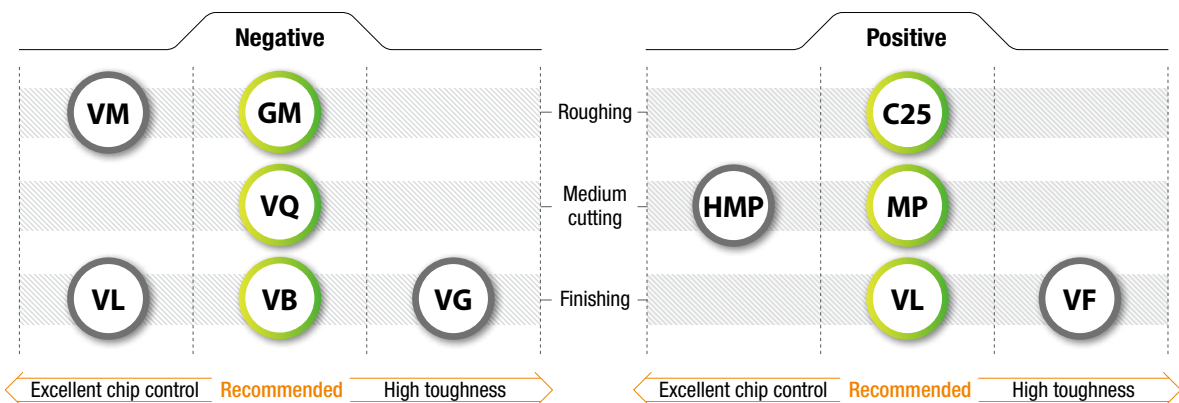
- Maximized resistance to built-up edge and oxidation in interrupted cutting at high feeds and high depth of cuts
- Superior impact resistance vs. existing tools in interrupted cutting of carbon steel and alloy steel



### Grades lineup



### Chip breakers lineup





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

### Features

#### • 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

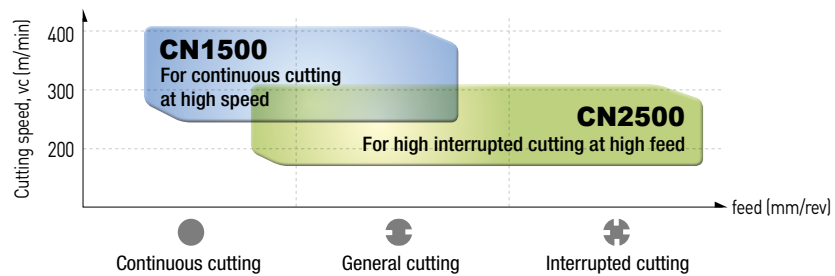


#### • CN2500

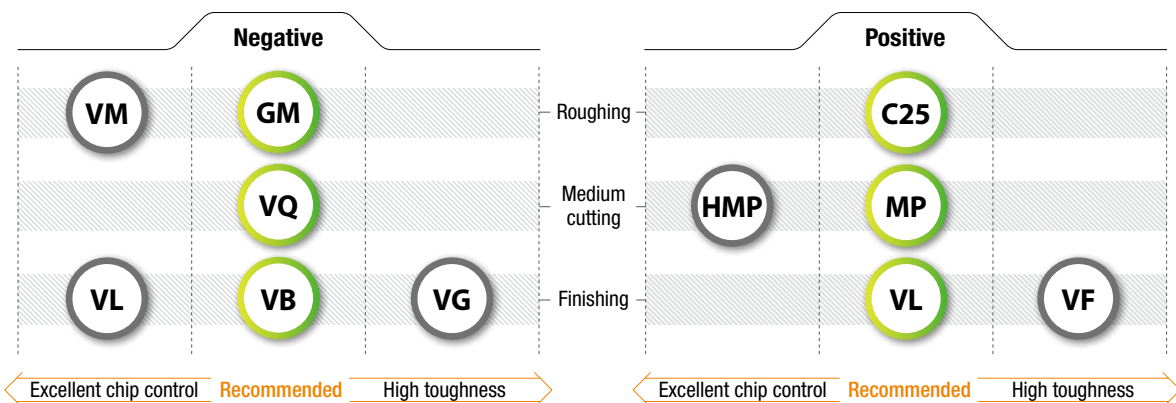
- For high interrupted machining of cold/hot forged steel and Sintered ferrous alloy at high feed and high depth of cut
- Excellent resistance against chipping, fracture and thermal crack



### Grades lineup



### Chip breakers lineup





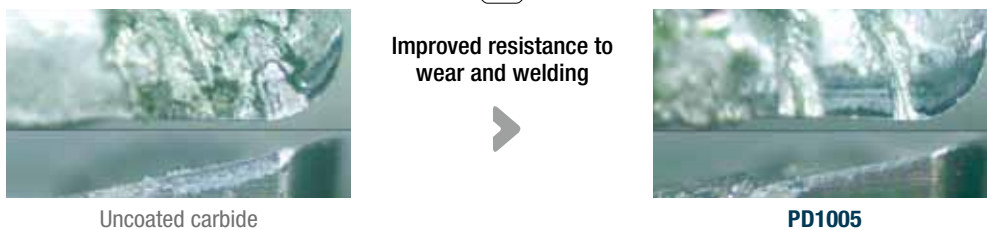
# PD1005 PD1010

## Features

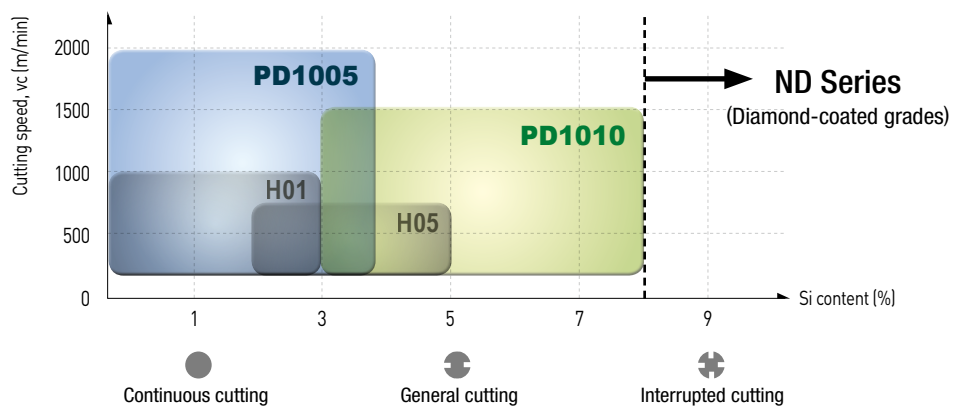
- DLC-coated grades for high speed and quality machining of non-ferrous metals such as aluminum and copper
- Maximized resistance to chipping and welding due to the dedicated grades and advanced DLC coating

### Features

- **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



# MP/LP 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

### Features of MP chip breaker

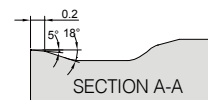
#### Front two step dot

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

#### Variable land

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

#### Flat zone



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

### Features of LP chip breaker

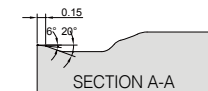
#### Front dot

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

#### Variable land

- Less crater wear
- Prevents chipping on minor cutting edge

#### Flat zone



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





# RM/MM Chip Breaker

## Features

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

### Features of RM chip breaker

#### Variable land

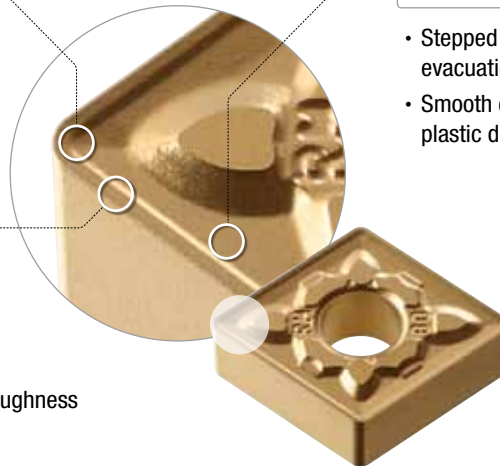
- Excellent chip control and sharp cutting at low depths of cut
- Delays crater wear
- Prevents plastic deformation

#### Wide land & Gentle front angle

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

#### Stepped design

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



### Features of MM chip breaker

#### Variable land

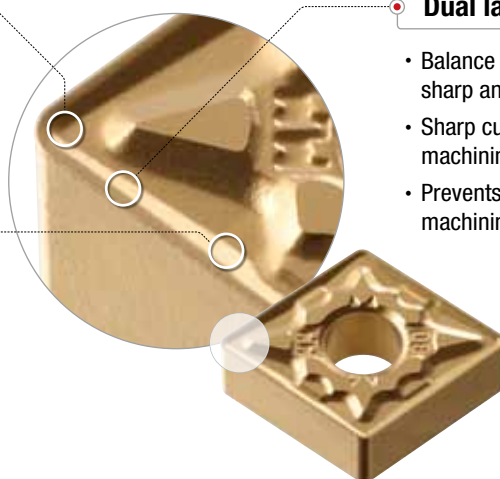
- Excellent chip control and sharp cutting at low depths of cut
- Delays crater wear
- Prevents plastic deformation

#### 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

#### Dual land

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



# 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

### Features of 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

### Features of 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



# 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

### Top side (Insert)



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



### KGT lineup

### Application

	Parting	Grooving	Turning	Copying	Special	For Aluminium
<p>Medium and large, interrupted cutting</p> <p>•</p> <p>Small, continuous cutting</p>	<p><b>Rough Parting</b> For high feed parting off</p> <p><b>Rough Grooving</b> For high feed machining</p>	<p><b>Turning-Multi Grooving</b> For general purpose</p> <p><b>T(KGM) Internal Grooving</b> For internal machining</p>		<p><b>Copying</b></p>	<p><b>Blank</b> For customized shapes</p>	<p><b>KGGN-A</b> For copying aluminium</p> <p><b>KRGN-A</b> For grooving aluminium</p>
	<p>▶ Lead angle applied to LP &amp; RP chip breakers - only for parting off</p> <p>▶ B chip breaker can be customized (contact required in advance)</p>					

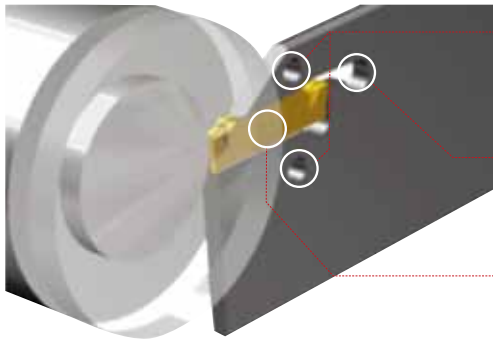


# KGT Blade

## 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

### Features



#### Specially designed slot

- Strong clamping and durability

#### Easy change of insert

#### Wide clamping area

- Better stability

### How to clamp insert

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



### Blade lineup

Range of cutting edge width: 1.5 ~ 8.0mm



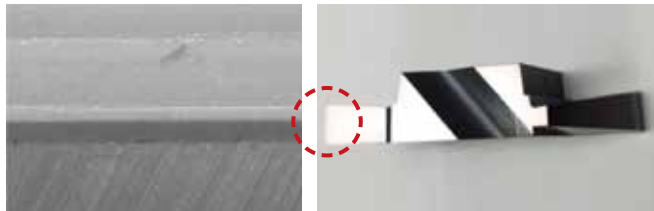


# Top Notch

## 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 and cBN grade

## Features

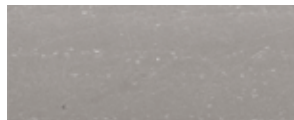


- Excellent surface finish due to cutting edges in uniformly high quality

Competitor's coating

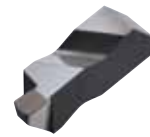


**KORLOY's coating**

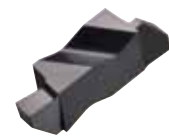


- Lower cutting load due to the lubricating treatment

## Product range



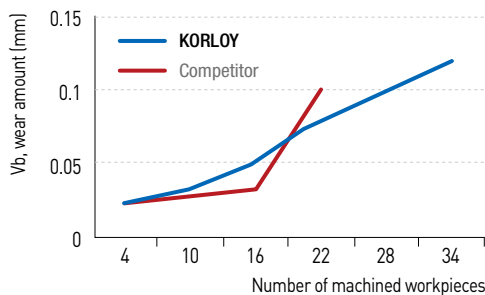
**PC8110**  
(Coated insert)



**cBN**  
(Insert)

## Performance evaluation

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



## Number of machined workpieces



Competitor



**KGNP3M300R**  
(PC8110)





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

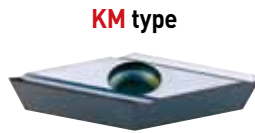
**E class tolerance (KF/KM type) – Fully ground high precision Insert**

**G class tolerance (VP1 type)**



For finishing

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



For medium to finishing

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



For medium to finishing

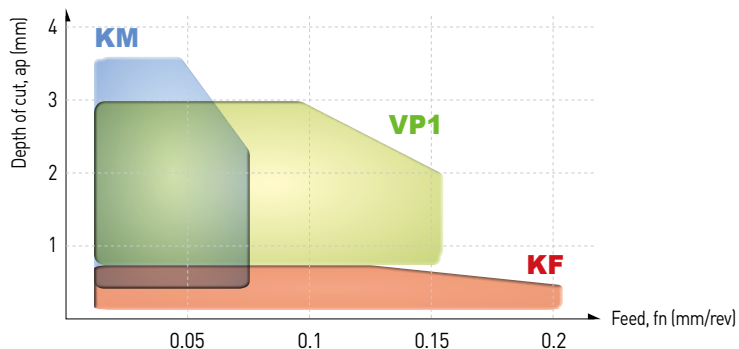
- Three dimensional C/B for stable chip control
- Sharp edges for low cutting load and heat

**Insert tolerance**

Precise tolerance	True R formation / Minus tolerance	High surface quality
<p>• E class: <math>\pm 0.025\text{mm}</math></p>	<p>• Existing one: <math>\pm 0.02\text{mm}</math> • Minus tolerance: <math>0 \sim -0.02\text{mm}</math></p>	<p>• Precise machining: High quality and precision</p>

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

**Cutting range**



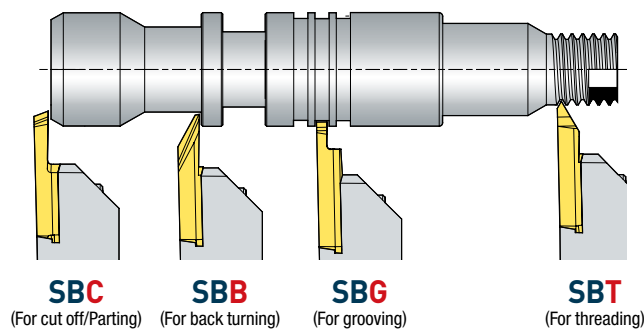


# AUTO Tools Blade





## 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

## Application example



## Types of blade insert

<b>SBC</b> (For cut off/Parting)	<b>SBB</b> (For back turning)	<b>SGB</b> (For grooving)	<b>SBT</b> (For threading)
			
<ul style="list-style-type: none"> <li>• Cutting width: 0.7~2.0</li> <li>• D Max.: 16mm</li> <li>• Nose R: 0.05mm</li> </ul>	<ul style="list-style-type: none"> <li>• Approach angle: 59°</li> <li>• Max. cutting depth: 4mm</li> <li>• Nose R: 0.05, 0.1, 0.2mm</li> </ul>	<ul style="list-style-type: none"> <li>• Width: 0.5~2.5mm</li> <li>• Nose R: 0.05mm</li> </ul>	<ul style="list-style-type: none"> <li>• V profile: 60°</li> <li>• Pitch: 0.2~1.0mm</li> <li>• Nose R: 0.05mm</li> </ul>

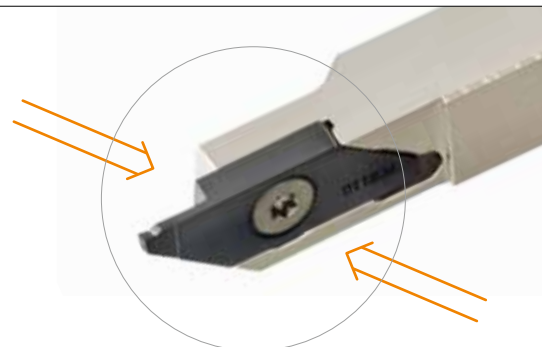
## Blade holder

### Screw holes on both sides

- Easy to exchange inserts → **Improved productivity**

### Insert corner change

- Tolerance repetition  $\pm 0.001$  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

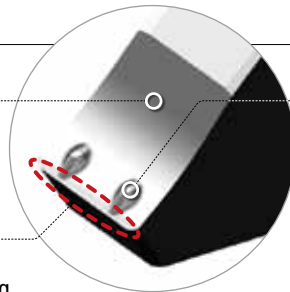
### TB5-M chip breaker

#### Lowered back area

- Minimizes chip frictions to prevent overload when evacuating chips

#### Cutting edge land

- Prevents chipping and improves machining stability in interrupted cutting



#### 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

Designation	TB5050N-M ~ TB5120N-M	TB5140N-M ~ TB5178N-M	TB5196N-M ~ TB5239N-M	TB5247N-M ~ TB5287N-M	TB5300N-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

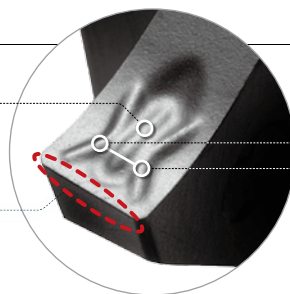
### TB4-M chip breaker

#### Sub dots

- Control stability of chip curls at high feed

#### Sharp cutting edges

- Deliver sharp cutting performance



#### Main dots

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

Designation	TB4150R-M ~ TB4185R-M	TB4200R-M ~ TB4228R-M	TB4300R-M ~ TB4350R-M	TB4400R-M ~ TB4450R-M
Cutting edge width (b)	1.5 ~ 1.85mm	2.0 ~ 2.8mm	3.0 ~ 3.5mm	4.0 ~ 4.5mm



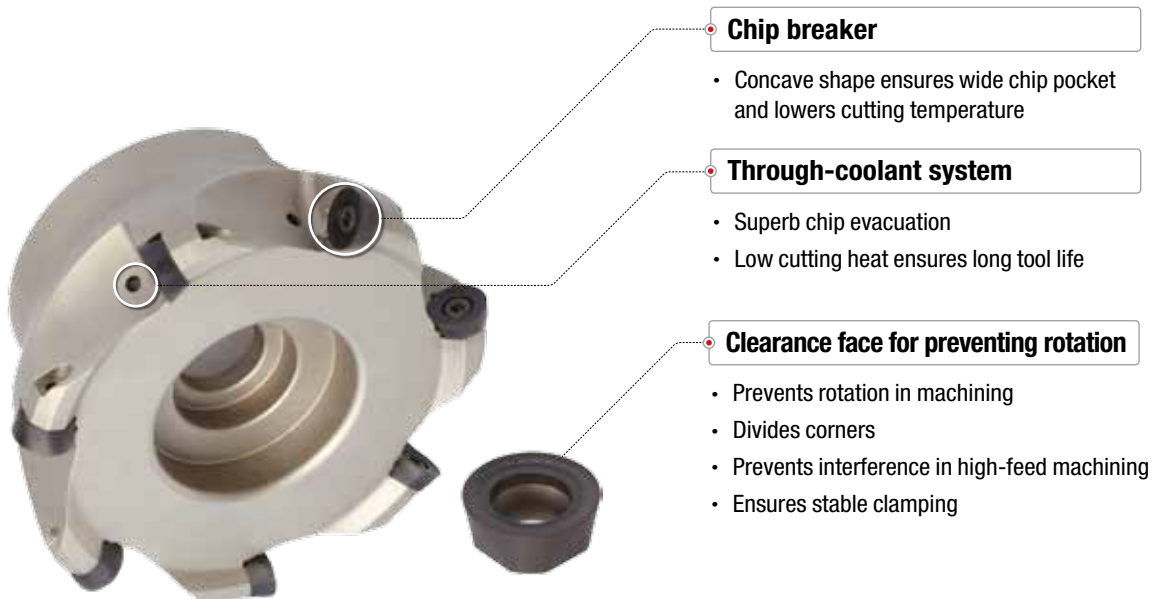
# FMR P-Positive

## 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

## Features

- P-positive relief angle ( $11^\circ$ ) 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



## Type



**Cutter**  
Ø40 ~ Ø250



**Shank**  
Ø17 ~ Ø50



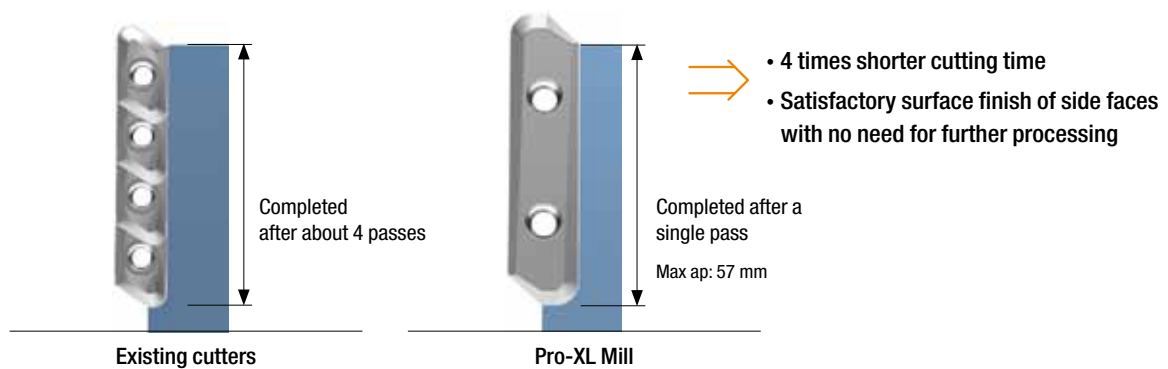
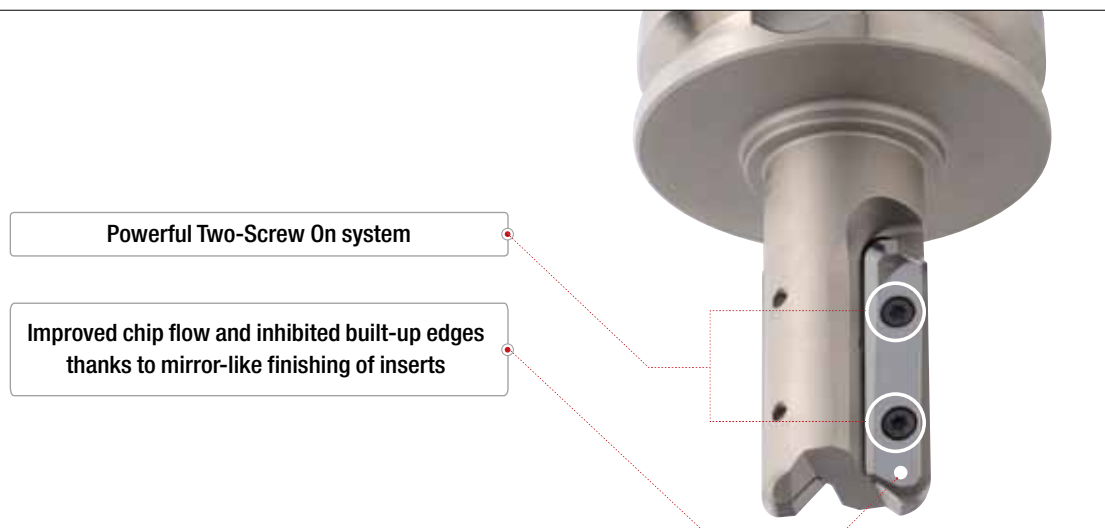
**Modular**  
Ø17 ~ Ø42

# 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

## Features



## Type



**Mono Tool**  
Ø40 ~ Ø80

**Shank**  
Ø40 ~ Ø50



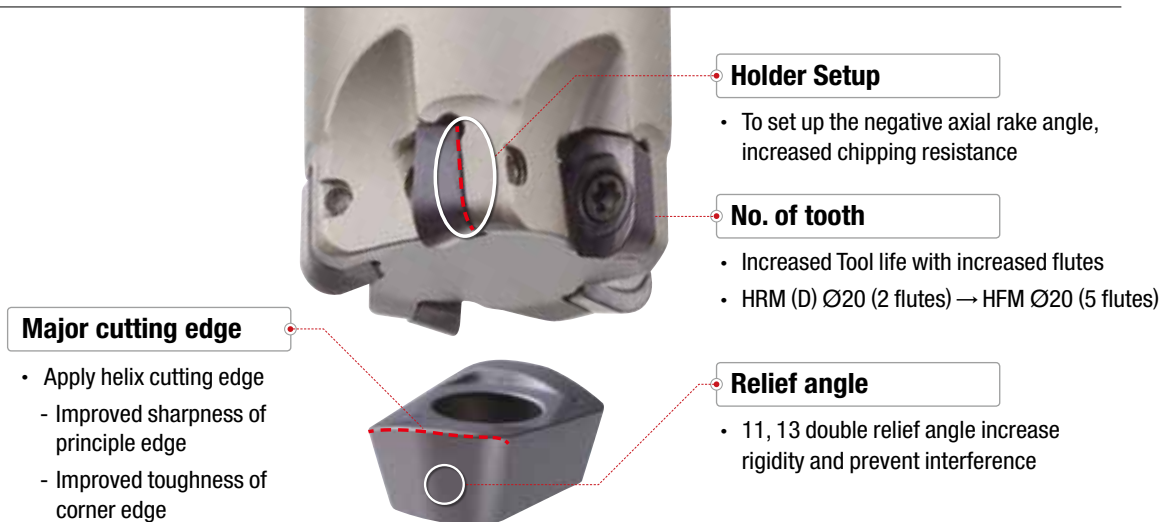


# HFM

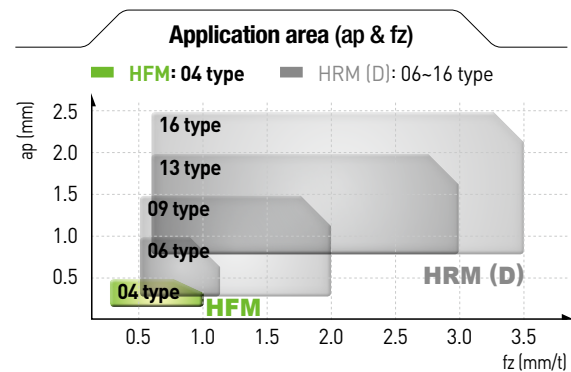
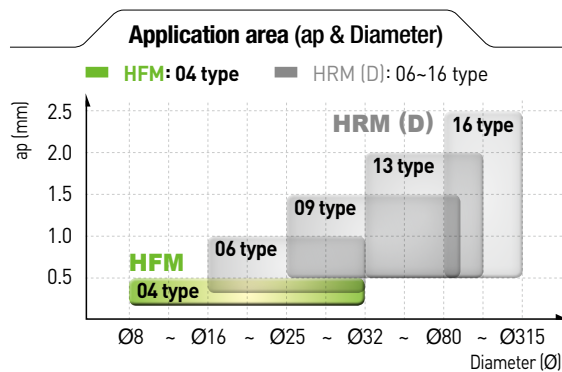
## Features

- 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

## Features



## Application Area



## Type



**Shank**  
Ø8 ~ Ø21



**Modular**  
Ø8 ~ Ø33

# RM3 (Rich Mill)

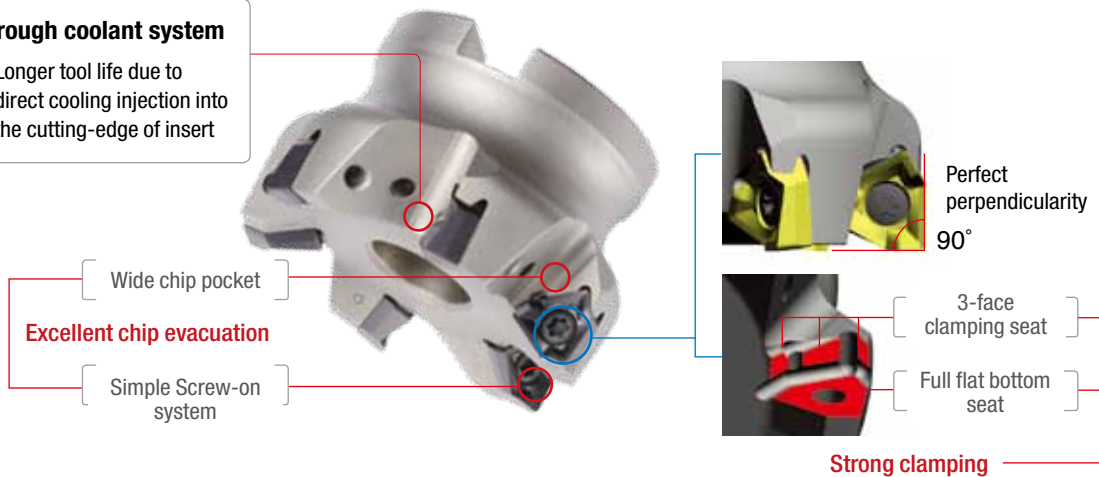
## Features

- 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

### Features of cutter

#### Through coolant system

- Longer tool life due to direct cooling injection into the cutting-edge of insert



### Features of insert

#### Chip breaker

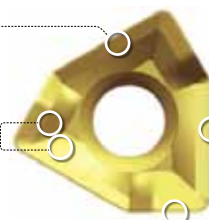
- High rake angle
- Smooth chip flow

#### Step design

- Good chip evacuation
- Low cutting force

#### Minor cutting-edge

- Wiper action for better surface finish



MAX. ap  
XNKT12: 12.0mm  
XNKT08: 8.0mm  
XNKT06: 5.5mm

#### Major cutting-edge

- High rake
- Sharpened edge



#### 2-step clearance

- Strong clamping
- Rigidity improvement

### Type



**Cutter**  
Ø40 ~ Ø125



**Shank**  
Ø20 ~ Ø63

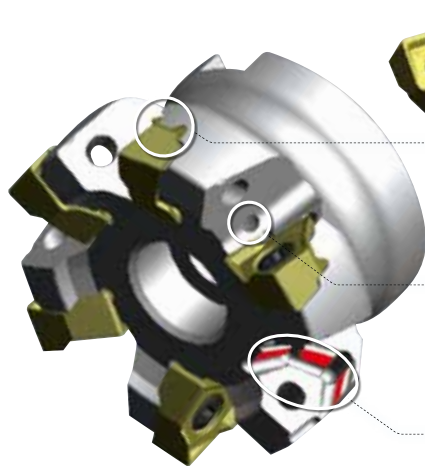


# RM6 (Rich Mill)

## 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

### Features of cutter



#### Strong clamping screws

- Strong clamping screws enable rigid clamping

#### Streamlined holder design

- Improved chip evacuation in deep shouldering and slotting

#### Through coolant system

- Improved chip flow and tool life thanks to insert cooling

#### 3-side supporting system

- Stable tool life

### Features of insert

#### Higher clamping stability

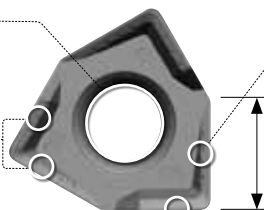
- Wide clamping areas and strong clamping screws for rigid clamping

#### High rake angle chip breaker

- Maintains stable clamping
- Induces smooth chip flow  
→ Increases insert life

#### Wide minor cutting-edges

- Improved surface finish
- Enable multi-purpose machining incl. plunging



#### High rake cutting-edges

- Improved machinability and reduces cutting resistance

MAX. ap  
WNGX08: 8.2mm  
WNGX04: 4.3mm

#### 3-level flank relief surface

- Enhances rigidity and enables stable clamping  
→ Improves cutting stability



### Type



**Cutter**  
Ø40 ~ Ø125



**Shank**  
Ø20 ~ Ø50

# 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)

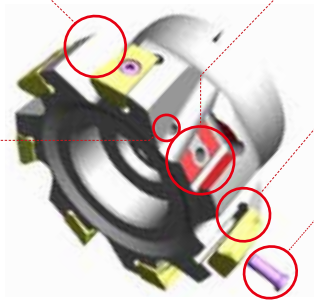
### Features of cutter

#### 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

- 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

### Features of insert

#### Wedge type clamping area

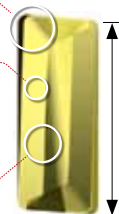
- Clamping in wedge form on seats  
→ Creates strong clamping force

#### High-rake angle chip breaker

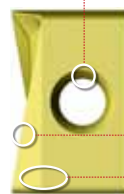
- High-rake angle applied
- Produces smooth chip flow → Extended insert life

#### 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

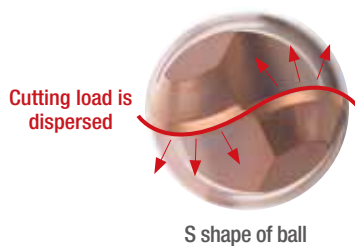
- For cutting high hardened and heat-treated steel under HRC70
- New coating technology improves wear resistance
- A new shape improves machinability
- High speed and highly accurate machining available

### Features

- **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

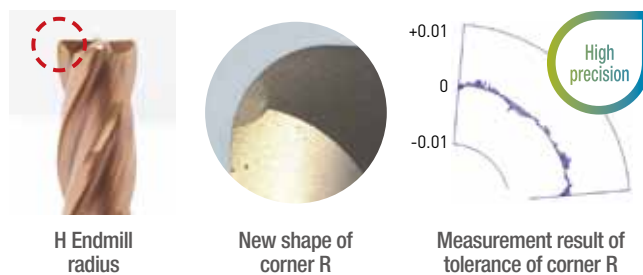


### PBE (Ball)



- ⇒ The S shape of ball disperses cutting loads
- The tolerance of ball R is under  $\pm 0.005\text{mm}$

### PRE (Radius)



- ⇒ The new shape of corner R reduces cutting loads
- The tolerance of corner R is under  $\pm 0.005\text{mm}$

### Type



**Ball type**  
PBE2000  
 $\varnothing 0.5 \sim \varnothing 12$



**Radius type**  
PRE4000  
 $\varnothing 3 \sim \varnothing 12$



# 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

### Features

- **New grade (PC315E)**

Fine substrate and lubricative coating guarantee excellent performance at high speed and high temperature

- **Special edge treatment**

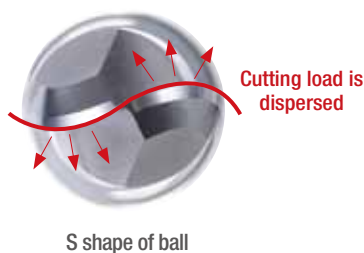
Special cutting-edge design was applied for less chipping and longer tool life

- **High accuracy with tolerance-h5**

High quality production system enables tolerance-h5 throughout the whole series

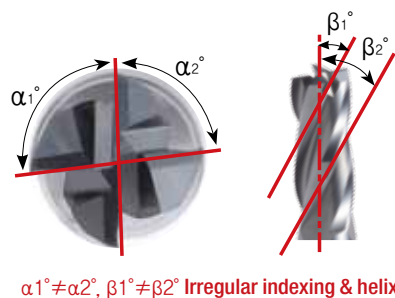


### ZBE (Ball)



- ⇒ The S shape of ball disperses cutting loads
- ⇒ The tolerance of ball R is under  $\pm 0.005\text{mm}$

### ZFE (Flat)



- ⇒ Irregular indexing & helix prevent chattering and improve surface

### Type







# 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

## Features

- 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

### Development of ND3000 (Diamond-coated grade)

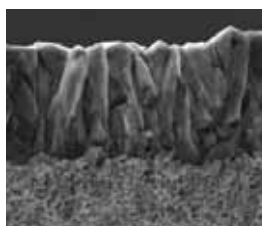
- High hardness diamond coating that is excellent in machining graphite and ceramic
- Optimized for high speed and medium duty cutting thanks to its excellent grip to coated layers

#### Surface of ND3000



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

#### Cross section of coated layers

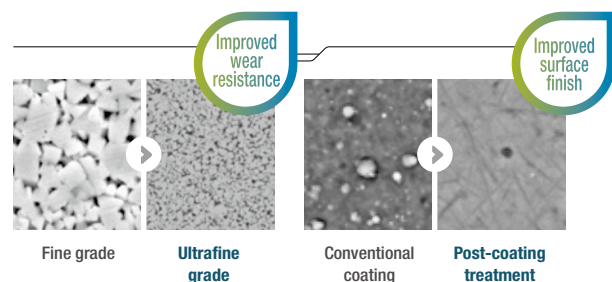


Specialized grade for Zirconia provides excellent adhesion

## Grade solution for titanium

### 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



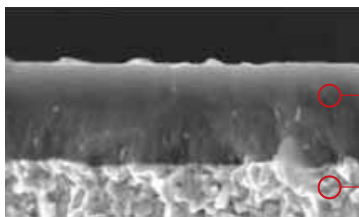
# Z<sup>+</sup> Endmill

## 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

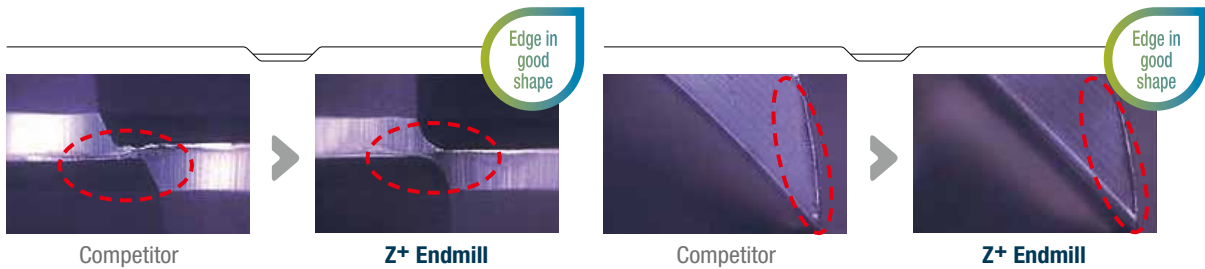
## Features

- 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

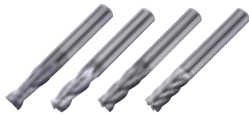
- **AlCrSiN coating layer**  
: Coating lubrication making possible high temperature/high speed machining
- **Ultra-fine substrate**  
: Substrate with excellent wear resistance applied



## 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



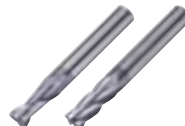
### Long ball type

ZPLBE2000  
Ø2 ~ Ø12



### Radius type

ZPRE2000/4000  
Ø1 ~ Ø16



### Long radius type

ZPRE2000/4000  
Ø6 ~ Ø16





# R<sup>+</sup> Endmill

## Features

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

## Features

- 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

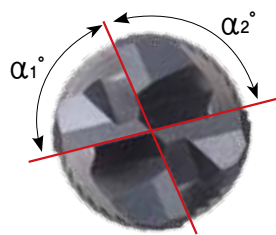
### Soft cutting

- Serrated cutting edges
- 3 Combo R

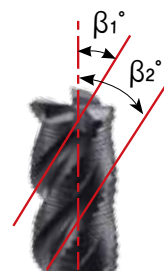


## High quality results

Irregular flute spacing to prevent chattering  
( $\alpha_1^\circ \neq \alpha_2^\circ$ )



Irregular lead angles to disperse cutting force  
( $\beta_1^\circ \neq \beta_2^\circ$ )



## Type

EM09CA / EM11CA  
Ø6 - Ø20 / Ø6 - Ø25

EM36CA / EM37CA  
Ø5 - Ø20

EM38CA / EM43CA  
Ø5 - Ø20

EM11PM / EM16PM / EM17PM  
Ø6 - Ø20

EM06H9  
Ø6 - Ø50



# D Endmill

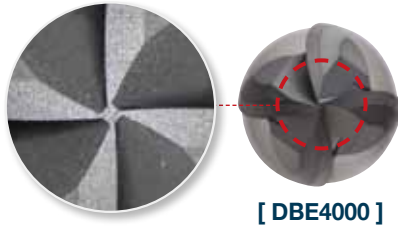
## Features

- 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

### Features

#### Center-matched ball shape (4-flutes)

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



#### Tangential cutting-edge geometries

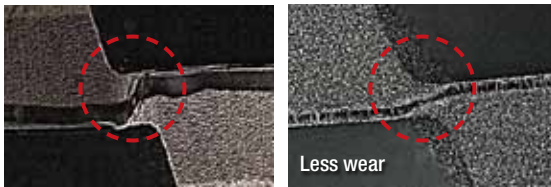
- One-Pass grinding system
- Prevents stepped cone on the machined surface
- 2-flutes and 4-flutes tooling with a ball nose



### 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)



# Composite Router Endmill

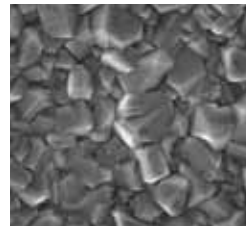
## Features

- 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

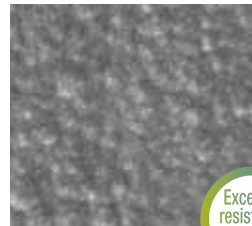
## Features

- 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

### Existing diamond coating



### Nano-diamond coating



Excellent  
resistance  
to friction

### CCR (Router Endmill)

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



### CCDR (Dual Helix Router Endmill)

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

CCDR2000/4000  
Ø6 ~ Ø12



### Flat type

CCR2000  
Ø4 ~ Ø12



### Flat type

CCLR4000  
Ø4 ~ Ø12



### Flat type

CCRR6000/8000  
Ø6 ~ Ø12





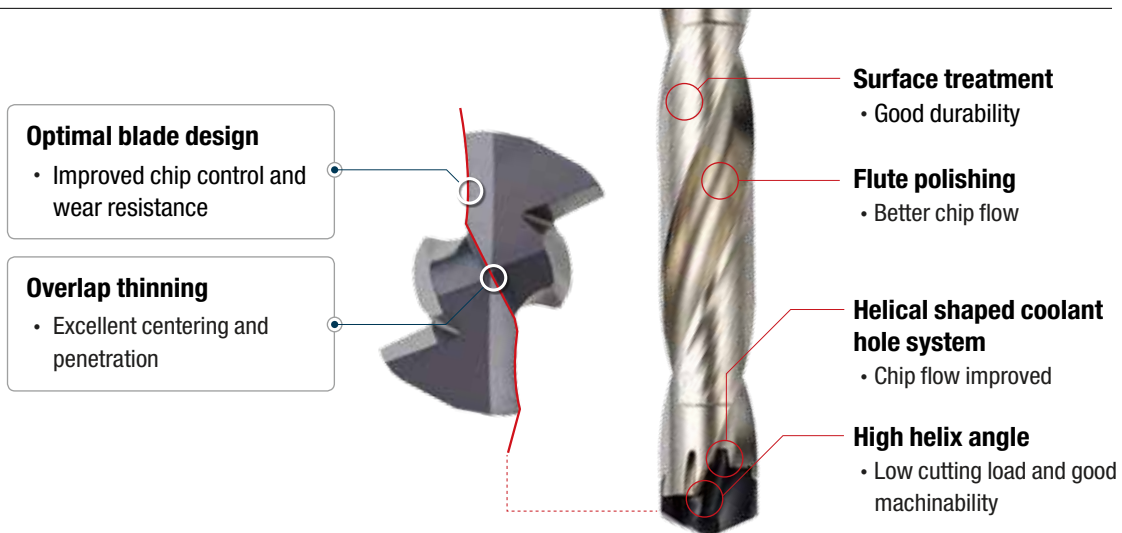


# TPDC

## 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

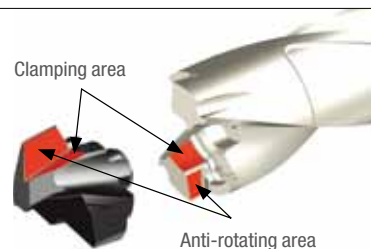
## Features



## 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



## Type





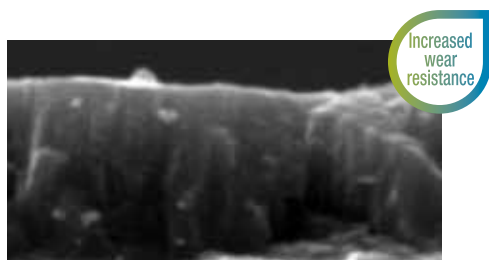


- Highly efficient hole making for various workpieces including automobile components
- Excellent chip evacuation thanks to wider chip pockets.
- Strong wear resistance thanks to our new PC325U grade

## Features

### New grade (PC325U)

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

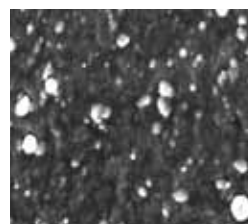


PC325U

### Surface of coating layer

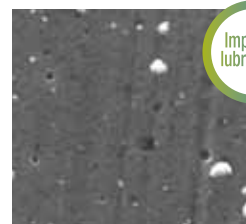
- Increased welding resistance and lower cutting load
- Reduced frictional resistance at cutting edges and on the flute

#### Smooth coating surface



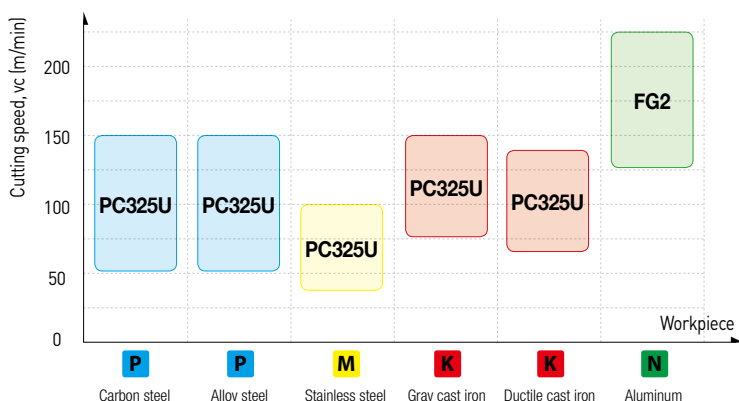
Competitor

#### Rough coating surface

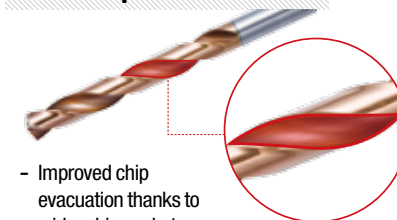


PC325U

## Application area



### Flute shape



## Type



**MSDP-□ (P/M/K/N)**  
Ø1 ~ Ø2.4



**MSDPH-□ (P/M/K/N)**  
Ø2.5 ~ Ø20



- 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

### Features

**Flute design**

- Wider chip pockets improve chip evacuation

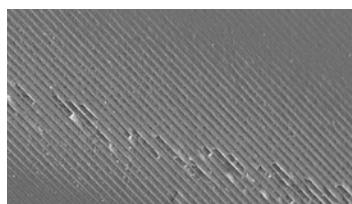
**Optimized margin and back-tapered design**

- Reduced friction resistance and cutting temperature

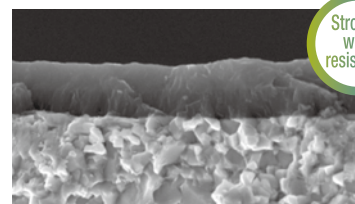
**Cutting-edge design**

- 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

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



Smooth coating surface



PC325T

### Type



**MSDPH-S**  
| Ø3.0 ~ Ø16



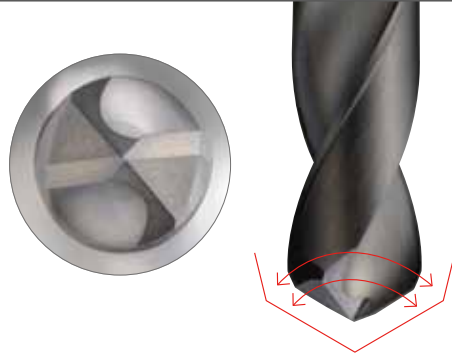
# MSD Plus CFRP

## Features

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

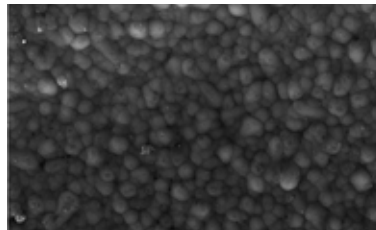
## Features

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

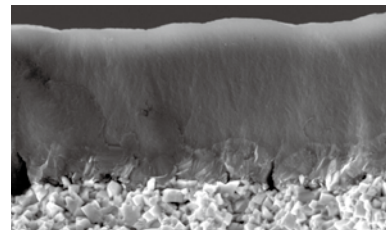


- Diamond Coating specialized in CFRP machining
- Diamond-coated substrate optimized for CFRP cutting

### High hardness diamond coating maintains well-cut shapes



### Diamond coating's strong grip to the substrate



- Inhibited burr creation by keeping cutting edges in good shape

### Less wear and flaking on the rake surface



### Fewer burrs on workpieces



## Type



**MSDP-5C**  
Ø3 ~ Ø12.7

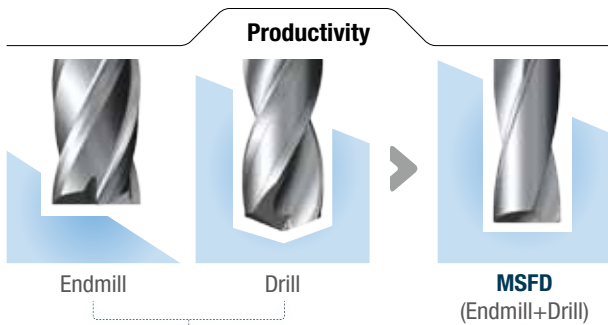
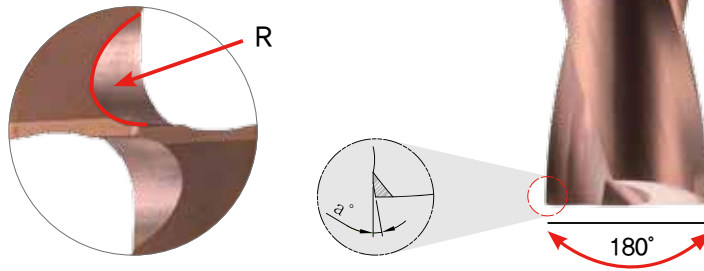


- High quality hole making capability with 180°-point angle
- Improved anti chipping and welding resistance by edge honing and chamfering which minimized the creation of burrs compared to general drills

### Features

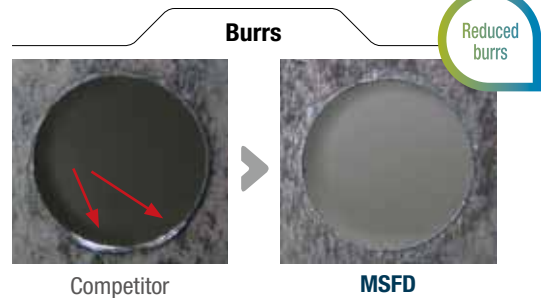
#### Cutting edge design

- 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



Conventional tools used and their application

**Tool cost reduction, Higher productivity**



Reduced burrs

### Type



**MSFD-2P**  
Ø2.5 ~ Ø12



**MSFDH-3P**  
Ø2.5 ~ Ø12



# MLD Plus

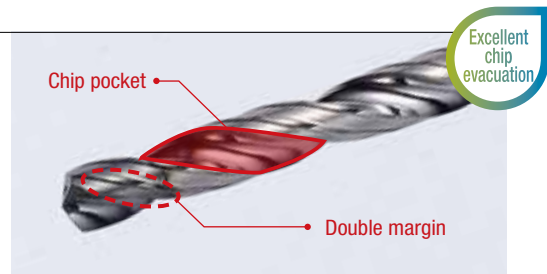
## Features

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

## Features

### Cutting edge and flute shape

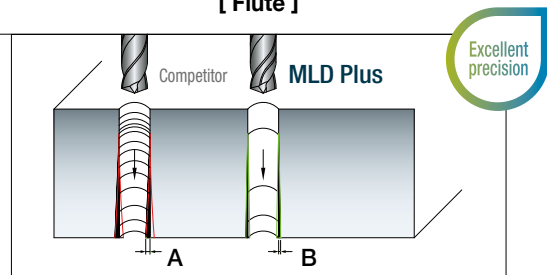
- Straight cutting edge provides better rigidity
- Excellent chip evacuation due to wider chip pocket and improved flute surface roughness
- Double margin secures machining stability



[ Flute ]

### Degree of machining precision

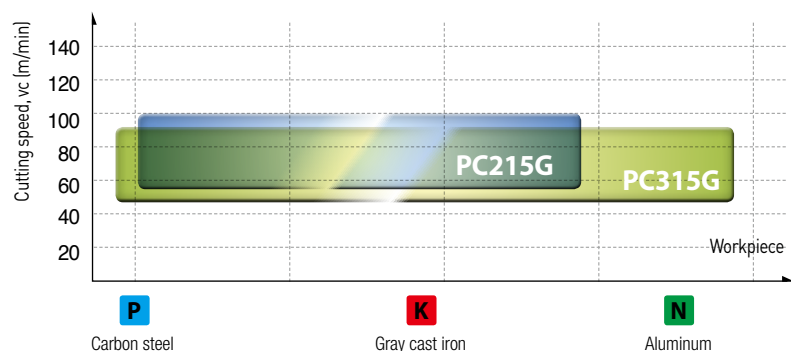
- Improved machining precision
  - Bent holes reduced, Inside hole surface roughness improved
  - Hole size uniformity increased
- Improved point shape
  - Precise location secured



Reduced bent holes compared to competitors (a > b)

## 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

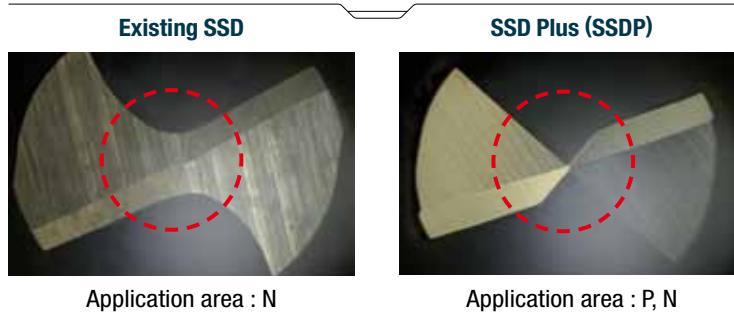




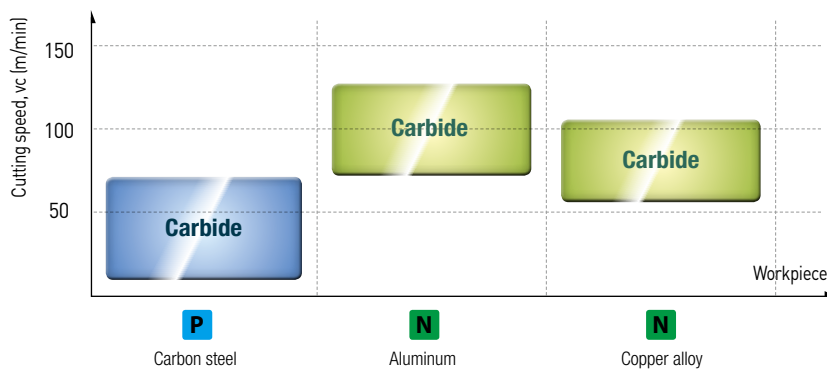
Features

- 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

Features



Application area



Type





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