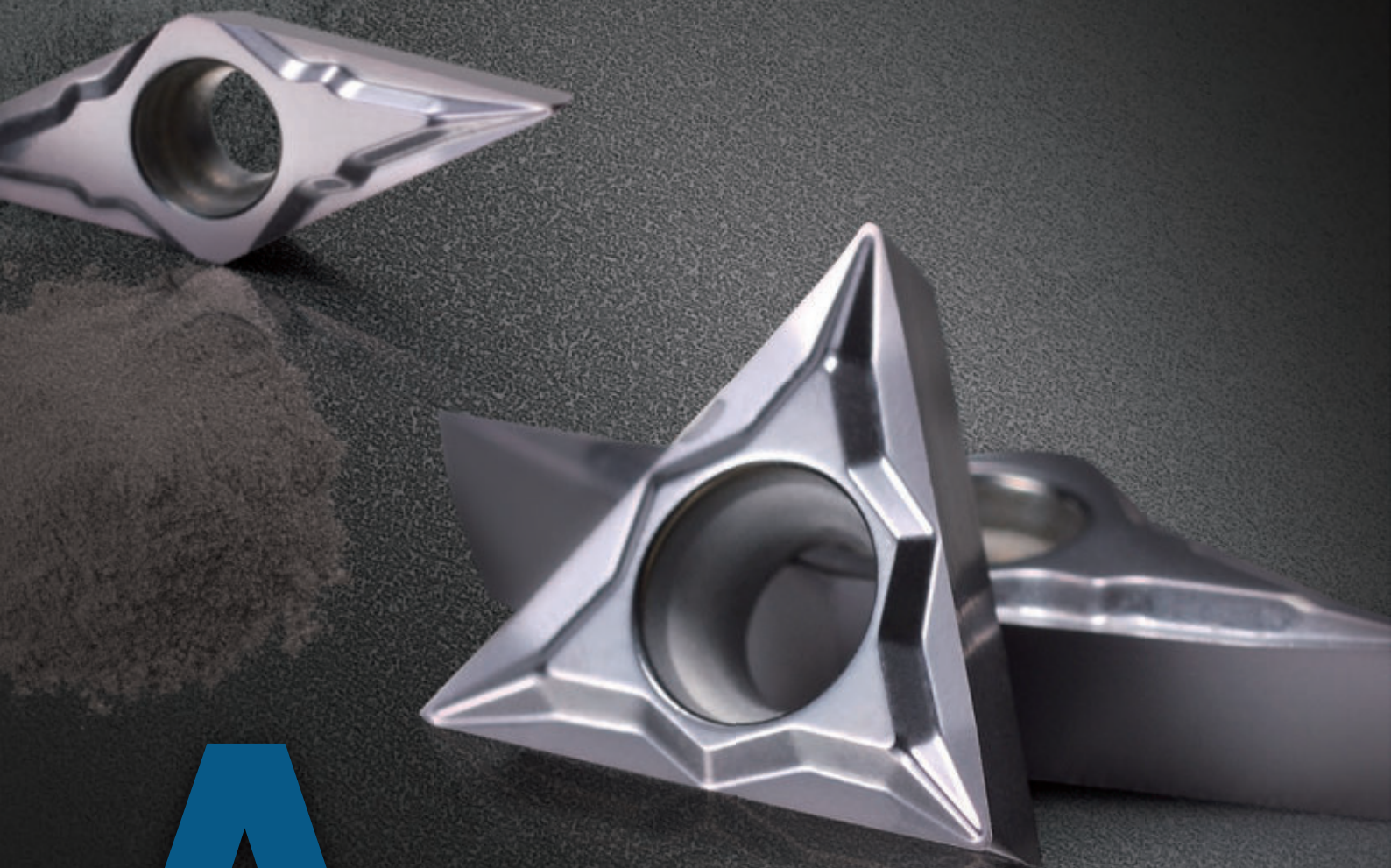


# GRADES & CHIP BREAKERS

KORLOY's new grades are designed with optimal substrates for each application and are PVD coated for high temperature, high hardness and oxidation resistance, or CVD coated for high temperature and wear resistance. Additionally, the improved post-coating treatment provides superior surface finishes to ensure the highest levels of quality and productivity.



# A

### Grades

**A02** KORLOY grades system

### Turning Grades

**A04** Turning grade selections  
**A05** CVD coated grades  
**A10** PVD coated grades  
**A12** Uncoated Carbide grades  
**A13** Cermet grades  
**A15** Coated Cermet grades

### Milling Grades

**A16** Milling grade selections  
**A17** CVD coated grades  
**A18** PVD coated grades  
**A23** Uncoated Carbide grades  
**A24** Cermet grades

### Solid Endmills & Solid Drills Grades

**A25** Solid Endmills grade selections  
**A26** Solid Endmills grades  
**A27** Solid Drills grade selections  
**A28** Solid Drills grades

### Others (Turning/Milling/Endmills)

**A29** Diamond coated grades  
**A30** DLC coated grades  
**A31** cBN inserts grades  
**A36** PCD inserts grades

### Chip Breakers

**A37** Chip Breaker for Turning  
**A42** Chip Breaker for Milling  
**A49** Chip Breaker for Drilling

## Grades system

### ➤ Cutting tool

|                  |   |                           |      |      |       |
|------------------|---|---------------------------|------|------|-------|
| Uncoated carbide | P | Steel                     | ST10 | ST20 | ST30A |
|                  | M | Stainless steel           | U20  |      |       |
|                  | K | Cast iron                 | H01  | H05  | G10   |
|                  | S | Titanium alloy            | H01  | H05  |       |
|                  | N | Aluminum ally/Copper ally | H01  | H05  |       |
|                  | H | Hardened steel            | H01  |      |       |

|                            |   |                      |        |        |        |        |        |        |        |        |        |        |        |
|----------------------------|---|----------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Coated carbide for turning | P | Steel                | NC3215 | NC3225 | NC3120 | NC3030 | NC5330 | PC5300 | PC5400 | PC3035 |        |        |        |
|                            | M | Stainless steel      | PC8105 | PC8110 | PC8115 | PC8120 | NC9115 | NC9125 | NC5330 | NC9135 | PC5300 | PC9030 | PC5400 |
|                            | K | Cast iron            | NC6310 | NC6315 | NC5330 | PC5300 | PC5400 |        |        |        |        |        |        |
|                            | S | Heat resistant alloy | PC8105 | PC8110 | PC8115 | PC8120 | NC9125 | NC9135 | PC5300 | PC5400 |        |        |        |
|                            | N | Non-ferrous metal    | ND3000 | PD1005 | PD1010 |        |        |        |        |        |        |        |        |
|                            | H | Hardened steel       | PC8105 | PC8110 | PC8115 |        |        |        |        |        |        |        |        |

|                  |   |                      |        |        |        |        |        |  |  |
|------------------|---|----------------------|--------|--------|--------|--------|--------|--|--|
| Multi-functional | P | Steel                | NC3210 | NC3225 | NC3030 | NC5330 | PC3035 |  |  |
|                  | M | Stainless steel      | PC9030 | PC5300 |        |        |        |  |  |
|                  | K | Cast iron            | NC6315 | PC5300 |        |        |        |  |  |
|                  | S | Heat resistant alloy | PC8110 | PC5300 |        |        |        |  |  |
|                  | N | Non-ferrous metal    | H01    | H05    |        |        |        |  |  |
|                  | H | Hardened steel       | PC8110 | PC5300 |        |        |        |  |  |

|                            |   |                      |        |        |        |        |        |        |  |
|----------------------------|---|----------------------|--------|--------|--------|--------|--------|--------|--|
| Coated carbide for milling | P | Steel                | NC5330 | NCM535 | PC3700 | PC5300 | PC5400 | NCM545 |  |
|                            | M | Stainless steel      | NC5330 | PC5300 | PC9530 | PC5400 | PC9540 |        |  |
|                            | K | Cast iron            | PC6510 | NC5330 | NCM535 | PC5300 | PC5400 | NCM545 |  |
|                            | S | Heat resistant alloy | PC5300 | PC5400 | PC9540 |        |        |        |  |
|                            | N | Non-ferrous metal    | ND3000 | PD1005 | PD1010 |        |        |        |  |
|                            | H | Hardened steel       | PC2005 | PC2010 | PC2015 | PC210F | PC2505 | PC2510 |  |

|                                     |   |                      |        |        |        |        |        |        |        |
|-------------------------------------|---|----------------------|--------|--------|--------|--------|--------|--------|--------|
| Coated carbide for drills, endmills | P | Steel                | PC3700 | PC5300 | PC5335 | PC9530 | PC9540 | NC5330 | NCM535 |
|                                     | M | Stainless steel      | PC5300 | PC5335 | PC9530 | PC9540 |        |        |        |
|                                     | K | Cast iron            | PC6510 | PC5300 |        |        |        |        |        |
|                                     | S | Heat resistant alloy | PC5300 | PC9530 | PC9540 |        |        |        |        |
|                                     | N | Non-ferrous metal    | H01    |        |        |        |        |        |        |



## Grades system

### ➤ Cutting tool

|                   |   |           |        |        |
|-------------------|---|-----------|--------|--------|
| Turning<br>cermet | P | Steel     | CN1500 | CN2500 |
|                   | K | Cast iron | CN1500 | CN2500 |

|                                         |   |           |        |        |
|-----------------------------------------|---|-----------|--------|--------|
| Coated<br>carbide for<br>turning cermet | P | Steel     | CC1500 | CC2500 |
|                                         | K | Cast iron | CC1500 | CC2500 |

|                |   |       |        |      |
|----------------|---|-------|--------|------|
| Milling cermet | P | Steel | CN2500 | CN30 |
|----------------|---|-------|--------|------|

|                   |       |                      |        |        |        |        |        |       |        |
|-------------------|-------|----------------------|--------|--------|--------|--------|--------|-------|--------|
| Solid<br>endmills | P M K | Steel                | PC203F | PC215F | PC303S | PC310U | PC315E | PC320 | PC320S |
|                   | S     | Heat resistant alloy | PC320  | PC320S | SL     |        |        |       |        |
|                   | N     | Non-ferrous metal    | ND3000 | ND2100 | PD1005 | PD1010 | PC210C | H01   | H05S   |
|                   | H     | Hardened steel       | PC203F | PC303S | PC310U |        |        |       |        |

|                 |       |                      |        |        |        |        |
|-----------------|-------|----------------------|--------|--------|--------|--------|
| Solid<br>drills | P M K | Steel                | PC325U | PC215G | PC315G | PC230F |
|                 | S     | Heat resistant alloy | PC325T |        |        |        |
|                 | N     | Non-ferrous metal    | FG2    | FA1    | ND2100 |        |

|     |   |                      |        |         |        |        |        |        |
|-----|---|----------------------|--------|---------|--------|--------|--------|--------|
| cBN | K | Cast iron            | DBN500 | DBN700A |        |        |        |        |
|     | S | Heat resistant alloy | DBN700 |         |        |        |        |        |
|     | H | Hardened steel       | DB1000 | DB2000  | DBNX20 | DBN250 | DBN350 | DBN400 |

|            |   |                |        |        |        |        |
|------------|---|----------------|--------|--------|--------|--------|
| Coated cBN | H | Hardened steel | DNC100 | DNC250 | DNC350 | DNC400 |
|------------|---|----------------|--------|--------|--------|--------|

|     |   |                   |      |       |       |
|-----|---|-------------------|------|-------|-------|
| PCD | N | Non-ferrous metal | DP90 | DP150 | DP200 |
|-----|---|-------------------|------|-------|-------|

### ➤ Wear resistance tool

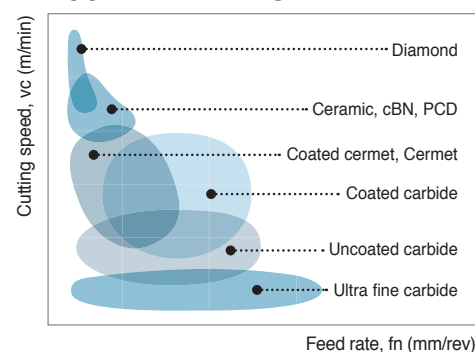
|                                      |   |                                      |     |     |     |
|--------------------------------------|---|--------------------------------------|-----|-----|-----|
| Ultra fine grain<br>cemented carbide | Z | Ultra fine grain<br>cemented carbide | FS1 | FA1 | FCC |
|--------------------------------------|---|--------------------------------------|-----|-----|-----|

|                     |   |                         |      |      |      |    |
|---------------------|---|-------------------------|------|------|------|----|
| Uncoated<br>carbide | V | Wear parts              | D1   | D2   | D3   | G5 |
|                     | I | Corrosion<br>resistance | IN10 | IN20 | IN40 |    |

### ➤ Mining tool

|                  |   |         |      |      |      |      |      |
|------------------|---|---------|------|------|------|------|------|
| Uncoated carbide | E | General | GR10 | GR20 | GR30 | GR35 | GR40 |
|------------------|---|---------|------|------|------|------|------|

### ➤ Application range

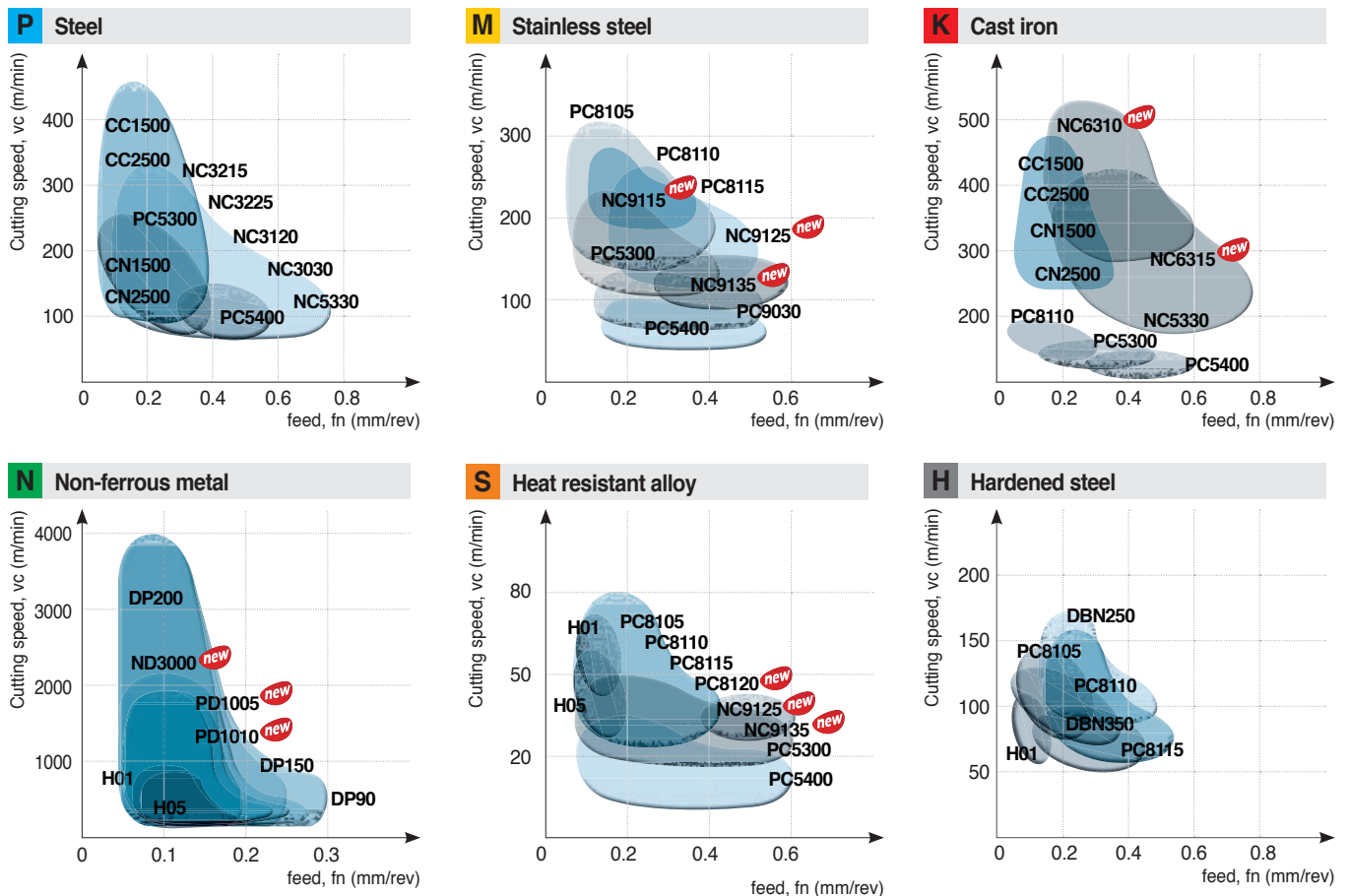


## Turning grade selections

### Selection system

| Workpiece        | P   | Steel                                                                               |                                                                                     |                                                                                   |                                                                                   |        | M                                                                                   | Stainless steel                                                                   |        |     |                                                                                     | K                                                                                 | Cast iron                                                                         |                                                                                   |                                                                                      | S                                                                                  | HRSA                                                                                |                                                                                     |                                                                                     |                                                                                       | N                                                                                   | Nonferrous                                                                          |                                                                                     |                                                                                       |                                                                                     | H                                                                                   | Hardened                                                                            |        |  |  |
|------------------|-----|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|--------|-------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|--------|-----|-------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------|--|--|
| ISO              | P01 | P10                                                                                 | P20                                                                                 | P30                                                                               | P40                                                                               | P50    | M10                                                                                 | M20                                                                               | M30    | M40 | K01                                                                                 | K10                                                                               | K20                                                                               | K30                                                                               | S01                                                                                  | S10                                                                                | S20                                                                                 | S30                                                                                 | N01                                                                                 | N10                                                                                   | N20                                                                                 | N30                                                                                 | H01                                                                                 | H10                                                                                   | H20                                                                                 | H30                                                                                 |                                                                                     |        |  |  |
| Coated carbide   |     |                                                                                     |    | NC3215                                                                            |                                                                                   |        |    | PC8105                                                                            |        |     |                                                                                     |  | NC6310                                                                            |  |                                                                                      |   | PC8105                                                                              |                                                                                     |                                                                                     |    | ND3000                                                                              |  |                                                                                     |                                                                                       |  | PC8105                                                                              |                                                                                     |        |  |  |
|                  |     |                                                                                     |    | NC3225                                                                            |                                                                                   |        |    | PC8110                                                                            |        |     |                                                                                     |                                                                                   |  | NC6315                                                                            |                                                                                      |  | PC8110                                                                              |                                                                                     |                                                                                     |                                                                                       |  | PD1005                                                                              |  |                                                                                       |                                                                                     |  | PC8110                                                                              |        |  |  |
|                  |     |                                                                                     |    | NC3120                                                                            |                                                                                   |        |    | PC8115                                                                            |        |     |                                                                                     |                                                                                   |                                                                                   |                                                                                   |                                                                                      |                                                                                    |   | PC8115                                                                              |                                                                                     |                                                                                       |                                                                                     |                                                                                     |                                                                                     |                                                                                       |                                                                                     |                                                                                     |  | PC8110 |  |  |
|                  |     |                                                                                     |                                                                                     |  | NC3030                                                                            |        |    | NC9115                                                                            |        |     |                                                                                     |                                                                                   |  | NC5330                                                                            |                                                                                      |                                                                                    |  | PC8120                                                                              |  |                                                                                       |                                                                                     |  | PD1010                                                                              |    |                                                                                     |                                                                                     |  | PC8115 |  |  |
|                  |     |                                                                                     |                                                                                     |  | NC5330                                                                            |        |    | NC5330                                                                            |        |     |                                                                                     |                                                                                   |                                                                                   |                                                                                   |     | PC5300                                                                             |                                                                                     |  | NC9125                                                                              |    |                                                                                     |                                                                                     |                                                                                     |                                                                                       |                                                                                     |                                                                                     |                                                                                     |        |  |  |
|                  |     |                                                                                     |                                                                                     |  | PC5300                                                                            |        |    | PC5300                                                                            |        |     |                                                                                     |                                                                                   |                                                                                   |                                                                                   |                                                                                      |                                                                                    |    | PC5400                                                                              |                                                                                     |    | NC9135                                                                              |  |                                                                                     |                                                                                       |                                                                                     |                                                                                     |                                                                                     |        |  |  |
|                  |     |                                                                                     |                                                                                     |                                                                                   |  | PC5400 |                                                                                     |  | PC9030 |     |                                                                                     |                                                                                   |                                                                                   |                                                                                   |                                                                                      |                                                                                    |                                                                                     |                                                                                     |  | PC5300                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                       |                                                                                     |                                                                                     |                                                                                     |        |  |  |
|                  |     |                                                                                     |                                                                                     |                                                                                   |                                                                                   |        |                                                                                     |  | PC5400 |     |                                                                                     |                                                                                   |                                                                                   |                                                                                   |                                                                                      |                                                                                    |                                                                                     |                                                                                     |                                                                                     |    | PC5400                                                                              |                                                                                     |                                                                                     |                                                                                       |                                                                                     |                                                                                     |                                                                                     |        |  |  |
| Cermets          |     |    | CC1500                                                                              |                                                                                   |                                                                                   |        |                                                                                     |                                                                                   |        |     |                                                                                     |  | CC1500                                                                            |                                                                                   |                                                                                      |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                       |                                                                                     |                                                                                     |                                                                                     |                                                                                       |                                                                                     |                                                                                     |                                                                                     |        |  |  |
|                  |     |    | CC2500                                                                              |                                                                                   |                                                                                   |        |                                                                                     |                                                                                   |        |     |                                                                                     |  | CC2500                                                                            |                                                                                   |                                                                                      |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                       |                                                                                     |                                                                                     |                                                                                     |                                                                                       |                                                                                     |                                                                                     |                                                                                     |        |  |  |
|                  |     |    | CN1500                                                                              |                                                                                   |                                                                                   |        |                                                                                     |                                                                                   |        |     |                                                                                     |  | CN1500                                                                            |                                                                                   |                                                                                      |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                       |                                                                                     |                                                                                     |                                                                                     |                                                                                       |                                                                                     |                                                                                     |                                                                                     |        |  |  |
|                  |     |                                                                                     |    | CN2500                                                                            |                                                                                   |        |                                                                                     |                                                                                   |        |     |                                                                                     |  | CN2500                                                                            |                                                                                   |                                                                                      |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                       |                                                                                     |                                                                                     |                                                                                     |                                                                                       |                                                                                     |                                                                                     |                                                                                     |        |  |  |
| cBN / PCD        |     |                                                                                     |                                                                                     |                                                                                   |                                                                                   |        |                                                                                     |                                                                                   |        |     |    | DBN700                                                                            |                                                                                   |                                                                                   |     | DB7000                                                                             |                                                                                     |                                                                                     |  | DP90                                                                                  |                                                                                     |                                                                                     |  | DNC100                                                                                |                                                                                     |                                                                                     |                                                                                     |        |  |  |
|                  |     |                                                                                     |                                                                                     |                                                                                   |                                                                                   |        |                                                                                     |                                                                                   |        |     |    | DBN800                                                                            |                                                                                   |                                                                                   |                                                                                      |                                                                                    |                                                                                     |  | DP150                                                                               |                                                                                       |                                                                                     |  | DNC250                                                                              |                                                                                       |                                                                                     |                                                                                     |                                                                                     |        |  |  |
|                  |     |                                                                                     |                                                                                     |                                                                                   |                                                                                   |        |                                                                                     |                                                                                   |        |     |    | DBN500                                                                            |                                                                                   |                                                                                   |                                                                                      |                                                                                    |                                                                                     |  | DP200                                                                               |                                                                                       |                                                                                     |                                                                                     |  | DNC400                                                                                |                                                                                     |                                                                                     |                                                                                     |        |  |  |
|                  |     |                                                                                     |                                                                                     |                                                                                   |                                                                                   |        |                                                                                     |                                                                                   |        |     |                                                                                     |                                                                                   |                                                                                   |                                                                                   |                                                                                      |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                       |                                                                                     |                                                                                     |                                                                                     |    | DNC350                                                                              |                                                                                     |                                                                                     |        |  |  |
| Uncoated carbide |     |  | ST10                                                                                |                                                                                   |                                                                                   |        |  | U20                                                                               |        |     |  | H01                                                                               |                                                                                   |                                                                                   |   | H01                                                                                |                                                                                     |                                                                                     |                                                                                     |  | H01                                                                                 |                                                                                     |                                                                                     |  | H01                                                                                 |                                                                                     |                                                                                     |        |  |  |
|                  |     |                                                                                     |  | ST20                                                                              |                                                                                   |        |                                                                                     |                                                                                   |        |     |  | H05                                                                               |                                                                                   |                                                                                   |  | H05                                                                                |                                                                                     |                                                                                     |                                                                                     |  | H05                                                                                 |                                                                                     |                                                                                     |                                                                                       |                                                                                     |                                                                                     |                                                                                     |        |  |  |
|                  |     |                                                                                     |  | ST30A                                                                             |                                                                                   |        |                                                                                     |                                                                                   |        |     |  | G10                                                                               |                                                                                   |                                                                                   |                                                                                      |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                       |                                                                                     |                                                                                     |                                                                                     |                                                                                       |                                                                                     |                                                                                     |                                                                                     |        |  |  |
|                  |     |                                                                                     |                                                                                     |                                                                                   |                                                                                   |        |                                                                                     |                                                                                   |        |     |                                                                                     |                                                                                   |                                                                                   |                                                                                   |                                                                                      |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                       |                                                                                     |                                                                                     |                                                                                     |                                                                                       |                                                                                     |                                                                                     |                                                                                     |        |  |  |

### Application range of turning grades

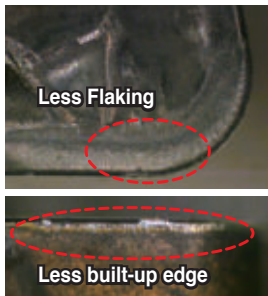
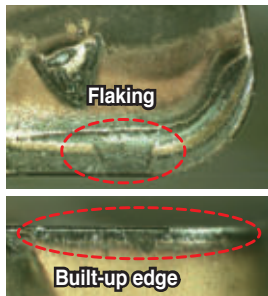


**CVD coated grades****NC3215 / NC3225**

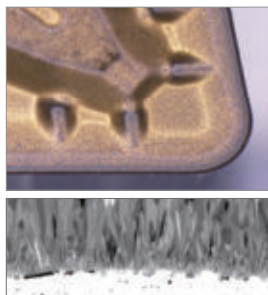
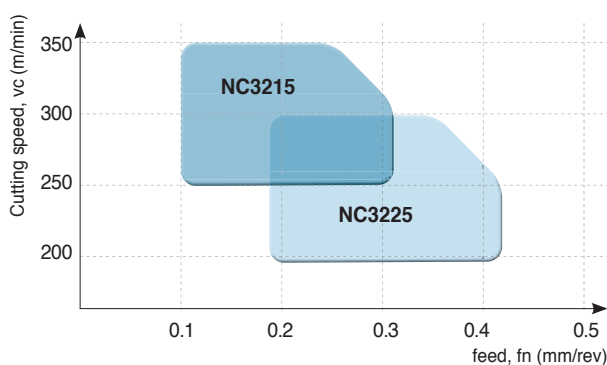
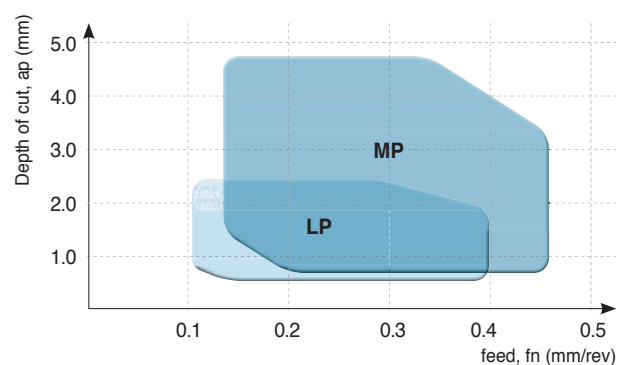
- Universal grade especially for machining forged automobile components and bearing steel both in continuous and interrupted cutting
- Available for all kinds of steels - carbon steel, alloy steel, rolled steel, tool steel, mild steel, bearing steel and other special kinds of steel
- New coating technology 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

**Stable tool like****NC3215/NC3225****Unstable tool life****Competitor****Increased wear resistance****NC3215/NC3225****Poor wear resistance****Competitor**

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

**New coating****Previous coating****Application range****Grades line up****MP/LP chip breaker line up**

## CVD coated grades

CVD coated grade for high efficiency and quality turning of cast iron

### NC6310 <sup>new</sup> / NC6315 <sup>new</sup>

- CVD coating with improved wear resistance and chipping resistance.
- Solutions for the most common issues in cast iron machining: Preventing excessive wear on rake and flank surfaces of insert, chipping and burr

#### Features of NC6310

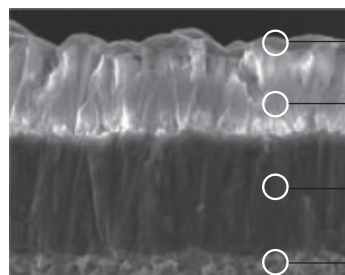
Normal wear on rake surface and nose radius



NC6310

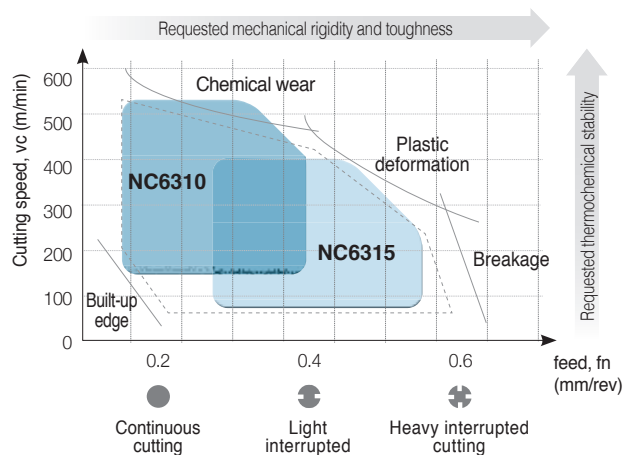


Existing grade (K10)



- Titanium layer with excellent lubrication identifying wear
- Alumina layer specialized for heat resistance
- Titanium layer with improved fracture resistance
- Functional substrate optimized for high speed cast iron machining

#### Recommended machining range for each grade



#### Features of NC6315

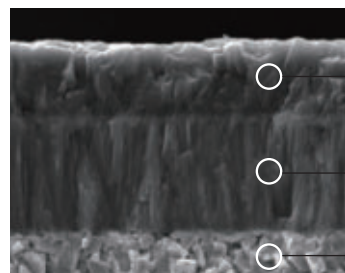
Improved flaking resistance and wear resistance on rake surface



NC6315



Existing grade (K15)



- Alumina layer with better surface finish and improved wear resistance and welding resistance
- Titanium layer with improved fracture resistance
- Functional substrate optimized for high feed and heavy interrupted cast iron machining

Normal wear on flank surface



NC6315



Existing grade (K15)

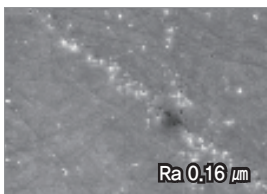


**CVD coated grades****Turning grades for stainless steel****NC9115<sup>new</sup> / NC9125<sup>new</sup> / NC9135<sup>new</sup>**

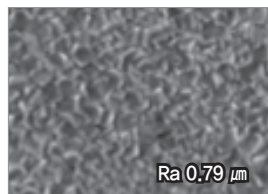
- Optimized for reducing built-up edges, notch wear, plastic deformation and burrs, and for machining stainless steel
- Ideal combination of a grade and MM/RM chip breakers for stable tool life and wide applications ranging from roughing to finishing
- Stable tool life even at high speeds, feeds and depth of cuts (for STS316, vc over 150 m/min available), shortening cutting time
- Excellent versatility responding to workpiece change, covering the austenite, the martensite and the ferrite
- NC9115 is for P20 class, mild steel and forged steel machining.

**Features**

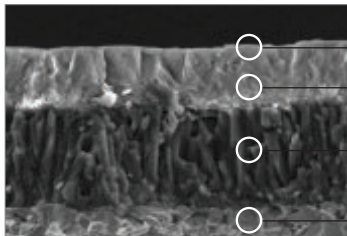
- Improved surface finish thanks to the new lubricative CVD coating

**Lubricative coating layer to prevent built-up edge**

NC9100 Series

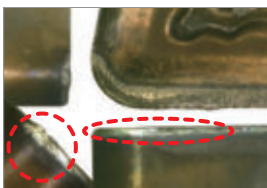


Existing coating

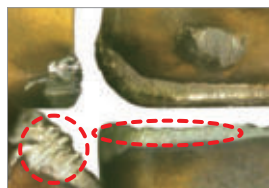


- Top coat with improved welding resistance
- Alumina coating layer for high speed cutting
- Titanium coating layer with stronger resistance to chipping
- Tough substrate optimized for continuous cutting and both light & heavy interruption

- Lubricative coating layers → Improves welding resistance

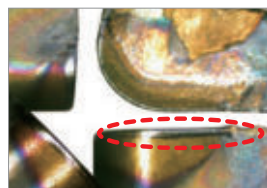
**Inhibited built-up edge and blade damage**

NC9125 (M25)

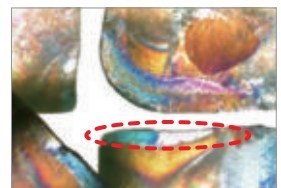


Competitor (M25)

- Coated layers of stronger chipping resistance and the substrate of high toughness → Inhibits notch wear creation

**Inhibited wear on notch and relief surface**

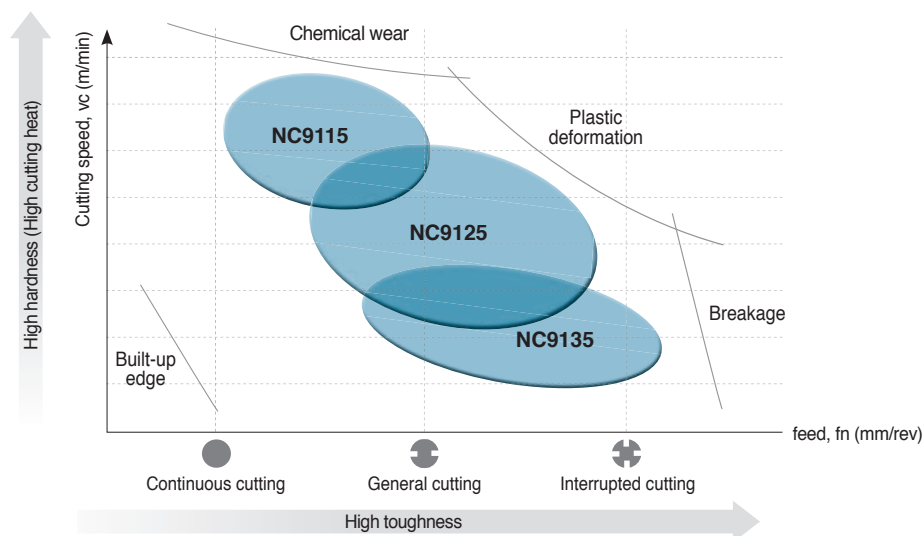
NC9135 (M35)



Competitor (M35)

## CVD coated grades

### Grades line up



### Recommended grade and chip breaker per stainless steel type

#### [Austenitic stainless steel]

| Grade  | Cutting speed (m/min) |     |     |     |     |
|--------|-----------------------|-----|-----|-----|-----|
|        | 50                    | 100 | 150 | 200 | 250 |
| NC9115 |                       |     | 160 | 220 |     |
| NC9125 |                       |     | 150 | 200 |     |
| NC9135 |                       | 100 | 150 |     |     |

#### [Duplex stainless steel]

| Grade  | Cutting speed (m/min) |     |     |     |     |
|--------|-----------------------|-----|-----|-----|-----|
|        | 50                    | 100 | 150 | 200 | 250 |
| NC9115 |                       |     | 120 | 160 |     |
| NC9125 |                       | 100 | 140 |     |     |
| NC9135 |                       | 60  | 100 |     |     |

#### [Ferritic/Martensitic stainless steel]

| Grade  | Cutting speed (m/min) |     |     |     |     |
|--------|-----------------------|-----|-----|-----|-----|
|        | 50                    | 100 | 150 | 200 | 250 |
| NC9115 |                       |     | 150 | 250 |     |
| NC9125 |                       | 120 | 220 |     |     |
| NC9135 |                       | 100 | 150 |     |     |

#### [Precipitation hardened (PH) stainless steel]

| Grade  | Cutting speed (m/min) |     |     |     |     |
|--------|-----------------------|-----|-----|-----|-----|
|        | 50                    | 100 | 150 | 200 | 250 |
| NC9115 | 50                    | 110 |     |     |     |
| NC9125 | 40                    | 110 |     |     |     |
| NC9135 | 30                    | 100 |     |     |     |



## Selection system of CVD coated grade

| Workpiece | Machining types     | Recommended grade     | Recommended cutting speed (m/min) | ISO | Application range     |
|-----------|---------------------|-----------------------|-----------------------------------|-----|-----------------------|
| <b>P</b>  | Continuous cutting  | NC3215                | 295 (170~420)                     | P10 |                       |
|           |                     | NC3225                | 260 (150~370)                     | P15 | NC3215                |
|           | Interrupted cutting | NC3120                | 260 (120~370)                     | P20 | NC3225                |
|           |                     | NC3030                | 205 (120~290)                     | P30 | NC3120                |
|           |                     | NC5330                | 185 (110~260)                     | P35 | NC3030                |
| <b>M</b>  | Continuous cutting  | NC9115 <sup>new</sup> | 240 (220~260)                     | M10 | NC9115 <sup>new</sup> |
|           |                     | NC9125 <sup>new</sup> | 210 (190~230)                     | M20 | NC9125 <sup>new</sup> |
|           | Interrupted cutting | NC9135 <sup>new</sup> | 180 (160~200)                     | M30 | NC9125 <sup>new</sup> |
|           |                     |                       |                                   | M40 | NC5330                |
|           |                     |                       |                                   |     | NC9135 <sup>new</sup> |
| <b>K</b>  | Continuous cutting  | NC6310 <sup>new</sup> | 380 (300~500)                     | K10 | NC6310 <sup>new</sup> |
|           |                     | NC6315                | 280 (200~400)                     | K20 | NC6315                |
|           | Interrupted cutting | NC5330                | 190 (110~270)                     | K30 | NC5330                |
| <b>S</b>  | Continuous cutting  | NC9125 <sup>new</sup> | 40 (20~60)                        | S10 | NC9125 <sup>new</sup> |
|           | Interrupted cutting | NC9135 <sup>new</sup> |                                   | S20 | NC9135 <sup>new</sup> |

## The features of CVD coated grades

| CVD Coated grades     | ISO                                      | Features                                                                                                                                                                                                                                                                                                                                                                                                  |
|-----------------------|------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| NC3215                | P10~P15                                  | <ul style="list-style-type: none"> <li>Continuous machining of general steel and forged steel at high speed</li> <li>Substrate with excellent thermal crack/plastic deformation resistance, coating with improved chipping resistance for continuous machining</li> <li>MT-TiCN + Al<sub>2</sub>O<sub>3</sub> + TiN</li> </ul>                                                                            |
| NC3225                | P20~P25                                  | <ul style="list-style-type: none"> <li>Universal grade for general steel and forged steel</li> <li>1st recommended grade for general machining with the use of high toughness substrate and coating layer with improved welding/chipping resistance</li> <li>MT-TiCN + Al<sub>2</sub>O<sub>3</sub> + TiN</li> </ul>                                                                                       |
| NC3120                | P20~P25                                  | <ul style="list-style-type: none"> <li>Medium to roughing for steel</li> <li>Combining excellent fracture resistance substrate with chipping resistance and heat resistance Al<sub>2</sub>O<sub>3</sub> increased stability</li> <li>MT-TiCN + TiC + Al<sub>2</sub>O<sub>3</sub></li> </ul>                                                                                                               |
| NC3030                | P25~P35                                  | <ul style="list-style-type: none"> <li>Medium to low speed machining of steel and interrupted roughing</li> <li>Harmony between substrate with excellent wear/fracture resistance and Al<sub>2</sub>O<sub>3</sub> film with excellent thermal/chipping resistance</li> <li>Increased stability in wide ranges of cutting conditions</li> <li>MT-TiCN + TiC + Al<sub>2</sub>O<sub>3</sub> + TiN</li> </ul> |
| NC5330                | P30~P35<br>M25~M35<br>K15~K25<br>S15~S25 | <ul style="list-style-type: none"> <li>Stainless Steel - General cutting for mild steel &amp; forging steel</li> <li>Excellent cutting performance in hard to cut materials which are vulnerable to built up edge, due to the high tough substrate with improved fracture resistance and the coated layers</li> <li>MT-TiCN + Al<sub>2</sub>O<sub>3</sub> + TiN</li> </ul>                                |
| NC9115 <sup>new</sup> | M10~M20                                  | <ul style="list-style-type: none"> <li>High speed cutting for ferritic and martensitic stainless steels</li> <li>MT-TiCN + Al<sub>2</sub>O<sub>3</sub> + TiN</li> </ul>                                                                                                                                                                                                                                   |
| NC9125 <sup>new</sup> | M20~M30                                  | <ul style="list-style-type: none"> <li>General cutting of stainless steel and heat resistant alloys</li> <li>MT-TiCN + Al<sub>2</sub>O<sub>3</sub> + TiN</li> </ul>                                                                                                                                                                                                                                       |
| NC9135 <sup>new</sup> | M30~M40                                  | <ul style="list-style-type: none"> <li>Interrupted cutting of stainless steel and heat resistant alloys</li> <li>MT-TiCN + Al<sub>2</sub>O<sub>3</sub> + TiN</li> </ul>                                                                                                                                                                                                                                   |
| NC6310 <sup>new</sup> | K01~K10                                  | <ul style="list-style-type: none"> <li>High speed and continuous cutting of grey cast iron</li> <li>Increased tool life due to coating layer with high wear resistance</li> <li>MT-TiCN + Al<sub>2</sub>O<sub>3</sub> + TiN</li> </ul>                                                                                                                                                                    |
| NC6315                | K10~K20                                  | <ul style="list-style-type: none"> <li>Universal grade for ductile and gray cast Iron</li> <li>Excellent performance thanks to the alumina (Al<sub>2</sub>O<sub>3</sub>) coating's improved grip on the tough substrate</li> <li>MT-TiCN + Al<sub>2</sub>O<sub>3</sub></li> </ul>                                                                                                                         |

## PVD coated grades

Turning grade for heat resistant alloy and stainless steel

### PC8105

- Micro grain carbide minimizes chipping of cutting edge due to enhanced edge strength
- Latest PVD coating technology with high hardness and high temperature oxidation resistance
- Excellent tool life when finishing heat resistant alloys and stainless steels at high speeds

### PC8115

- Ultra fine matrix technology increases wear resistance and chipping resistance
- PVD coating technology with high hardness and oxidation resistance at high temperature
- 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

### PC8110

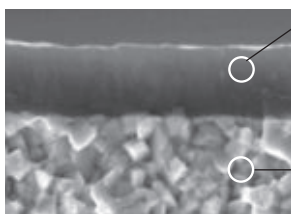
- Substrate with superior wear resistance and plastic deformation resistance at high temperature
- PVD coating technology with high hardness and oxidation resistance at high temperature
- Long tool life when machining heat resistant alloy and stainless steel at high speed

### PC8120 new

- Control technology for uniform ultra-fine substrate increases wear resistance and chipping resistance
- The new PVD dioxide film enhances oxidation resistance and heating resistance
- Special technology of coating surface treatment prevents chipping and realizes stable machining

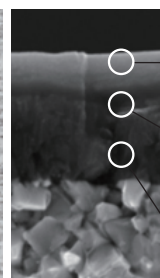
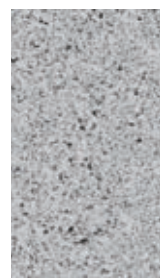
## Features

#### Features of PC8105/10/15 series



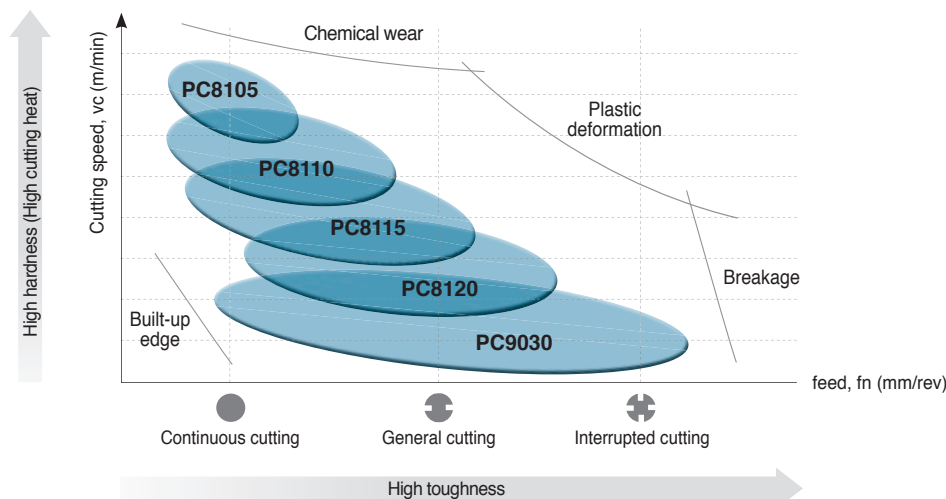
- It prevents wear at a high temperature to apply excellent surface roughness and coating with oxidation resistance and high hardness
- It improves wear resistance to equalize submicron matrix, secure stability between corners and improve chipping- and wear resistance

#### PC8120



- PVD multi-layer  
→ Reducing cracks
- PVD oxidation layer  
→ Good oxidation resistance and heating resistance
- PVD nitride  
→ Good wear resistance

## Grades line up



## Selection system of PVD coated grade

| Workpiece | Machining types     | Recommended grade          | Recommended cutting speed (m/min) | ISO | Application range |
|-----------|---------------------|----------------------------|-----------------------------------|-----|-------------------|
| <b>P</b>  | <b>Steel</b>        | PC5300                     | 175 (100~250)                     | P30 |                   |
|           |                     |                            | 145 (80~120)                      | P40 |                   |
|           | Interrupted cutting | PC5400                     | 125 (80~160)                      | P50 |                   |
| <b>M</b>  | Continuous cutting  | PC8105                     | 175 (120~230)                     | M01 |                   |
|           |                     | PC8110                     | 160 (110~210)                     | M10 |                   |
|           |                     | PC8115/8120 <sup>new</sup> | 150 (100~200)                     | M20 |                   |
|           | Interrupted cutting | PC5300                     | 135 (80~190)                      | M30 |                   |
|           |                     | PC9030                     | 130 (80~180)                      | M40 |                   |
|           |                     | PC5400                     | 110 (80~140)                      | M50 |                   |
| <b>K</b>  | Continuous cutting  | PC8110                     | 135 (95~180)                      | K10 |                   |
|           |                     |                            |                                   | K20 |                   |
|           | Interrupted cutting | PC5300                     | 105 (75~140)                      | K30 |                   |
|           |                     | PC5400                     | 90 (65~120)                       | K40 |                   |
| <b>S</b>  | Continuous cutting  | PC8105                     | 55 (40~70)                        | S01 |                   |
|           |                     | PC8110                     | 50 (35~65)                        | S10 |                   |
|           |                     | PC8115/8120 <sup>new</sup> | 45 (30~60)                        | S20 |                   |
|           | Interrupted cutting | PC5300                     | 40 (20~60)                        | S30 |                   |
|           |                     | PC5400                     | 35 (20~50)                        | S40 |                   |
|           |                     |                            |                                   |     |                   |
| <b>H</b>  | Interrupted cutting | PC8105                     | 110 (80~140)                      | H01 |                   |
|           |                     | PC8110                     | 100 (70~130)                      | H05 |                   |
|           |                     | PC8115                     | 90 (65~115)                       | H10 |                   |

## The features of PVD coated grades

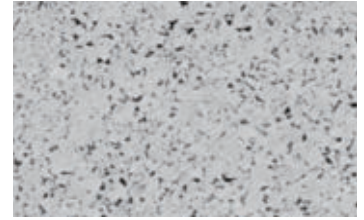
| PVD Coated grades     | ISO                                      | Features                                                                                                                                                                                                                                                                                                                              |
|-----------------------|------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PC8105                | M05~M15<br>S01~S10<br>H01~H05            | <ul style="list-style-type: none"> <li>For high speed and continuous finishing of hard-to-cut materials and STS</li> <li>Excellent cutting performance with high wear resistance and oxidation resistance</li> <li>Ultra fine substrate and the new TiAlN coating layer</li> </ul>                                                    |
| PC8110                | M10~M20<br>K10~K20<br>S05~S15<br>H05~H10 | <ul style="list-style-type: none"> <li>For high speed and continuous medium cutting of hard-to-cut materials and STS</li> <li>Excellent tool life with high wear/plastic deformation resistance at high temperature</li> <li>New TiAlN coating layer and substrate with excellent thermal resistance</li> </ul>                       |
| PC8115                | M15~M25<br>S10~S20<br>H10~H15            | <ul style="list-style-type: none"> <li>For medium to low speed and medium to rough cutting of hard-to-cut materials and STS</li> <li>Excellent tool life with high wear resistance and chipping resistance</li> <li>Ultra fine substrate and the new TiAlN coating layer</li> </ul>                                                   |
| PC8120 <sup>new</sup> | M15~M25<br>S10~S20                       | <ul style="list-style-type: none"> <li>For hard-to-cut materials and STS roughing</li> <li>Applied ultra-fine substrate and new PVD oxidation layer</li> <li>Better chipping resistance and fracture resistance than PC8115</li> </ul>                                                                                                |
| PC5300                | P30~P40<br>M20~M30<br>K20~K25<br>S15~S25 | <ul style="list-style-type: none"> <li>Universal grade for stainless, HRSA, steel and interrupted cast iron machining</li> <li>High chipping and welding resistance for longer tool life</li> <li>New TiAlN coating and ultra fine grain substrate adopted</li> </ul>                                                                 |
| PC9030                | M25~M35                                  | <ul style="list-style-type: none"> <li>Medium, roughing and heavy interrupted cutting for stainless steel</li> <li>TiAlN coating and ultra fine grain substrate adopted</li> <li>High chipping and welding resistance for stable machining</li> </ul>                                                                                 |
| PC5400                | P35~P45<br>M30~M40<br>K30~K35<br>S25~S35 | <ul style="list-style-type: none"> <li>For medium cutting for hard-to-cut materials, stainless steel, steel, and cast iron at medium or low speed</li> <li>Stable machinability with chipping resistance, fracture resistance and welding resistance</li> <li>Ultra fine substrate with high toughness and new AlCrN layer</li> </ul> |

## Uncoated carbide grades

### Uncoated carbide grades for turning application of titanium

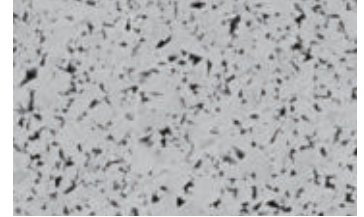
#### H01

- Increased wear resistance and chipping resistance with the use of ultra fine substrate
- Improved welding resistance and chipping resistance with the use of special surface treatment and sharp cutting edge of VP chip breaker
- Excellent tool life when finishing titanium alloy at high speed

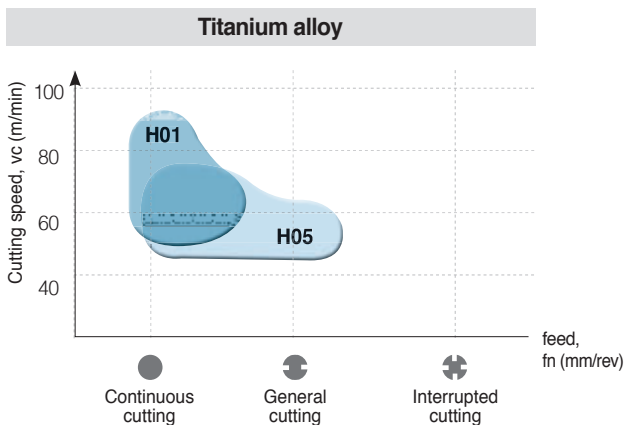


#### H05

- The 1st recommended grade for machining titanium alloy in a variety of cutting conditions
- Improved welding resistance and chipping resistance with the use of special surface treatment and sharp cutting edge of VP chip breaker
- Ideal for medium cutting of titanium alloy



### Grades line up



### Selection system of uncoated carbide grades

| Workpiece             | Recommended grade | Recommended cutting speed (m/min) | ISO | Application range |
|-----------------------|-------------------|-----------------------------------|-----|-------------------|
| P Steel               | ST10              | 110 (70~140)                      | P10 | ST10              |
|                       | ST20              | 80 (50~110)                       | P20 | ST20              |
|                       | ST30A             | 70 (40~90)                        | P30 | ST30A             |
| M Stainless steel     | U20               | 70 (40~90)                        | M25 | U20               |
| K Cast iron           | H01               | 105 (60~140)                      | K01 | H01               |
|                       | H05               | 105 (60~140)                      | K10 | H05               |
|                       | G10               | 90 (50~120)                       | K20 | G10               |
| N Aluminum alloy      | H01               | 600 (450~750)                     | N10 | H01               |
| Copper alloys         | H05               | 425 (320~530)                     | N20 | H05               |
| S Titanium alloy      | H01               | 55 (40~70)                        | S01 | H01               |
|                       | H05               | 50 (35~65)                        | S10 | H05               |
| H High hardness steel | H01               | 80 (55~105)                       | H10 | H01               |

### Main composition and application range

| Workpiece | Composition   | Features                                                  | Workpiece                                              |
|-----------|---------------|-----------------------------------------------------------|--------------------------------------------------------|
| P         | WC-TiC-TaC-Co | Heat resistance, excellent plastic deformation resistance | Carbon steel, Alloy steel, Stainless steel             |
| M         | WC-TiC-TaC-Co | General tools stable heat resistance with strength        | Carbon steel, Alloy steel, Stainless steel, Cast steel |
| K         | WC-Co         | High strength and superior wear resistance                | Cast iron, Non-ferrous metal, Plastic, etc.            |
| S         | WC-Co         | Excellent wear resistance and chipping resistance         | Titanium alloy                                         |



## The physical properties of uncoated carbide grades

| Workpiece | Grade | Hardness (HRA) | TRS (kgf/mm <sup>2</sup> ) | Young's modulus (10 <sup>3</sup> kgf/mm <sup>2</sup> ) | Thermal expansion coefficient (10 <sup>-6</sup> /°C) | Thermal conductivity (cal/cm · sec·°C) |
|-----------|-------|----------------|----------------------------|--------------------------------------------------------|------------------------------------------------------|----------------------------------------|
| <b>P</b>  | ST10  | 92.1           | 175                        | 48                                                     | 6.2                                                  | 25                                     |
|           | ST20  | 91.9           | 200                        | 56                                                     | 5.2                                                  | 45                                     |
|           | ST30A | 91.3           | 230                        | 53                                                     | 5.2                                                  | -                                      |
| <b>M</b>  | U20   | 91.1           | 210                        | -                                                      | -                                                    | 88                                     |
|           | ST30A | 91.3           | 230                        | 53                                                     | 5.2                                                  | -                                      |
| <b>K</b>  | H01   | 92.9           | 210                        | 66                                                     | 4.7                                                  | 109                                    |
|           | G10   | 90.9           | 250                        | 63                                                     | -                                                    | 105                                    |
| <b>S</b>  | H01   | 92.9           | 210                        | 66                                                     | 4.7                                                  | 109                                    |
|           | H05   | 91.8           | 250                        | -                                                      | -                                                    | -                                      |

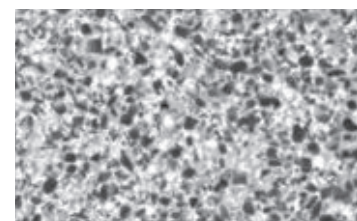
1KPa = 102kgf/m<sup>2</sup>, 1w/mk = 2.39×10<sup>-3</sup>cal/cm·sec·°C

## Cermet grades

### Solution for turning application of steel

## 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
- Improved surface roughness acquired by optimized cutting edges



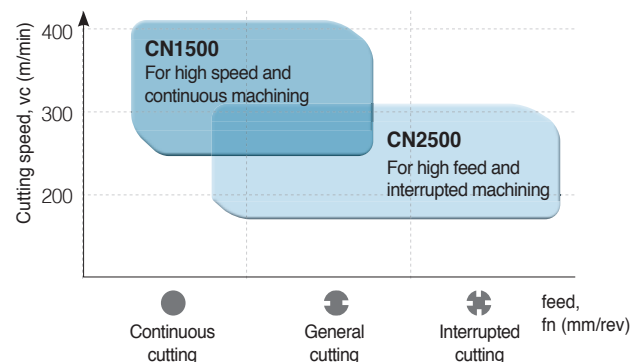
## CN2500

- 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
- Improved surface roughness acquired by optimized cutting edges

## Recommended cutting condition

| Division | Workpiece                         | Grade  | Recommended cutting speed (m/min) |             |         |
|----------|-----------------------------------|--------|-----------------------------------|-------------|---------|
|          |                                   |        | Minimum                           | Recommended | Maximum |
| Turning  | SM10C, SS440                      | CN1500 | 150                               | 270         | 400     |
|          |                                   | CN2500 | 130                               | 240         | 350     |
|          | SM45C                             | CN1500 | 150                               | 250         | 350     |
|          |                                   | CN2500 | 130                               | 220         | 300     |
|          | SCM440, Sintered Fe ferrous alloy | CN1500 | 120                               | 220         | 300     |
|          |                                   | CN2500 | 100                               | 200         | 250     |

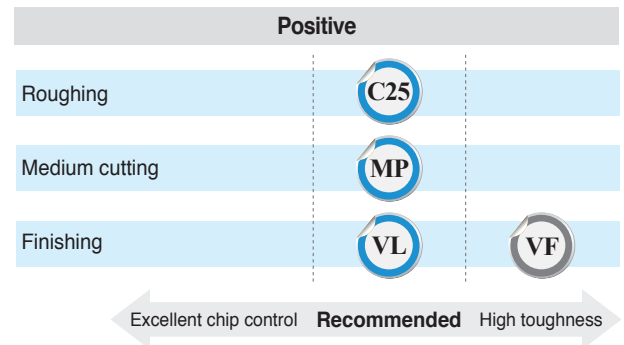
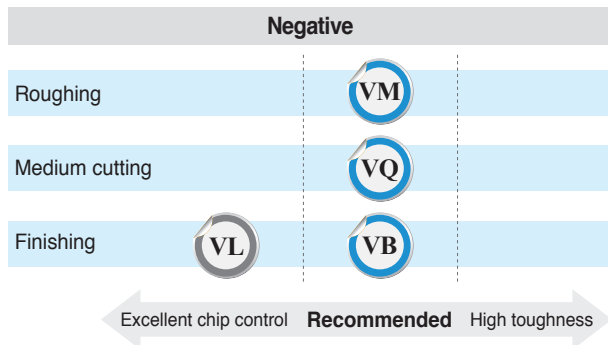
## Grades line up



# A Turning Grades

## Cermet grades

### Chip breakers line up



### Selection system of cermet grades

| Workpiece | Machining types | Recommended grade   | Recommended cutting speed (m/min) | ISO           | Application range |
|-----------|-----------------|---------------------|-----------------------------------|---------------|-------------------|
| P         | Steel           | Continuous cutting  | CN1500                            | 250 (150~350) | P10               |
|           |                 | Interrupted cutting | CN2500                            | 220 (130~300) | P20               |
|           |                 |                     |                                   |               | P30               |

### Comparison of chip breakers

| Insert types | Machining types     | Application range                                                                                       | Chip breakers |              |              |              |              |
|--------------|---------------------|---------------------------------------------------------------------------------------------------------|---------------|--------------|--------------|--------------|--------------|
|              |                     |                                                                                                         | KORLOY        | Competitor A | Competitor B | Competitor C | Competitor D |
| Nega type    | Continuous cutting  | For machining mild steel with enhanced chip control                                                     | VL            | FA           | GP           | TF           | FA           |
|              | General cutting     | For low interrupted cutting with stronger cutting edges than VG chip breaker                            | VB            | FG           | XP<br>CQ     | TSF<br>TS    | LU<br>SE     |
|              | General cutting     | For medium cutting to finishing at low interruption                                                     | VQ            | MC           | HQ           | AS, ZM       | SU           |
|              | Interrupted cutting | For medium cutting to roughing at high interruption                                                     | VM            | MT           | HS           | TM           | GU           |
| Posi type    | Continuous cutting  | For machining mild steel with enhanced chip control                                                     | VL            | FA           | GP           | PF           | FP           |
|              | Continuous cutting  | Enhanced chip control when machining internal diameter with stronger cutting edges than VL chip breaker | VF            | FG-PC        | HQ           | PS           | LU           |
|              | General cutting     | For medium cutting to finishing at low interruption                                                     | MP            | FG           | HQ           | PS           | LU           |
|              | Interrupted cutting | For medium cutting to roughing at high interruption                                                     | C25           | MT           | GK           | 24           | SC           |



## Coated cermet grades

Coated cermet for machining carbon steel, alloy steel and sintered ferrous components

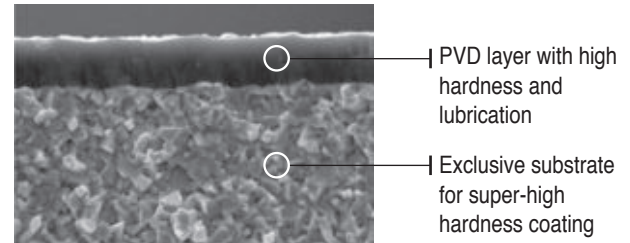
### CC1500 **new**

- 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 **new**

- 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

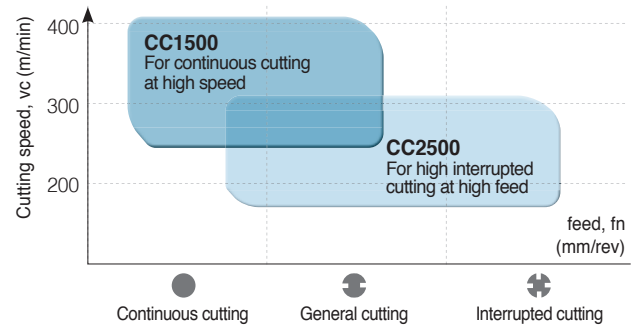
#### Features



#### Recommended cutting condition

| Division | Workpiece                         | Grade  | Recommended cutting speed (m/min) |             |         |
|----------|-----------------------------------|--------|-----------------------------------|-------------|---------|
|          |                                   |        | Minimum                           | Recommended | Maximum |
| Turning  | SM10C, SS440                      | CC1500 | 200                               | 350         | 450     |
|          |                                   | CC2500 | 180                               | 290         | 400     |
|          | SM45C                             | CC1500 | 200                               | 300         | 400     |
|          |                                   | CC2500 | 180                               | 270         | 350     |
|          | SCM440, Sintered Fe ferrous alloy | CC1500 | 180                               | 270         | 350     |
|          |                                   | CC2500 | 150                               | 250         | 300     |

#### Grades line up



#### Chip breakers line up

| Negative                                          |    |    |
|---------------------------------------------------|----|----|
| Roughing                                          | VM |    |
| Medium cutting                                    | VQ |    |
| Finishing                                         | VL | VB |
| Excellent chip control Recommended High toughness |    |    |

| Positive                                          |     |    |
|---------------------------------------------------|-----|----|
| Roughing                                          | C25 |    |
| Medium cutting                                    | MP  |    |
| Finishing                                         | VL  | VF |
| Excellent chip control Recommended High toughness |     |    |

#### Selection system of coated cermet grades

| Workpiece   | Machining types     | Recommended grade | Recommended cutting speed (m/min) | ISO        | Application range |
|-------------|---------------------|-------------------|-----------------------------------|------------|-------------------|
| P Steel     | Continuous cutting  | CC1500            | 325 (200~450)                     | P10        | CC1500            |
|             | Interrupted cutting | CC2500            | 265 (180~350)                     | P20<br>P30 | CC2500            |
| K Cast iron | Continuous cutting  | CC1500            | 270 (180~350)                     | K10        | CC1500            |
|             | Interrupted cutting | CC2500            | 250 (150~300)                     | K20        | CC2500            |

#### The features of coated cermet grade

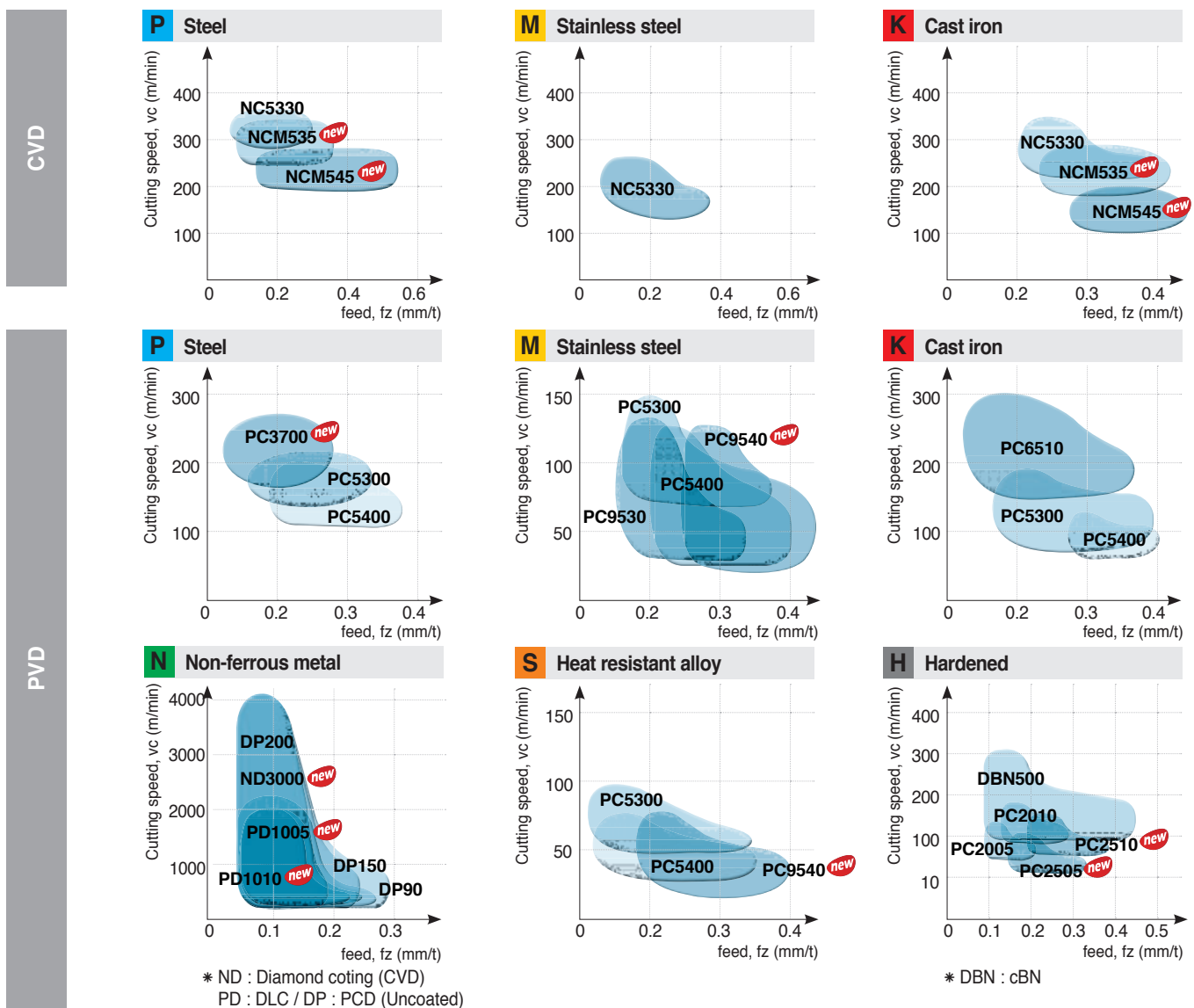
| Coated cermet | ISO               | Features            |                                                                           |                                     |
|---------------|-------------------|---------------------|---------------------------------------------------------------------------|-------------------------------------|
| CC1500        | P10~P20 / K05~K15 | • PVD coated Cermet | • Light cutting for steel and cast iron in high speed machining           | • Optimized for precision boring    |
| CC2500        | P20~P30 / K10~K20 | • PVD coated Cermet | • Light cutting for steel and cast iron in medium or high speed machining | • Dry and wet cutting are available |

## Milling grade selections

### Selection system

| 피삭재            | P   | Steel |        |        |     | M   | Stainless steel |     |        |     | K      | Cast iron |     |     |     | S      | HRSA |     |        |     | N      | Nonferrous |     |     |     | H      | Hardened |     |  |  |
|----------------|-----|-------|--------|--------|-----|-----|-----------------|-----|--------|-----|--------|-----------|-----|-----|-----|--------|------|-----|--------|-----|--------|------------|-----|-----|-----|--------|----------|-----|--|--|
| ISO            | P10 | P20   | P30    | P40    | P50 | M10 | M20             | M30 | M40    | K01 | K10    | K20       | K30 | K40 | S10 | S20    | S30  | S40 | N01    | N10 | N20    | N30        | H01 | H10 | H20 | H30    |          |     |  |  |
| Coated carbide |     |       | NC5330 |        |     |     |                 |     | NC5330 |     | PC6510 |           |     |     |     |        |      |     |        |     | ND3000 | new        |     |     |     | PC2005 |          |     |  |  |
|                |     |       |        |        |     |     |                 |     | PC5300 |     | NC5330 |           |     |     |     | PC5300 |      |     |        |     | PD1005 | new        |     |     |     | PC2505 | new      |     |  |  |
|                |     |       |        | PC3700 |     | new |                 |     | PC9530 |     | PC5300 |           |     |     |     | PC5400 |      |     |        |     |        | PD1010     | new |     |     |        | PC2010   |     |  |  |
|                |     |       |        | NCM535 |     | new |                 |     | PC5400 |     | NCM535 |           |     | new |     | PC9540 | new  |     | PC9540 | new |        |            |     |     |     |        | PC2510   | new |  |  |
|                |     |       |        | PC5300 |     |     |                 |     | PC9540 | new | PC5400 |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        | PC2015   |     |  |  |
|                |     |       |        | NCM545 |     | new |                 |     |        |     | NCM545 |           |     | new |     |        |      |     |        |     |        |            |     |     |     |        | PC210F   |     |  |  |
|                |     |       | PC5400 |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
| Cermet         |     |       | CN2500 |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       | CN30   |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
| cBN / PCD      |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |
|                |     |       |        |        |     |     |                 |     |        |     |        |           |     |     |     |        |      |     |        |     |        |            |     |     |     |        |          |     |  |  |

### Application range



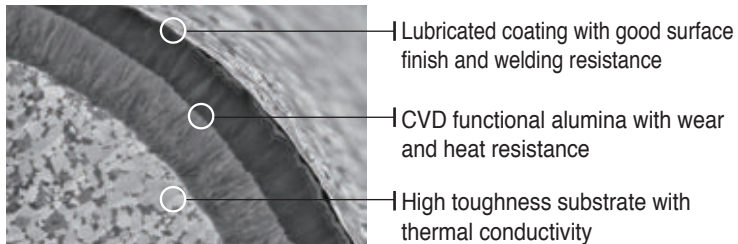
## CVD coated grades

### Milling Solutions for Steel and Cast Iron

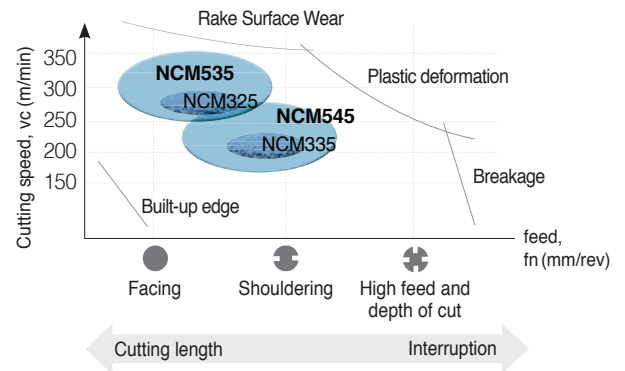
# NCM535<sup>new</sup> / NCM545<sup>new</sup>

- Improved chipping resistance / heat and crack resistance: Applied after treatment with good chipping resistance and heat and crack resistance
- Improved wear and heat resistance: Applied high toughness substrate and high functional CVD alumina

### Features



### Guideline for grade application



### Selection system of CVD coated grades

| Workpiece                | Machining types     | Recommended grade     | Recommended cutting speed (m/min) | ISO | Application range     |
|--------------------------|---------------------|-----------------------|-----------------------------------|-----|-----------------------|
| <b>P</b> Steel           | Continuous cutting  | NC5330                | 200 (150~250)                     | P20 | NC5330                |
|                          | Continuous cutting  | NCM535 <sup>new</sup> | 300 (200~400)                     | P25 |                       |
|                          | Interrupted cutting | NCM545 <sup>new</sup> | 200 (150~250)                     | P30 | NCM535 <sup>new</sup> |
|                          | Interrupted cutting | NCM545 <sup>new</sup> | 200 (150~250)                     | P35 |                       |
| <b>M</b> Stainless steel | Continuous cutting  | NC5330                | 150 (120~180)                     | P40 | NCM545 <sup>new</sup> |
|                          | Continuous cutting  | NC5330                | 150 (120~180)                     | P45 |                       |
| <b>K</b> Cast iron       | Continuous cutting  | NC5330                | 200 (150~250)                     | M10 | NC5330                |
|                          | Continuous cutting  | NC5330                | 200 (150~250)                     | M20 |                       |
|                          | Continuous cutting  | NCM535 <sup>new</sup> | 250 (200~300)                     | K10 | NCM535 <sup>new</sup> |
|                          | Continuous cutting  | NCM535 <sup>new</sup> | 250 (200~300)                     | K20 |                       |
|                          | Continuous cutting  | NCM545 <sup>new</sup> | 250 (200~300)                     | K30 | NCM545 <sup>new</sup> |

### The features of CVD milling grades

| CVD Coated grades     | ISO                           | Features                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-----------------------|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| NC5330                | P20~P30<br>M20~M30<br>K15~K25 | <ul style="list-style-type: none"> <li>• For high speed milling of steel and stainless steel</li> <li>• Superior wear resistance and chipping resistance grade for steel and stainless steel</li> <li>• MT-TiCN + Al<sub>2</sub>O<sub>3</sub> + TiN</li> </ul>                                                                                                                                                                    |
| NCM535 <sup>new</sup> | P30~P40<br>K20~K30            | <ul style="list-style-type: none"> <li>• Rising CVD milling grade for high productivity in large steel and cast iron machining at high speed</li> <li>• High toughness and thermal conductivity substrate and high functional CVD coating layer with heat resistance</li> <li>• High chipping resistance and heat and crack resistance from excellent after treatment</li> <li>• MT-TiCN + Al<sub>2</sub>O<sub>3</sub></li> </ul> |
| NCM545 <sup>new</sup> | P40~P50<br>K30~K40            | <ul style="list-style-type: none"> <li>• For steel and cast iron milling with high toughness</li> <li>• High toughness substrate and high functional CVD coating layer</li> <li>• High chipping resistance and heat and crack resistance from excellent after treatment</li> <li>• MT-TiCN + Al<sub>2</sub>O<sub>3</sub></li> </ul>                                                                                               |

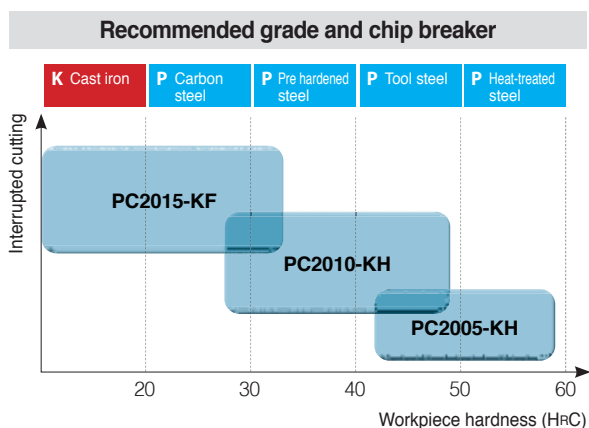
## PVD coated grades

PVD coated grades for finishing high hardened steel

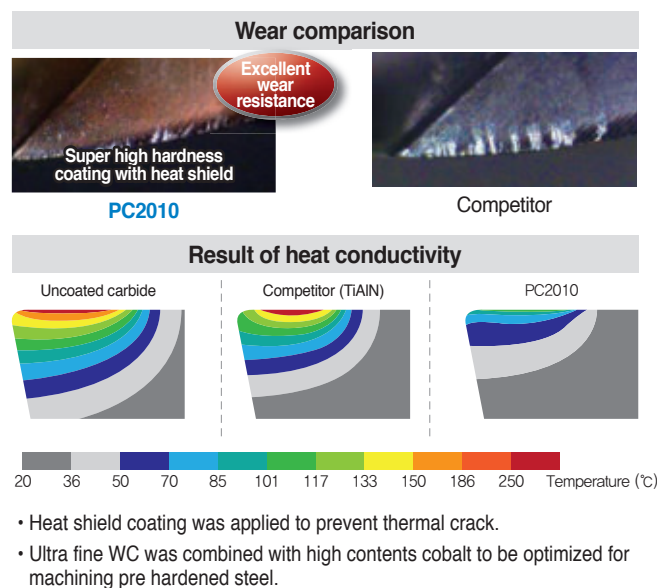
### PC2005 / PC2010 / PC2015

- 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

#### Application guideline per workpiece



#### Features

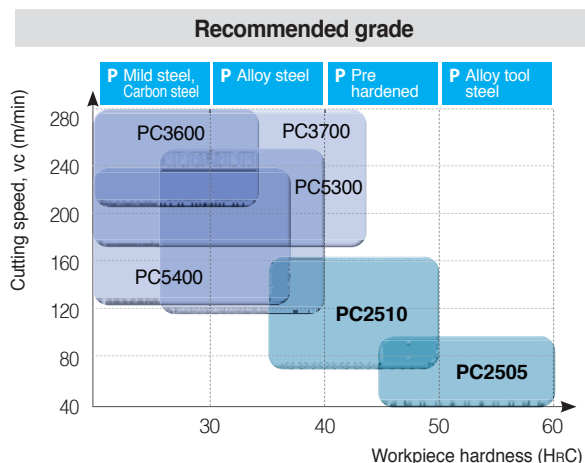


PVD coated grades for roughing high hardened steel

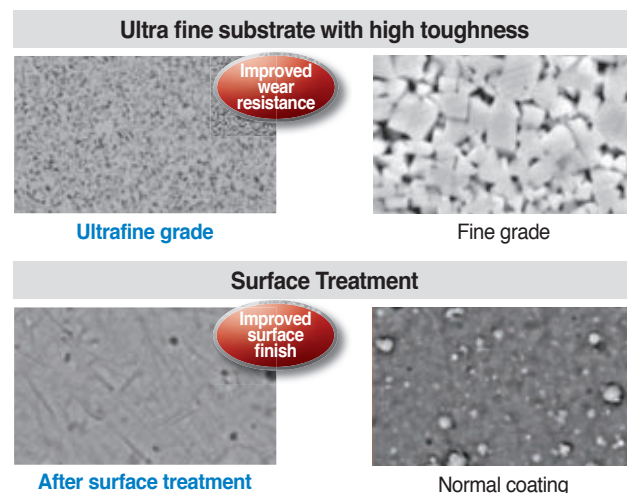
### PC2505 <sup>new</sup> / PC2510 <sup>new</sup>

- 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

#### Application guideline per workpiece



#### Features



## PVD coated grades

Milling grade specialized for steel

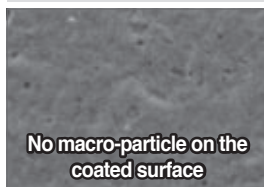
# PC3700 new

- Excellent chip removal rate due to a tough substrate specialized for steel, and lubricative PVD coating of high-hardness
- A highly chipping-resistant grade for minimized deviation and extended tool life under various cutting conditions

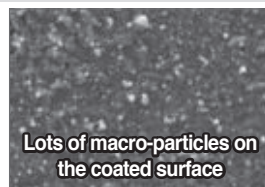
### Features

- Smooth surface due to special surface treatment  
→ Smooth chip evacuation, improved chipping resistance and surface finish of the workpiece

#### Special coating surface treatment

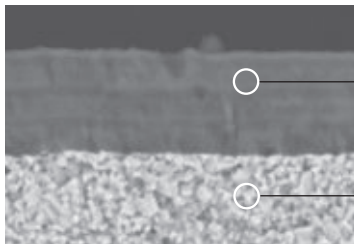


PC3700



Existing products

- Substrate for general milling applications of steel and PVC coating treatment

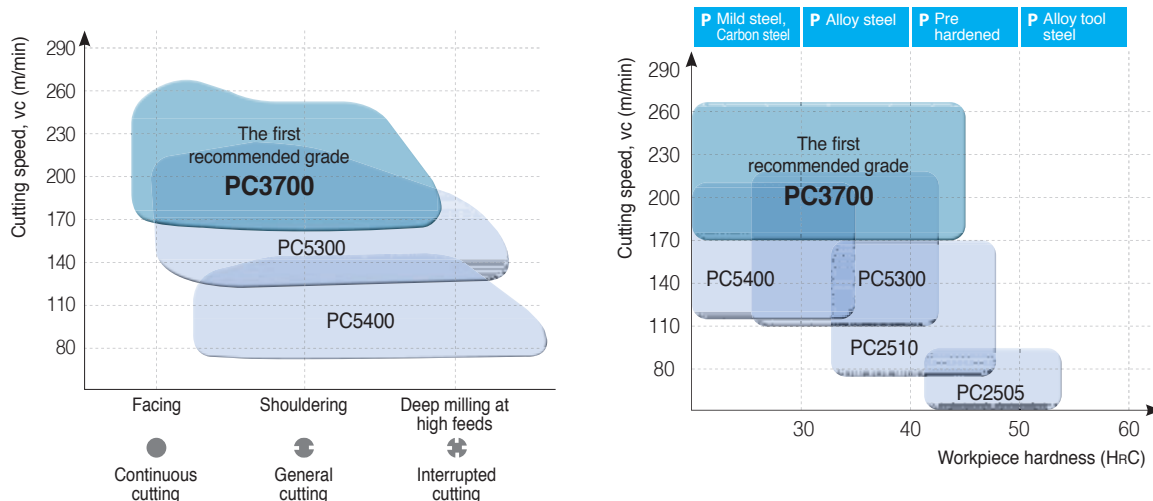


Stronger resistance to welding and chipping due to the multi-layer coating technology with high hardness and lubricating treatment

Ensuring general machinability due to wear and breakage resistant materials optimized for milling applications of steel

### Application range

#### Recommended grades and cutting conditions for p-type milling application



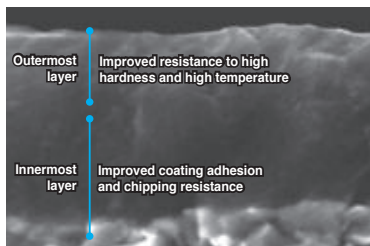
## PVD coated grades

### Universal PVD grade

## PC5300

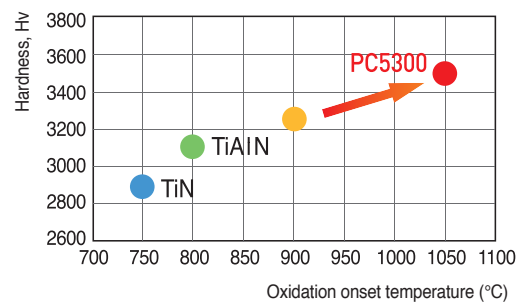
- Advanced PVD coating with high hardness and high temp stability
- High tough substrate and coating films produce excellent surface finish
- Universal tooling capability covering P, M, K, S with this single grade, PC5300
- Stable machining resulting from excellent edge hardness and chipping resistance

### Features



- Latest PVD coating technology developed by KORLOY
- New concept of coating equipped with high temperature oxidation resistance and high hardness

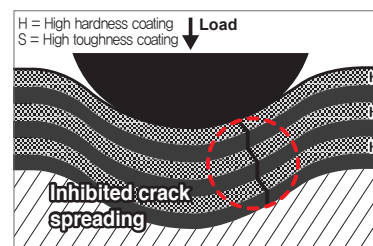
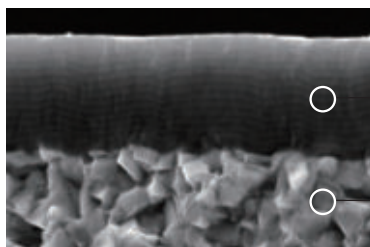
### High temp properties



## PC5400

- New PVD coating layer with high toughness and lubrication
- High adhesive strength and toughness between the substrate and coating layer
- Excellent cutting edge strength and chipping resistance ensure stable machinability for P, M, K, S.

### Features



### Crack creation on the coating surface after leaving an indentation by 60kg



Normal coating



High toughness coating



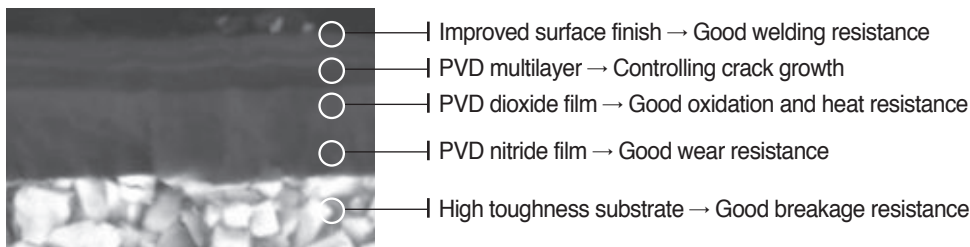
## PVD coated grades

Optimal PVD grade for medium to rough cutting and highly interrupted milling in stainless steel

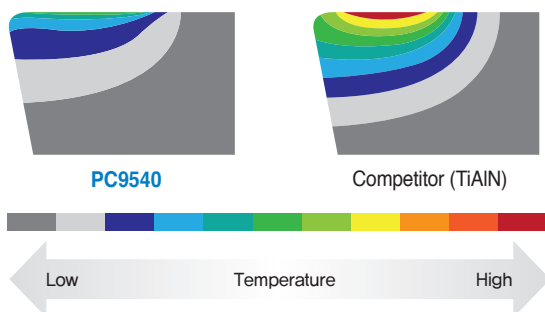
### PC9540 **new**

- Longer tool life due to higher breakage resistance applying high toughness substrate controlling crack growth
- Excellent and new PVD dioxide film with oxidation and heat resistance overcoming the limit of hard-to-cut materials machining
- Stable machinability by preventing welding and chipping due to applying special coating surface treatment

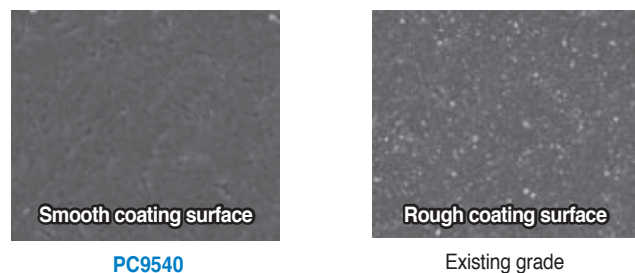
#### Features



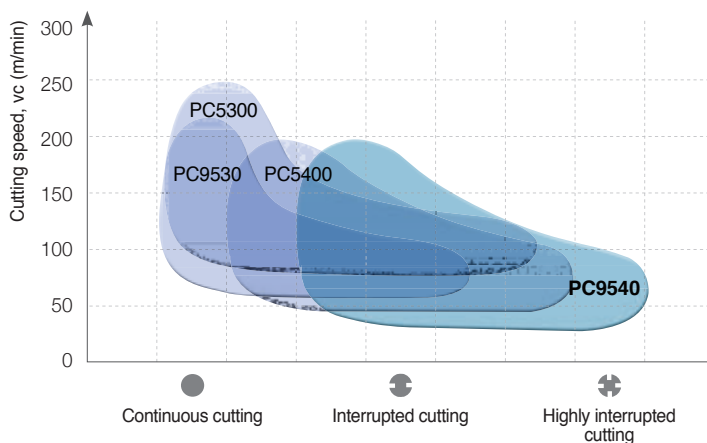
#### New PVD dioxide film (comparison of thermal conductivity)



#### Special coating surface treatment technology



#### Application range



## Selection system of PVD coated grades

| Workpiece | Machining types     | Recommended grade     | Recommended cutting speed (m/min) | ISO           | Application range                          |
|-----------|---------------------|-----------------------|-----------------------------------|---------------|--------------------------------------------|
| P         | Steel               | Continuous cutting    | PC3600                            | 235 (180~290) | P20                                        |
|           |                     | PC3700 <sup>new</sup> | 235 (180~290)                     | P30           | PC3600                                     |
|           | Interrupted cutting | PC5300                | 195 (150~240)                     | P40           | PC3700 <sup>new</sup> PC5300 PC5400        |
|           |                     | PC5400                | 145 (80~210)                      | P50           |                                            |
| M         | Stainless steel     | Continuous cutting    | PC5300                            | 130 (100~160) | M20                                        |
|           |                     | PC9530                | 130 (100~160)                     | M30           | PC5300 PC9530 PC5400 PC9540 <sup>new</sup> |
|           | Interrupted cutting | PC5400                | 120 (95~155)                      | M40           |                                            |
|           |                     | PC9540 <sup>new</sup> | 110 (80~140)                      | M50           |                                            |
| K         | Cast iron           | Continuous cutting    | PC6510                            | 180 (140~230) | K01                                        |
|           |                     |                       |                                   | K10           | PC6510                                     |
|           | Interrupted cutting | PC5300                | 145 (110~180)                     | K20           |                                            |
|           |                     | PC5400                | 125 (85~160)                      | K30           | PC5300 PC5400                              |
| S         | HRSA                | Continuous cutting    | PC5300                            | 55 (40~70)    | S10                                        |
|           |                     |                       |                                   | S20           | PC5300                                     |
|           | Interrupted cutting | PC5400                | 40 (30~50)                        | S30           |                                            |
|           |                     | PC9540 <sup>new</sup> | 40 (30~50)                        | S40           | PC5400 PC9540 <sup>new</sup>               |
| H         | High hardness steel | Continuous cutting    | PC2005                            | 60 (40~80)    | H01                                        |
|           |                     |                       | PC2010                            | 55 (40~70)    | H10                                        |
|           |                     |                       | PC2015                            | 50 (35~65)    | H20                                        |
|           |                     |                       | PC210F                            | 50 (35~65)    | H30                                        |

## The features of PVD coated grades

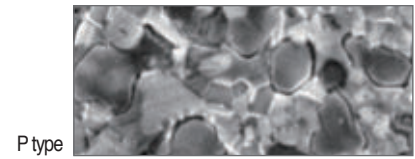
| PVD Coated grades     | ISO                                                 | Features                                                                                                                                                                                                                                                                                                                                                  |
|-----------------------|-----------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PC3600                | P20~P30                                             | <ul style="list-style-type: none"> <li>Milling grade for medium and roughing of steel</li> <li>New coating layer with superior wear resistance and oxidation resistance with high toughness substrate</li> </ul>                                                                                                                                          |
| PC3700 <sup>new</sup> | P30~P40                                             | <ul style="list-style-type: none"> <li>Exclusive grade for milling grade</li> <li>Lubricated and high hardness multi-layered coating</li> </ul>                                                                                                                                                                                                           |
| PC5300                | P30~P40<br>M20~M30                                  | <ul style="list-style-type: none"> <li>Superior universal grade for steel, cast iron, hard to cut material, stainless steel</li> <li>New coating and ultra fine grain provide wear resistance and oxidation resistance</li> <li>TiAlN Series new coating</li> </ul>                                                                                       |
| PC5400                | P35~P45<br>M30~M40                                  | <ul style="list-style-type: none"> <li>Universal grade for interrupted machining of steel, cast iron, hard-to-cut materials and stainless steel with stable machinability</li> <li>New coating layer with high toughness and lubrication on ultra fine grain substrate with high toughness</li> <li>AlCrN series new coating</li> </ul>                   |
| PC6510                | K05~K15                                             | <ul style="list-style-type: none"> <li>High speed milling grade for cast iron and aluminum</li> <li>K-Gold coating</li> </ul>                                                                                                                                                                                                                             |
| PC9530                | M25~M35<br>S20~S30                                  | <ul style="list-style-type: none"> <li>Medium to rough cutting of hard to cut materials such as stainless steel, Cr-Ni steel, etc.</li> <li>The toughest sub-micron substrate provides excellent cutting performance at high feed</li> <li>TiAlN coating</li> </ul>                                                                                       |
| PC9540 <sup>new</sup> | M35~M45<br>S30~S40                                  | <ul style="list-style-type: none"> <li>Exclusive high toughness grade for stainless steel milling</li> <li>PVD dioxide film with good heat resistance</li> </ul>                                                                                                                                                                                          |
| PC2005                | H01~H10<br>P01~P10<br>K01~K10                       | <ul style="list-style-type: none"> <li>Exclusive for Laser Mill in milling of high hardness workpieces and press mold steel</li> <li>Utmost wear resistance due to high hardness substrate and coating</li> <li>Ultra high hardness K-Brown coating</li> </ul>                                                                                            |
| PC2010                | H05~H15                                             | <ul style="list-style-type: none"> <li>Exclusive for Laser Mill in milling of pre hardened steel and plastic mold steel</li> <li>High hardness enhanced cutting edges due to ultra fine WC and high contents binder for expanding application range to high hardness steel and pre hardened steel</li> <li>Ultra high hardness K-Brown coating</li> </ul> |
| PC2015                | H10~H20                                             | <ul style="list-style-type: none"> <li>Exclusive for Laser Mill in milling of carbon steel and cast</li> <li>Highly lubricative K-SILVER coating</li> <li>Lubricative coating layer and high contents substrate for machining mild steel and hard-to-cut cast materials</li> </ul>                                                                        |
| PC210F                | H10~H20<br>P25~P35<br>K15~K25<br>M15~M25<br>S10~S20 | <ul style="list-style-type: none"> <li>High speed milling grade for hardened steel, cast iron, and stainless steel(Laser Mill)</li> <li>New coating and ultra fine grain provide wear resistance and oxidation resistance</li> <li>TiAlN Series new coating</li> </ul>                                                                                    |
| PC2505 <sup>new</sup> | H01~H10                                             | <ul style="list-style-type: none"> <li>Roughing grade for high hardened steel and pressed die steel</li> <li>Excellent wear resistance ideal for machining die steel and high hardened steel over HRC50</li> </ul>                                                                                                                                        |
| PC2510 <sup>new</sup> | H05~H15                                             | <ul style="list-style-type: none"> <li>Roughing grade for pre-hardened steel and plastic die steel</li> <li>Stabilized toughness ideal for interrupted cutting of high hardened steel and wet cutting accompanied by massive thermal shock</li> </ul>                                                                                                     |



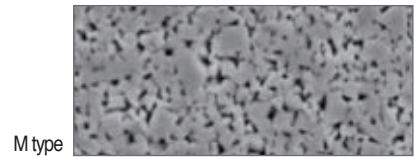
## Uncoated carbide grades

### Features

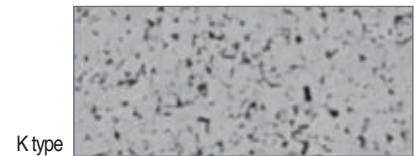
- Due to KORLOY's advanced sintering technology, our uncoated carbide grades have a fine alloy structure which is necessary to get superior quality from a uncoated cutting tool



P type



M type



K type

### Advantages

- Consist of P,M,K carbide grades and can be used in all kinds of workpiece
- Excellent quality at machining with coolant, due to the superior thermal crack resistance of the carbide
- Due to the special design of carbides, it has fine micro structure and low affinity with workpiece
- It has excellent toughness and produces lower cutting loads

### Selection system of uncoated carbide grade

| Workpiece | Grade           | Recommended cutting speed (m/min) | ISO           | Application range |
|-----------|-----------------|-----------------------------------|---------------|-------------------|
| P         | Steel           | ST20                              | 90 (70~110)   | P20               |
|           |                 | ST30A                             | 80 (60~100)   | P30               |
| M         | Stainless steel | U20                               | 90 (70~110)   | M20               |
|           |                 |                                   |               | M30               |
| K         | Cast iron       | H01, H05                          | 150 (110~190) | K10               |
|           |                 | G10                               | 120 (90~150)  | K20               |
| N         | Aluminum alloy  | H01                               | 600 (450~750) | N10               |
|           | Copper alloys   | H05                               | 425 (320~530) | N20               |

### Main composition and application range

| Workpiece | Composition   | Features                                                              | Workpiece                                              |
|-----------|---------------|-----------------------------------------------------------------------|--------------------------------------------------------|
| P         | WC-TiC-TaC-Co | Excellent thermal shock resistance and plastic deformation resistance | Carbon steel, Alloy steel, Stainless steel             |
| M         | WC-TiC-TaC-Co | General grades with thermal shock resistance and hardness             | Carbon steel, Alloy steel, Stainless steel, Cast steel |
| K         | WC-Co         | High hardness and superior wear resistance                            | Cast iron, Non-ferrous metal, Non metal                |

### The physical properties of uncoated carbide grades

| Workpiece | Grade | Hardness (HRA) | TRS (kgf/mm <sup>2</sup> ) | Young's modulus (10 <sup>3</sup> kgf/mm <sup>2</sup> ) | Thermal expansion coefficient(10 <sup>-6</sup> /°C) | Thermal conductivity (cal/cm·sec·°C) |
|-----------|-------|----------------|----------------------------|--------------------------------------------------------|-----------------------------------------------------|--------------------------------------|
| P         | ST10  | 92.1           | 175                        | 48                                                     | 6.2                                                 | 25                                   |
|           | ST20  | 91.9           | 200                        | 56                                                     | 5.2                                                 | 45                                   |
|           | ST30A | 91.3           | 230                        | 53                                                     | 5.2                                                 | -                                    |
| M         | U20   | 91.1           | 210                        | -                                                      | -                                                   | 88                                   |
| K         | H01   | 92.9           | 210                        | 66                                                     | 4.7                                                 | 109                                  |
|           | G10   | 90.9           | 250                        | 63                                                     | -                                                   | 105                                  |

1KPa = 102kgf/m<sup>2</sup>, 1w/mk = 2.39×10<sup>-3</sup>cal/cm·sec·°C

## Cermet grades

### Features

- High hardness substrate ensures long tool life in high speed milling
- High toughness cutting edge ensures long tool life even in high impact machining
- Chemically stable substrate provides excellent surface finish of the workpiece

### Selection system of cermet grades

| Workpiece | Machining types     | Grade  | Recommended cutting speed (m/min) | ISO | Application range                                                                  |
|-----------|---------------------|--------|-----------------------------------|-----|------------------------------------------------------------------------------------|
| P         | Steel               | CN2500 | 250 (200~300)                     | P20 |  |
|           | Interrupted cutting | CN30   | 150 (100~200)                     | P30 |                                                                                    |

### The features of cermet grades

| Cermet Grade | ISO     | Features                                                                                                                                          |
|--------------|---------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| CN2500       | P20~P30 | <ul style="list-style-type: none"> <li>• Universal grade from finishing to roughing of steel</li> <li>• Functionally gradient material</li> </ul> |
| CN30         | P25~P35 | <ul style="list-style-type: none"> <li>• For milling of steel</li> <li>• Cermet with high toughness</li> </ul>                                    |

### The physical properties of cermet grades

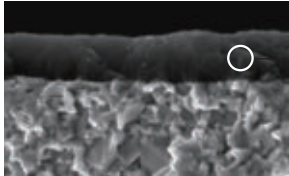
| Workpiece | Grade  | Hardness (Hv) | TRS (kgf/mm <sup>2</sup> ) | SG (g·cm <sup>-3</sup> ) |
|-----------|--------|---------------|----------------------------|--------------------------|
| P         | CN2500 | < 1800        | 210 <                      | 6.8~7.0                  |
|           | CN30   | < 1500        | 240 <                      | 7.0~7.3                  |



## Solid endmills grade selection

**PC303S / PC310U**

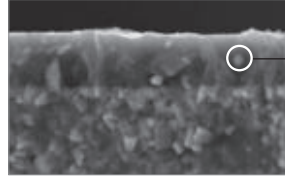
- Ultrafine substrate & high hardness coatings for excellent wear resistance
- Special surface treatment provides higher chipping resistance

**Features**

Exceptional wear resistance resulting from extremely hard coating layers

**SL**

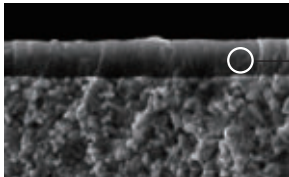
- Applied high lubrication coating and special surface treatment technology

**Features**

Enhanced welding resistance, chipping resistance and machining stability due to surface treatment technology

**PC315E**

- Fine substrate & lubricative coatings for stable machinability

**Features**

Lubricative coatings for excellent machinability

**PC305H**

- Enhanced wear resistance and stability from frictional heat due to high hardness substrate and high hardness coating

**Features**

Applied layer of AlTiSiN series

**Selection system**

| Workpiece                    | Grade                 | ISO | Application range                           |
|------------------------------|-----------------------|-----|---------------------------------------------|
| <b>P</b> Steel               | PC303S                | P01 |                                             |
|                              | PC310U                | P10 | PC303S PC203F PC305H PC310U                 |
|                              | PC315F                | P20 |                                             |
|                              | PC320                 | P30 | PC315E PC320 PC215F PC215F                  |
| <b>M</b> Stainless steel     | PC303S                | M01 |                                             |
|                              | PC310U                | M10 | PC303S PC203F PC305H PC310U                 |
|                              | PC320S                | M20 | PC320S PC315E PC320 PC215F                  |
|                              | PC315E                | M30 |                                             |
| <b>K</b> Cast iron           | PC303S                | K01 |                                             |
|                              | PC310U                | K10 | PC303S PC203F PC305H PC310U                 |
|                              | PC315E                | K20 |                                             |
|                              | PC320                 | K30 | PC315E PC320 PC215F                         |
| <b>S</b> HRSA                | PC320S                | S20 | PC320S PC315E PC320 PC215F SL               |
|                              | PC315E                | S30 |                                             |
| <b>N</b> Nonferrous          | ND3000 <sup>new</sup> | N01 | ND3000 <sup>new</sup>                       |
|                              | ND2100 <sup>new</sup> | N05 | ND2100 <sup>new</sup> PD1005 <sup>new</sup> |
|                              | PD3000                | N10 | PD1010 <sup>new</sup> H01 H05S PC210C       |
|                              | H01                   | N20 |                                             |
| <b>H</b> High hardness steel | PC303S                | H01 |                                             |
|                              | PC203F                | H10 | PC303S PC203F PC305H PC310U                 |
|                              | PC310U                | H20 |                                             |

## Solid endmills grade

### Grade information for each product

| Item           | Grade          |          |
|----------------|----------------|----------|
|                | Coated         | Uncoated |
| H-Star Endmill | PC305H         | -        |
| V Endmill      | PC215F         | -        |
| Z Endmill      | PC315E         | -        |
| F Endmill      | PC203F         | -        |
| T Endmill      | PC2510, ND3000 | H01      |
| I+ Endmill     | PC320          | -        |
| Z+ Endmill     | PC320U         | -        |
| S+ Endmill     | PC320S         | -        |

| Item                     | Carbide                    |          | HSS                 |              |
|--------------------------|----------------------------|----------|---------------------|--------------|
|                          | Coated                     | Uncoated | Coated              | Uncoated     |
| R+ Endmill               | PC10T, PC20T, PC30T, PC40T | FN30T    | HC10T, HC20T, HC30T | HN20T, HN30T |
| Aluminum Solid Endmill   | PD1005, PD1010             | H01      | -                   | -            |
| A+ Endmill               | -                          | H05S     | -                   | -            |
| M+ Endmill               | PC40T                      | -        | -                   | -            |
| C-Max                    | PC210C                     | -        | -                   | -            |
| Super Endmill            | SL                         | -        | -                   | -            |
| D Endmill                | ND3000                     | -        | -                   | -            |
| Composite Router Endmill | ND2100                     | -        | -                   | -            |
| Brazed Endmill           | PC221F                     | FCC      | -                   | -            |

### The features of Coated grades

| Workpiece              | ISO                                | Features                                                                                                                                                                                                                                                                                        |
|------------------------|------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PC305H                 | P05~P15, M05~M15, K05~K15, H05~H15 | • Grade with higher Si, enhanced wear resistance and stability from frictional heat due to applying the new AlTiSiN series layer                                                                                                                                                                |
| PC315E<br>PC320        | P20~P35, K20~K35                   | • Excellent wear/welding resistance in high speed machining due to the combination of ultra fine substrate and PVD coating<br>• For low/medium speed machining of general steel<br>• New film applied with excellent chipping/wear resistance                                                   |
| PC320S                 | M20~M30, S20~S30                   | • Low to medium speed cutting of stainless steel and heat resistant alloys<br>• Advanced coating layers with increased resistance to built-up edge and oxidation<br>• Excellent resistance to wear and built-up edge at high speeds due to the ultrafine substrate and dedicated coating layers |
| SL                     | S20~S30                            | • Exclusive Endmill for Inconel<br>• Coating layer with oxidation resistance and high hardness<br>• Reducing fracture on cutting edge and enhancing wear resistance                                                                                                                             |
| PC210C                 | N10~N20                            | • Medium to high speed cutting of copper and copper electrode<br>• K-Silver coating with excellent lubrication and wear and chipping resistant substrate<br>• Medium to high speed cutting of acrylic materials                                                                                 |
| ND3000* <sup>new</sup> | N01~N05                            | • For electrode machining of graphite at medium to high speeds<br>• Dia. coating layer with high wear resistance and lubrication                                                                                                                                                                |
| ND2100* <sup>new</sup> | N03~N08                            | • For composite materials<br>• Diamond-coated layers with excellent adhesion                                                                                                                                                                                                                    |
| PD1005                 | N05~N10                            | • For Non-ferrous metals(Aluminum alloy) machining<br>• DLC(Diamond Like Carbon) coating layer with high wear resistance and lubrication                                                                                                                                                        |

\* : CVD

### Features of KORLOY endmills

| Index                                                          | Features                                                                                                                                                                                                                                                                                                                                  |
|----------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>H-Star Endmill</b><br>(Endmill for high hardness steel)     | • Carbide endmill for high hardness (HrC50~63) steel<br>• Suitable for precision cutting due to high precision tolerance on radius and tool diameter                                                                                                                                                                                      |
| <b>Z Endmill / I+ Endmill</b><br>(Endmill for general cutting) | • Excellent in machining various workpieces such as carbon steel, alloy steel, cast iron, pre hardened steel, etc. under HRC45<br>• Longer tool life with the use of ultra fine substrate and new coating technology                                                                                                                      |
| <b>T Endmill</b><br>(For dental purpose)                       | • Endmill for dental prostheses made of zirconia, titanium, Co-Cr, wax, PMMA, and glass ceramic<br>• Custom-made tools for each type of milling machines for dental purpose                                                                                                                                                               |
| <b>Z+ Endmill</b>                                              | • Universal endmill applicable to a variety of workpiece materials under HrC47<br>• Roughing and finishing availability<br>• Improved tool life thanks to the new substrate and the most advanced coating<br>• Inhibited chipping and longer cutting time due to the optimized blade design                                               |
| <b>SSEA / A+ Endmill</b><br>(Endmill for aluminum)             | • Suitable for high speed machining in aluminum and other Non-ferrous materials<br>• Can accomplish excellent surface finishing, superior chip removal in high feed rate                                                                                                                                                                  |
| <b>M+ Endmill</b><br>(Multi-functional endmill)                | • Various cutting with one Endmill: Drilling, Ramping, Slotting and Side Milling<br>• Reducing cutting resistance and enhancing surface finish due to high tool rigidity                                                                                                                                                                  |
| <b>S+ Endmill</b><br>(Endmill for hard-to-cut materials)       | • Sharp cutting edge and high rake angle with streamline chip pocket shows good cutting performance in stainless steel machining where work hardening is a problem                                                                                                                                                                        |
| <b>R+ Endmill</b>                                              | • High efficient roughing endmill for medium to rough cutting<br>• Excellent machining efficiency thanks to the high efficient roughing edge design<br>• Reduced cutting force thanks to specifically designed corners, and irregular flute spacing and lead angle                                                                        |
| <b>D Endmill</b>                                               | • Diamond-coated endmill for graphite and ceramic<br>• Excellent wear resistance thanks to the diamond coating of high hardness and high purity<br>• Optimized for high speed and heavy duty cutting thanks to the strong grip of coating<br>• Excellent cutting performance and finish thanks to the optimized blade design of high rake |
| <b>Composite Router Endmill</b>                                | • Router endmill for machining composite materials (CFRP & GFRP)<br>• Minimized machining defects thanks to its design to prevent flaking, peeling off and burrs<br>• Excellent resistance to wear and flaking thanks to the nano-crystalline diamond coating of high hardness and high purity                                            |
| <b>C-Max</b>                                                   | • Ideally suited for machining copper, brass, bronze, and Non-ferrous materials thanks to the optimized combination between K-Silver coating with excellent lubrication and resistance to wear and chipping, and the dedicated substrate                                                                                                  |
| <b>Super Endmill</b>                                           | • High lubricated coating and special surface treatment<br>• Improved welding and chipping resistance and machining stability due to surface treatment technology                                                                                                                                                                         |



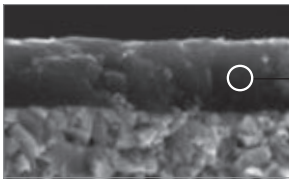
## Solid drills grades selection

## Grades for Mach Solid Drill (MSD)

**PC325U**

- Special surface treatment provides improved lubrication and reduced cutting loads
- Stable tool life thanks to increased welding resistance

## Features



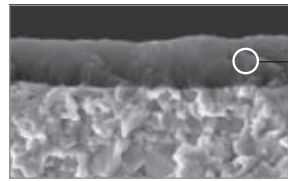
Increased welding resistance in medium to high speed cutting due to highly lubricative coating layers  
Increased wear resistance in carbon steel machining

## Grades for Mach Solid Drill (MSD)

**PC325T** *new*

- Good wear resistance in HRSA machining at high temperature
- Good surface finish reduces friction resistance and increases chip evacuation

## Features



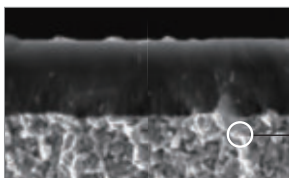
High heat and oxide resistance increase tool life  
Increased wear.  
Good surface finish coating layer ensures lubrication and high quality in machining.

## Grades for Mach Long Drill (MLD)

**PC215G / PC315G**

- Improved wear resistance due to the ultrafine substrate
- Reduced friction resistance and smooth chip flow due to improved coating lubrication

## Features



Exceptional wear resistance due to the ultrafine substrate

## Selection system

| Workpiece                | Grade             | ISO | Application range |        |        |        |
|--------------------------|-------------------|-----|-------------------|--------|--------|--------|
| <b>P</b> Steel           | PC215G            | P01 |                   |        |        |        |
|                          | PC315G            | P10 |                   |        |        |        |
|                          | PC325U            | P20 | PC215G            | PC315G | PC325U |        |
|                          | PC230F            | P30 |                   |        |        | PC230F |
| <b>M</b> Stainless steel | PC215G            | M01 |                   |        |        |        |
|                          | PC315G            | M10 |                   |        |        |        |
|                          | PC205F            | M20 | PC215G            | PC315G | PC325U |        |
|                          | PC325U            | M30 |                   |        |        |        |
| <b>K</b> Cast iron       | PC215G            | K01 |                   |        |        |        |
|                          | PC315G            | K10 |                   |        |        |        |
|                          | PC205F            | K20 | PC215G            | PC315G | PC325U |        |
|                          | PC325U            | K30 |                   |        |        |        |
| <b>N</b> Nonferrous      | ND2100 <i>new</i> | N05 | ND2100 <i>new</i> |        |        |        |
|                          | FG2               | N10 |                   | FG2    | FA1    |        |
|                          | FA1               | N20 |                   |        |        |        |
| <b>S</b> HRSA            | PC325T <i>new</i> | S20 | PC325T <i>new</i> |        |        |        |
|                          |                   | S30 |                   |        |        |        |

## Solid drills grades

### Grade information for each product

| Item          | Grade          |          |
|---------------|----------------|----------|
|               | Coated         | Uncoated |
| MSD Plus      | PC325U         | FG2      |
| MSD Plus-S    | PC325T         | -        |
| MSD Plus CFRP | ND2100         | -        |
| MSFD          | PC325U         | -        |
| MLD Plus      | PC215G, PC315G | FG2      |
| VZD           | PC230F         | -        |
| ESD Plus      | PC325U         | FG2      |
| SSD Plus      | -              | FA1, FG2 |

### The features of PVD coated grades

| Workpiece                                                                                  | ISO                           | Features                                                                                                                                                                                                                                                                                               |
|--------------------------------------------------------------------------------------------|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PC325U                                                                                     | P20~P35<br>M20~M30<br>K20~K35 | <ul style="list-style-type: none"> <li>• Universal grade for machining steel, cast iron, stainless steel, etc.</li> <li>• Stable cutting performance with excellent wear/chipping resistance</li> <li>• Increased welding resistance due to lubricative new coating at medium to high speed</li> </ul> |
| PC325T    | M20~M30<br>S20~S30            | <ul style="list-style-type: none"> <li>• Good wear resistance realizes HRSA machining at high temperature</li> <li>• Good wear and chipping resistance ensure stable machinability</li> </ul>                                                                                                          |
| PC215G                                                                                     | P15~P30<br>M15~M25<br>K15~K30 | <ul style="list-style-type: none"> <li>• Universal grade for machining steel, cast iron, etc.</li> <li>• Stable cutting performance with excellent wear/chipping resistance</li> </ul>                                                                                                                 |
| PC315G                                                                                     | P15~P30<br>M15~M25<br>K15~K30 | <ul style="list-style-type: none"> <li>• Universal grade for machining steel, cast iron, stainless steel, etc.</li> <li>• Stable cutting performance with excellent wear/chipping resistance</li> <li>• Increased welding resistance due to lubricative new coating at medium to high speed</li> </ul> |
| PC230F                                                                                     | P25~P35                       | <ul style="list-style-type: none"> <li>• For machining general steel at medium to high speed</li> <li>• Stable cutting performance with excellent wear/chipping resistance</li> </ul>                                                                                                                  |
| ND2100  | N05~N10                       | <ul style="list-style-type: none"> <li>• For machining composite materials</li> <li>• Diamond-coated layers with excellent adhesion</li> </ul>                                                                                                                                                         |
| FG2 / FA1                                                                                  | N05~N25                       | <ul style="list-style-type: none"> <li>• Increased wear/chipping resistance with the use of ultra fine substrate</li> </ul>                                                                                                                                                                            |

### Features of KORLOY drills

| Index         | Features                                                                                                                                                                                                                                                                                                                                                                     |
|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MSD Plus      | <ul style="list-style-type: none"> <li>• Increased welding resistance in medium to high speed cutting due to highly lubricative coating layers</li> <li>• Increased wear resistance in carbon steel machining</li> <li>• Reduced friction resistance around corners and flutes</li> </ul>                                                                                    |
| MSD Plus-S    | <ul style="list-style-type: none"> <li>• Exclusive for HRSA grooving with good wear resistance at high temperature and chipping resistance.</li> <li>• New coating layer with good surface finish reduces frictional resistance and increases chip evacuation.</li> <li>• Preventing chipping on the cutting edge and fracture of tool ensures high productivity.</li> </ul> |
| MSD Plus CFRP | <ul style="list-style-type: none"> <li>• The best tool for hole making of CFRP workpieces</li> <li>• Excellent wear resistance due to the diamond-coated grade</li> <li>• Reduced burr creation in CFRP machining due to high rake cutting edges</li> </ul>                                                                                                                  |
| MSFD          | <ul style="list-style-type: none"> <li>• High quality hole making capability with 180° point angle</li> <li>• Improved anti-chipping and welding resistance by edge honing and chamfering</li> <li>• Minimized creation of burrs compared to general drills</li> </ul>                                                                                                       |
| MLD Plus      | <ul style="list-style-type: none"> <li>• Higher rigidity due to straight-edge design</li> <li>• Smooth chip flow due to wider chip pockets and improved surface finish on flutes</li> <li>• Double margin system for stable machinability</li> </ul>                                                                                                                         |
| ESD Plus      | <ul style="list-style-type: none"> <li>• Lubricative coating layer improves welding resistance at middle to high speed.</li> <li>• Increase wear resistance in machining carbon steel</li> <li>• Increased welding resistance and wear resistance with new PC325U grade applied.</li> </ul>                                                                                  |
| SSD Plus      | <ul style="list-style-type: none"> <li>• New shape increases chip control</li> <li>• Surface finish and improved shape realize high quality of machining</li> <li>• Stable tool life increases productivity</li> </ul>                                                                                                                                                       |



## Diamond coated grades

### Grade for graphite and ceramic

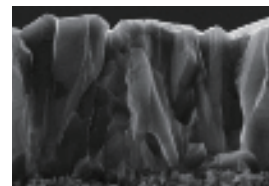
## ND3000 new

- SP3-crystalline diamond coatings of high purity and high hardness
- Improved adhesion between coated layers and the substrate that is specialized for diamond coatings
- Excellent tool life when machining graphite and ceramic

Surface of ND3000



Cross section of ND3000's coated layers

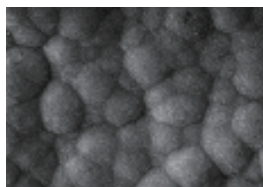


### Grade for composite materials

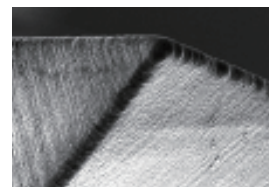
## ND2100 new

- Improved surface finish and wear resistance due to the control technology of nano-crystalline diamond particles
- Improved flaking resistance due to the substrate that is specialized for diamond coatings
- High quality and high precision machining availability thanks to sharp edges
- Excellent tool life when machining composite materials

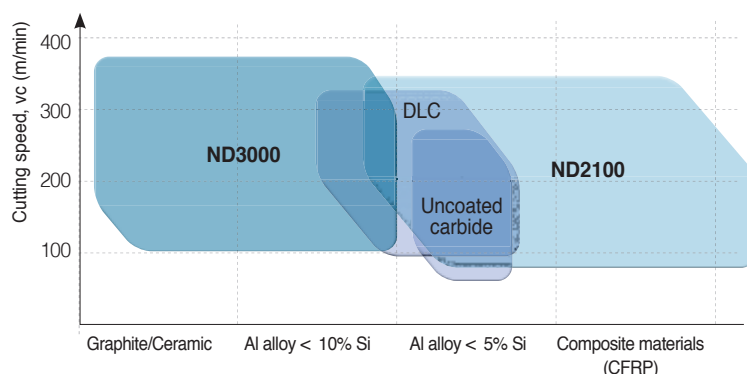
Surface of ND2100



Sharp edges of ND2100



### Application range



### Selection system

| Workpiece           |                     | Grade                                                  | ISO | Application range         |                           |
|---------------------|---------------------|--------------------------------------------------------|-----|---------------------------|---------------------------|
| <b>N</b> Nonferrous | Graphite/Ceramic    | ND3000 <small>new</small>                              | N01 |                           |                           |
|                     | Al alloy            | ND3000 <small>new</small><br>ND2100 <small>new</small> | N05 | ND3000 <small>new</small> | ND2100 <small>new</small> |
|                     | Composite materials | ND2100 <small>new</small>                              | N10 |                           |                           |

### The features of diamond coated grades

| Grade                     | ISO     | Features                                                                                                                                                                                                                                                                                               |
|---------------------------|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ND3000 <small>new</small> | N01~N05 | <ul style="list-style-type: none"> <li>• For continuous roughing of graphite, ceramic, and Al alloy at high speeds</li> <li>• Exceptional cutting performance due to high resistance to wear and flaking</li> <li>• High hardness diamond coatings of high purity SP3-crystalline structure</li> </ul> |
| ND2100 <small>new</small> | N05~N10 | <ul style="list-style-type: none"> <li>• For continuous finishing of composite materials and Al alloy at high speeds</li> <li>• Stable machinability due to durable sharp edges</li> <li>• Nano-crystalline diamond coatings under particle control</li> </ul>                                         |

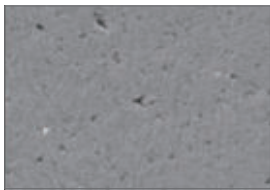
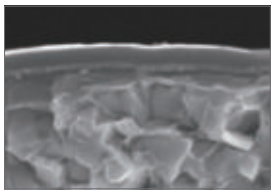
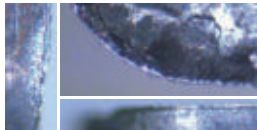
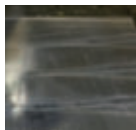
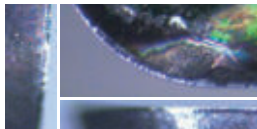
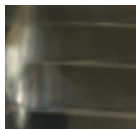
## DLC coated grades

### DLC-Coated Inserts for Non-Ferrous Metals

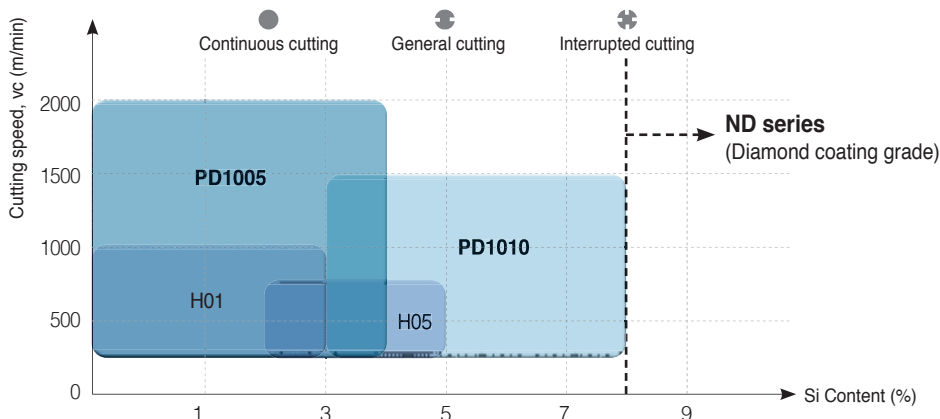
# PD1005 <sup>new</sup> / PD1010 <sup>new</sup>

- High hardness and low friction DLC coating technology
- Lubrication and maximized wear resistance increases machinability and machining quality.
- Optimal substrate for each workpiece ensures stable and long tool life
- For non-ferrous metals such as aluminum, Al-Si alloy, copper and etc. machining

### Features

| Smooth coating surface                                                            | Hard DLC coating                                                                  | Grade              | Wear resistance and Welding resistance                                             | Surface finish                                                                      | Chip curl                                                                           |
|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|--------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|  |  | Carbide non coated |  |  |  |
|                                                                                   |                                                                                   | DLC PD1010         |  |  |  |

### Application range



### Selection system

| Workpiece            | Grade                                         | ISO           | Application range |
|----------------------|-----------------------------------------------|---------------|-------------------|
| N Non-ferrous metals | Aluminum and copper (Soft non-ferrous metals) | PD1005        | N05               |
|                      | Aluminum alloy                                | PD1005 PD1010 | N10               |
|                      | Al-Si alloy (Hardened non-ferrous metals)     | PD1010        | N15               |

### The features of DLC coating grades

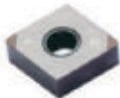
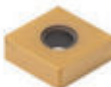
| Grade                 | ISO | Features                                                                                                                                                                                                                                                                             |
|-----------------------|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PD1005 <sup>new</sup> | N05 | <ul style="list-style-type: none"> <li>• For high speed and continuous machining of Aluminum and copper</li> <li>• High wear and welding resistance realize good machinability</li> <li>• High performance of DLC coating with high hardness and low friction</li> </ul>             |
| PD1010 <sup>new</sup> | N10 | <ul style="list-style-type: none"> <li>• For medium to high and interrupted machining of aluminum alloy and Al-Si alloy</li> <li>• Stable tool life due to substrate with chipping resistance</li> <li>• High performance DLC coating with high hardness and low friction</li> </ul> |



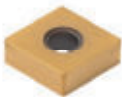
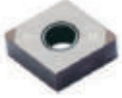
## cBN inserts grades

- Features**
- Excellent hardness and thermal resistance by sintering KORLOY's main constituents and special ceramic binder at high pressure and high temperature
  - Excellent hardness and wear resistance for higher productivity in machining cast iron and heat-treated alloy at high speed

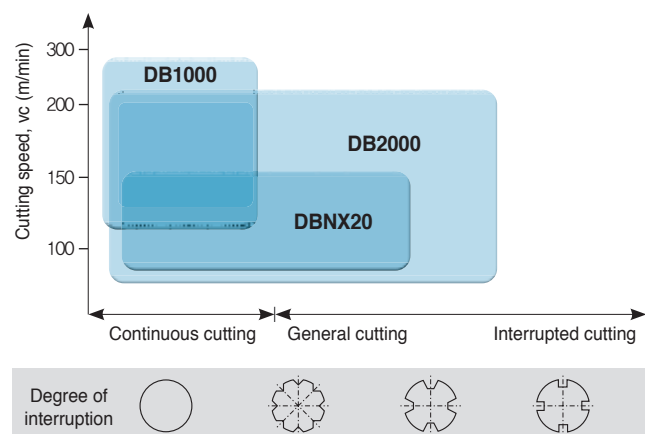
### ► Insert type

| High precision                                                                    |                                                                                   | Wear resistance                                                                   |                                                                                    | Productivity                                                                        |                                                                                     |
|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|  |  |  |  |  |  |
| For regrinding type                                                               | One use type                                                                      | Multi-corner type                                                                 | Multi-corner type (coated)                                                         | Solid type                                                                          | Grooving type                                                                       |

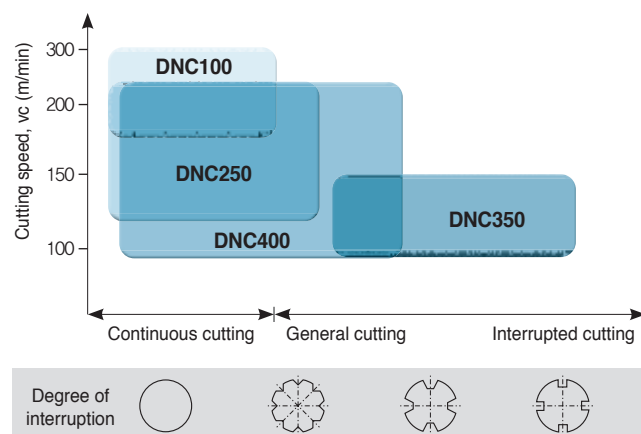
## cBN inserts

| Multi edge coated type                                                                                                                                                                                                                              |                                                                                                       | One use type                                                                                                                                                                                                                                                     |                                                                                                      |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|
|                                                                                                                                                                   | <br>2NU-CNGA120408   |                                                                                                                                                                               | <br>NU-CNGA120408 |
| <ul style="list-style-type: none"> <li>• Easy handling of corners</li> <li>• Strong Brazing</li> <li>• Excellent tool life compared to non-coated inserts</li> </ul>                                                                                |                                                                                                       | <ul style="list-style-type: none"> <li>• Economic price</li> <li>• Easy handling of tools</li> <li>• A wide variety of series</li> <li>• Smaller than expensive cBN and dramatic cost down</li> <li>• Strong weld face and stable cutting performance</li> </ul> |                                                                                                      |
| Multi edge type                                                                                                                                                                                                                                     |                                                                                                       | Regrinding type                                                                                                                                                                                                                                                  |                                                                                                      |
|                                                                                                                                                                  | <br>2NU-CNGA120408 |                                                                                                                                                                              | <br>CNMA120408  |
| <ul style="list-style-type: none"> <li>• Price per edge is more reasonable compare to normal single cornered, one-used type</li> <li>• Insert with several brazed cBN</li> <li>• Wide application of continuous to interrupted machining</li> </ul> |                                                                                                       | <ul style="list-style-type: none"> <li>• Long tool life</li> <li>• Excellent wear resistance, High hardness</li> <li>• Saved tool cost due to the regrinding insert 3~4 time</li> </ul>                                                                          |                                                                                                      |

## cBN application range



## Coated cBN application range



## ➤ Cutting condition of cBN grades

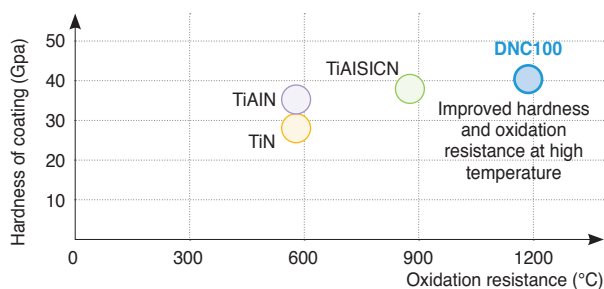
| Workpiece             | Grades     | Insert color | Application                                          | Cutting speed, vc (m/min) | Feed, fn (mm/rev) | Depth of cut, ap (mm) |
|-----------------------|------------|--------------|------------------------------------------------------|---------------------------|-------------------|-----------------------|
| H High hardness steel | Coated     | DNC100       | Continuous cutting at high speed                     | 180  300                  | 0.03~0.3          | 0.03~0.3              |
|                       |            | DNC250       | Continuous and low interrupted cutting at high speed | 120  220                  | 0.05~0.3          | 0.05~0.3              |
|                       |            | DNC300       | Medium and low interrupted cutting                   | 90  250                   | 0.05~0.2          | 0.05~0.2              |
|                       |            | DNC350       | Medium and high interrupted cutting                  | 90  150                   | 0.05~0.3          | 0.05~0.3              |
|                       |            | DNC400       | Continuous and medium interrupted cutting            | 90  220                   | 0.05~0.3          | 0.05~0.5              |
|                       | Non coated | DB1000       | Continuous cutting at high speed                     | 130  250                  | 0.03~0.15         | 0.03~0.2              |
|                       |            | DB2000       | Medium and low interrupted cutting                   | 80  200                   | 0.03~0.2          | 0.03~0.3              |
|                       |            | DBNX20       | Highly efficient cutting                             | 120  150                  | 0.03~0.3          | 0.03~0.5              |
|                       |            | DBN250       | Medium and low interrupted cutting                   | 80  120                   | 0.03~0.2          | 0.03~0.3              |
|                       |            | DBN350       | High interrupted cutting                             | 120  220                  | 0.03~0.2          | 0.03~0.3              |
| S HRSA                |            | DB7000       | Continuous cutting at high speed                     | 100  300                  | 0.05~0.2          | 0.1~1.0               |
| K Cast iron           |            | DBN700A      | Continuous cutting at high speed                     | 500  2000                 | 0.10~0.4          | 0.1~0.4               |

### Coated cBN

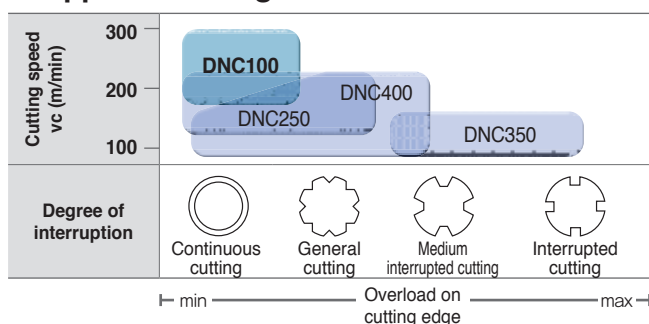
## DNC100

### ➤ Features

- Excellent thermal resistance
- Coating layer with high hardness, oxidation resistance and chipping resistance



### ➤ Application range



### ➤ Recommended cutting condition

|                               |           |
|-------------------------------|-----------|
| Cutting speed vc (m/min)      | 180  300  |
| Feed fn (mm/rev)              | 0.03  0.3 |
| Depth of cut per time ap (mm) | 0.03  0.3 |

- Increased oxidation resistance and wear resistance due to high hardness coating layer
- Dramatically improved fracture resistance and chipping resistance

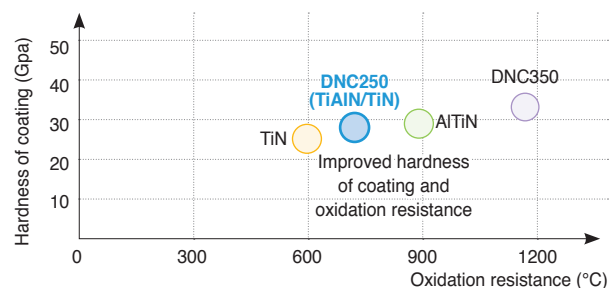


Multi-corner coated cBN for high efficient cutting of heat-treated alloy

## DNC250

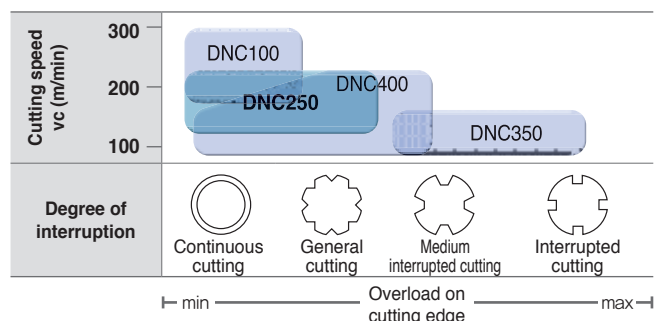
### Features

- Stable and long tool life
- Cost effective by multi-cornered one-use insert



- Advanced PVD coating
- High hardness and lubricative coating
- Improved wear resistance

### Application range



### Recommended cutting condition

|                               |            |
|-------------------------------|------------|
| Cutting speed vc (m/min)      | 120 — 220  |
| Feed fn (mm/rev)              | 0.05 — 0.3 |
| Depth of cut per time ap (mm) | 0.05 — 0.3 |

Coated cBN

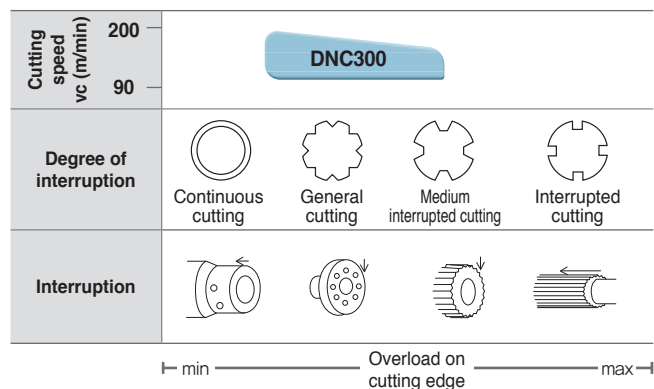
## DNC300

### Features

- 1st recommended grade for low to medium interrupted cutting
- Enhanced chipping resistance and wear resistance comparing to competitor's grade
- Minimizing flaking of coating by stable coating



### Application range



### Recommended cutting condition

|                               |             |
|-------------------------------|-------------|
| Cutting speed vc (m/min)      | 90 — 200    |
| Feed fn (mm/rev)              | 0.05 — 0.3  |
| Depth of cut per time ap (mm) | 0.05 — 0.25 |

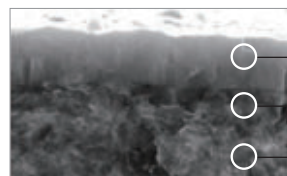
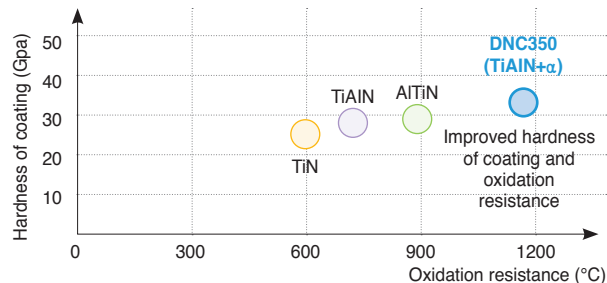
- Enhanced oxidation resistance and wear resistance due to high hardness layer
- Highly increased chipping resistance, fracture resistance and wear resistance

## Coated cBN for high interrupted cutting

### DNC350

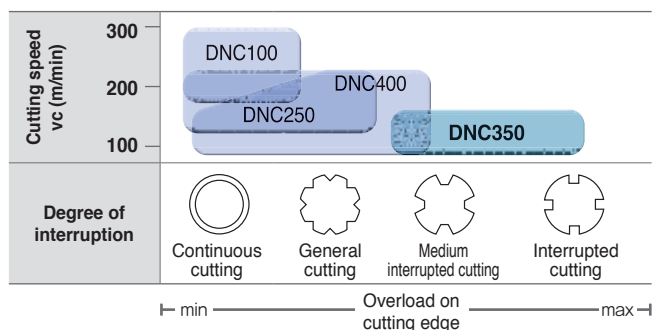
#### Features

- Excellent tool life and productivity in interrupted cutting
- New PVD coating applied with high hardness and oxidation resistance



- High hardness and oxidation-resistant coating
- High tough coating
- Fine cBN + High tough substrate

#### Application range



#### Recommended cutting condition

|                               |           |
|-------------------------------|-----------|
| Cutting speed vc (m/min)      | 90  150   |
| Feed fn (mm/rev)              | 0.05  0.3 |
| Depth of cut per time ap (mm) | 0.05  0.3 |

## Solid type coated cBN

### DNC400 new

#### Features

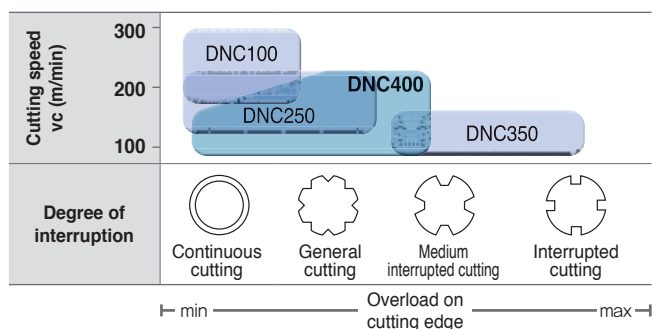
- For machining heat-treated steel in continuous and medium interrupted cutting
- Longer tool life due to coating layer
- Solid type for universal purpose

#### Features of solid type cBN

- Increased productivity at high speed and high depth of cut
- Ideal for removing cemented layer and the welds
- Better welding stability due to 3-face blazing
- Excellent cutting performance at varying depth of cuts



#### Application range



#### Recommended cutting condition

|                               |        |           |
|-------------------------------|--------|-----------|
| Feed fn (mm/rev)              | DNC400 | 0.05  0.3 |
|                               | DNC250 | 0.05  0.3 |
|                               | DNC350 | 0.05  0.3 |
| Depth of cut per time ap (mm) | DNC400 | 0.05  0.5 |
|                               | DNC250 | 0.05  0.3 |
|                               | DNC350 | 0.05  0.3 |



## Non-coated cBN

**DB1000**

## Features

- Non-coated cBN with the highest wear resistance at high speed
- Excellent tool life in continuous to light interrupted cutting
- Improved fracture resistance along with high wear resistance
  - Higher thermal resistance and hardness due to pure TiCN ceramic binder



## Non-coated cBN

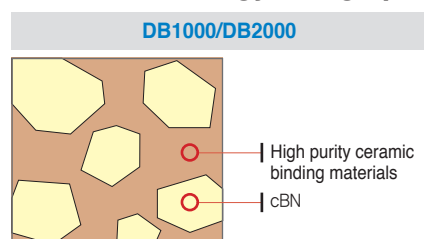
**DB2000**

## Features

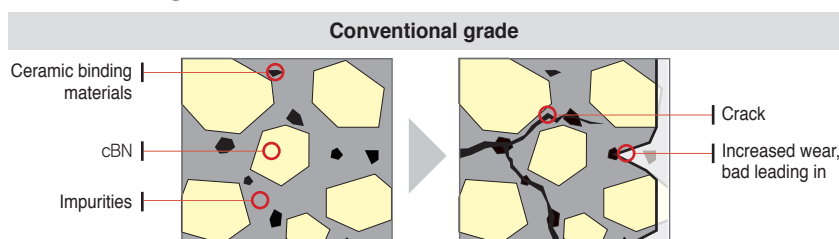
- Universal grade for overall machining of heat-treated
  - Stable tool life in continuous to low/medium interrupted cutting
- Both fracture resistance and wear resistance acquired with the use of pure ceramic binder
- Stable surface roughness



## New technology of high purity ceramic binding materials

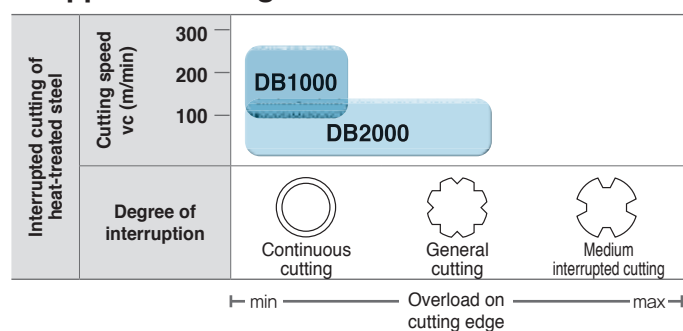


DB2000 dramatically minimizes impurities with the use of high purity ceramic binding materials and enhances thermal resistance and toughness.



Impurities included in conventional grade's ceramic binder caused inferior thermal resistance and hardness of sintered compounds, which led to crack (fracture) and wear

## Application range



## Recommended cutting condition (DB1000)

|                             |                 |
|-----------------------------|-----------------|
| Cutting speed $v_c$ (m/min) | 130 ————— 250   |
| Feed $f_n$ (mm/rev)         | 0.03 ————— 0.15 |
| Depth of cut $a_p$ (mm)     | 0.03 ————— 0.2  |

## Recommended cutting condition (DB2000)

|                             |                |
|-----------------------------|----------------|
| Cutting speed $v_c$ (m/min) | 80 ————— 200   |
| Feed $f_n$ (mm/rev)         | 0.03 ————— 0.2 |
| Depth of cut $a_p$ (mm)     | 0.03 ————— 0.3 |

## PCD inserts grades

### Features

KORLOY PCD products are manufactured by using high quality PCD tips under ultra high temperatures and pressure. The PCD tip is welded on the qualified KORLOY carbide insert  
KORLOY high quality PCD products meet a wide range of application needs in turning, milling, and endmills.

- Excellent tool life for aluminum alloy and copper alloy
- Excellent tool life for Ceramic, high-silicon aluminum and rock or stone
- Excellent tool life for rubber, carbon, graphite and wood

### PCD grade

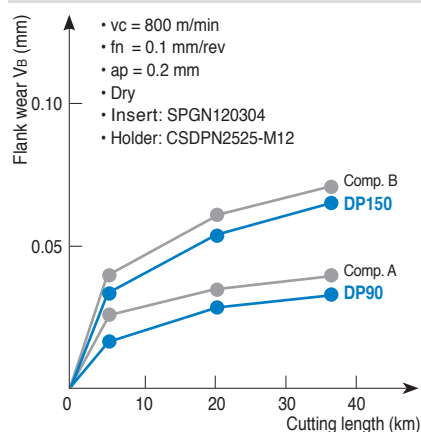
| Grade | Features                                                                                                                                    | Application                                                                   | Grain size (μm) | Hardness (Hv) | TRS (kgf/mm <sup>2</sup> ) |
|-------|---------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|-----------------|---------------|----------------------------|
| DP90  | Coarse diamond grain has been used to get excellent wear resistance enough to machine cemented-carbide, high Si aluminum alloy              | Cemented carbide<br>Ceramic roughing<br>High Si aluminum alloy<br>Rock, Stone | 25~30           | 50~65         | ≒ 1.10                     |
| DP150 | By use of fine diamond grain having good bonding property, it is suitable for machining of Non-ferrous metal, graphite                      | High Si aluminum alloy<br>Copper, Bronze alloy<br>Rubber, Wood, Carbon        | 5~10            | 50~60         | ≒ 1.95                     |
| DP200 | By use of ultra fine diamond grain, it is possible to make sharp cutting edge. Thus it is appropriate grade to machine Non-ferrous material | Plastic<br>Wood<br>Precise finishing of aluminum                              | ~2              | 45~55         | ≒ 2.45                     |

### Recommended cutting condition

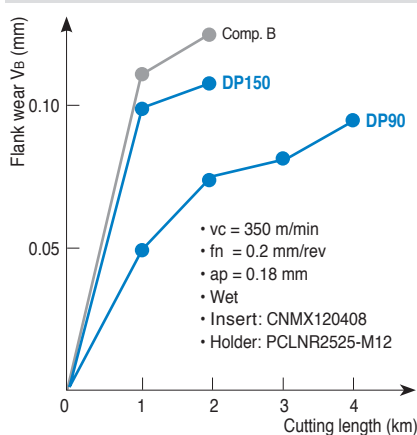
| Workpiece                   | Cutting speed (m/min) | Feed (mm/rev) | Depth of cut (mm) | Recommended grade |                 |
|-----------------------------|-----------------------|---------------|-------------------|-------------------|-----------------|
|                             |                       |               |                   | 1 <sup>st</sup>   | 2 <sup>nd</sup> |
| Aluminum alloy (4%~8% Si)   | 1000~3000             | 0.1~0.6       | ~3                | DP150             | DP200           |
| Aluminum alloy (9%~14% Si)  | 600~2500              | 0.1~0.5       | ~3                | DP150             | DP200           |
| Aluminum alloy (15%~18% Si) | 300~700               | 0.1~0.4       | ~3                | DP150             | DP200           |
| Copper, Bronze alloy        | ~1000                 | 0.05~0.2      | ~3                | DP150             | DP200           |
| Reinforced plastic          | ~1000                 | 0.1~0.3       | ~2                | DP150             | DP200           |
| Wood                        | ~4000                 | 0.1~0.4       | -                 | DP150             | DP200           |
| Cemented carbide            | 10~30                 | ~0.2          | ~0.5              | DP90              | DP150           |

### Cutting performance

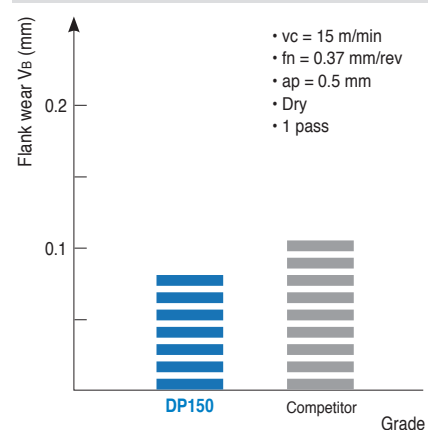
Continuous cutting test (Workpiece: Al-25%Si)



Interrupted cutting test (Workpiece: Al-20%Si)



Cutting test of cemented carbide

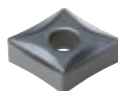
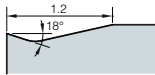
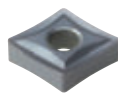
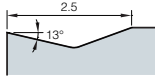
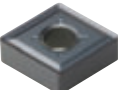
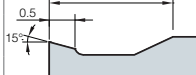
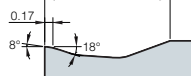
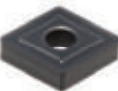
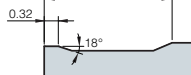
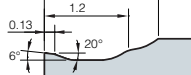
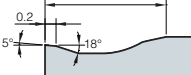
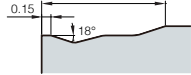


## Chip breaker for turning

| Geometry | Cutting edge | Application range        |       |      |      |      |           |      |     |           |          |      |      |    |                                                                                                                                                                                                                                    | Features |
|----------|--------------|--------------------------|-------|------|------|------|-----------|------|-----|-----------|----------|------|------|----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
|          |              | feed rate $f_n$ (mm/rev) |       |      |      |      |           |      |     |           |          |      |      |    |                                                                                                                                                                                                                                    |          |
|          |              | 0.04                     | 0.063 | 0.10 | 0.16 | 0.25 | 0.4       | 0.63 | 1.0 | 1.6       | 2.5      | 4.0  | 6.3  |    |                                                                                                                                                                                                                                    |          |
|          |              | depth of cut $a_p$ (mm)  |       |      |      |      |           |      |     |           |          |      |      |    |                                                                                                                                                                                                                                    |          |
|          |              | 0.1                      | 0.16  | 0.25 | 0.4  | 0.63 | 1.0       | 1.6  | 2.5 | 4.0       | 6.3      | 10.0 | 11.6 | 13 |                                                                                                                                                                                                                                    |          |
| V series | VL           |                          |       |      |      |      | 0.10~0.35 |      |     |           |          |      |      |    | For Finishing                                                                                                                                                                                                                      |          |
|          |              |                          |       |      |      |      | 0.2~1.5   |      |     |           |          |      |      |    | <ul style="list-style-type: none"><li>Stable chip control in high toughness material; low carbon steel, pipe steel &amp; steel plates</li><li>Improved chip control for facing, copy machining and better surface finish</li></ul> |          |
|          | VB           |                          |       |      |      |      | 0.15~0.45 |      |     |           |          |      |      |    | For Finishing                                                                                                                                                                                                                      |          |
|          |              |                          |       |      |      |      | 0.5~2.0   |      |     |           |          |      |      |    | <ul style="list-style-type: none"><li>Improved chip control for smaller depth of cuts</li><li>Excellent chip control in copying, corner R machining</li></ul>                                                                      |          |
|          | VF           |                          |       |      |      |      | 0.05~0.35 |      |     |           |          |      |      |    | For Finishing                                                                                                                                                                                                                      |          |
|          |              |                          |       |      |      |      | 0.5~1.5   |      |     |           |          |      |      |    | <ul style="list-style-type: none"><li>Good chip control quality on varied depth of cut</li><li>Excellent cutting edge strength has been acquired due to the special chip-breaker</li></ul>                                         |          |
|          | VC           |                          |       |      |      |      | 0.12~0.45 |      |     |           |          |      |      |    | For Medium to finish cutting                                                                                                                                                                                                       |          |
|          |              |                          |       |      |      |      | 0.5~3.5   |      |     |           |          |      |      |    | <ul style="list-style-type: none"><li>Stable chip control in copying and internal machining with various depths of cut</li></ul>                                                                                                   |          |
| VQ       |              |                          |       |      |      |      | 0.10~0.40 |      |     |           |          |      |      |    | For Medium to finish cutting                                                                                                                                                                                                       |          |
|          |              |                          |       |      |      |      |           |      |     | 1.0~3.0   |          |      |      |    | <ul style="list-style-type: none"><li>Medium to finishing cutting edges offer improved edge hardness</li><li>Increased chip control in low depth of cut cutting range</li><li>For cermet</li></ul>                                 |          |
| VM       |              |                          |       |      |      |      | 0.10~0.50 |      |     |           |          |      |      |    | For Medium cutting                                                                                                                                                                                                                 |          |
|          |              |                          |       |      |      |      |           |      |     | 1.0~5.0   |          |      |      |    | <ul style="list-style-type: none"><li>Wide available chip control range from medium-finishing to medium-roughing</li><li>Suitable chip breaker for CNC machining</li></ul>                                                         |          |
| VH       |              |                          |       |      |      |      |           |      |     | 0.70~1.40 |          |      |      |    | For Heavy duty cutting                                                                                                                                                                                                             |          |
|          |              |                          |       |      |      |      |           |      |     |           | 6.0~15.0 |      |      |    | <ul style="list-style-type: none"><li>Designed specifically for heavy machining</li><li>Specialized chip breaker for the heavy industries like Ship building, Power plant industry</li></ul>                                       |          |
| VT       |              |                          |       |      |      |      |           |      |     |           |          |      |      |    | For Heavy duty cutting                                                                                                                                                                                                             |          |
|          |              |                          |       |      |      |      |           |      |     | 0.75~1.60 |          |      |      |    | <ul style="list-style-type: none"><li>Designed specifically for heavy machining</li><li>Specialized chip breaker for the heavy industries like Ship building, Power plant industry</li></ul>                                       |          |

Notice: Application ranges are based on main cutting material

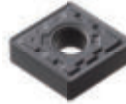
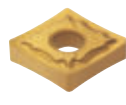
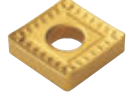
## Chip breaker for turning

| Geometry  | Cutting edge | Application range                                                                   |                                                                                     |      |      |      |           |      |     |     |     |      |      |    | Features                                                                                                                                                                                                                                                                                           |
|-----------|--------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|------|------|------|-----------|------|-----|-----|-----|------|------|----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|           |              | feed rate $f_n$ (mm/rev)                                                            |                                                                                     |      |      |      |           |      |     |     |     |      |      |    |                                                                                                                                                                                                                                                                                                    |
|           |              | 0.04                                                                                | 0.063                                                                               | 0.10 | 0.16 | 0.25 | 0.4       | 0.63 | 1.0 | 1.6 | 2.5 | 4.0  | 6.3  |    |                                                                                                                                                                                                                                                                                                    |
|           |              | depth of cut $a_p$ (mm)                                                             |                                                                                     |      |      |      |           |      |     |     |     |      |      |    |                                                                                                                                                                                                                                                                                                    |
|           |              | 0.1                                                                                 | 0.16                                                                                | 0.25 | 0.4  | 0.63 | 1.0       | 1.6  | 2.5 | 4.0 | 6.3 | 10.0 | 11.6 | 13 |                                                                                                                                                                                                                                                                                                    |
| V series  | VP1          |    |    |      |      |      | 0.05~0.20 |      |     |     |     |      |      |    | <b>For Finishing</b> <ul style="list-style-type: none"><li>• High positive cutting edge</li><li>• Reduced contract chip minimizes temperature to improve tool life</li></ul>                                                                                                                       |
|           | VP2          |    |    |      |      |      | 0.05~0.40 |      |     |     |     |      |      |    | <b>For Medium to finish cutting</b> <ul style="list-style-type: none"><li>• Stable chip control and high machinability in copying with various depths of cut</li></ul>                                                                                                                             |
|           | VP3          |    |    |      |      |      | 0.05~0.45 |      |     |     |     |      |      |    | <b>For Medium cutting</b> <ul style="list-style-type: none"><li>• High positive cutting edge with wide land</li><li>• Stable cutting performance in interrupted machining with high toughness</li><li>• Stable machinability and chip control in machining with high depth of cut</li></ul>        |
|           | VP4          |  |  |      |      |      | 0.15~0.45 |      |     |     |     |      |      |    | <b>For Roughing</b> <ul style="list-style-type: none"><li>• The first recommended chip breaker for inconel cutting</li><li>• High hard and resistant rake angle to prevent notch wear in roughing of rugged surfaces</li></ul>                                                                     |
|           | VR           |  |  |      |      |      | 0.25~0.55 |      |     |     |     |      |      |    | <b>For Roughing</b> <ul style="list-style-type: none"><li>• High feed machining with the combination of wide land and pockets</li><li>• Shallow chip breaker design prevents chip blocking at high feed</li><li>• Decreased wear on major cutting edge due to special treatment on blade</li></ul> |
| -P series | LP           |  |  |      |      |      | 0.10~0.40 |      |     |     |     |      |      |    | <b>For Medium to finish cutting</b> <ul style="list-style-type: none"><li>• Angle land decreases cutting resistance for better surface roughness</li><li>• Special dot design prevents chip blocking by clear chip breaking</li></ul>                                                              |
|           | MP           |  |  |      |      |      | 0.15~0.45 |      |     |     |     |      |      |    | <b>For Medium cutting</b> <ul style="list-style-type: none"><li>• Increased productivity due to excellent chip control in various conditions</li><li>• Stable tool life by reducing cutting load at high speed and high feed</li></ul>                                                             |
|           | CP           |  |  |      |      |      | 0.12~0.35 |      |     |     |     |      |      |    | <b>For Medium to finish cutting</b> <ul style="list-style-type: none"><li>• Chip breaker with strong cutting edge in high interrupted finishing and medium cutting</li><li>• Effective chip control in low depth of cut to high depth of cut due to 2-step rear angle</li></ul>                    |

Notice: Application ranges are based on main cutting material

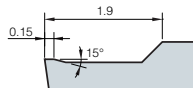
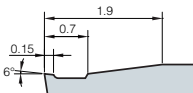
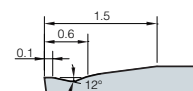
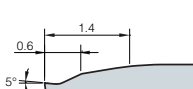
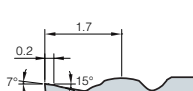
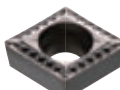
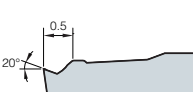
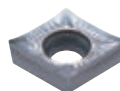
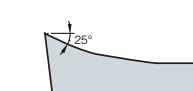
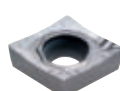
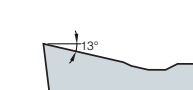


## Chip breaker for turning

| Geometry  | Cutting edge | Application range                                                                   |       |      |      |           |           |      |     |          |     |      |      |    | Features                                                                                                                                                                                                                                                                                                                                                        |
|-----------|--------------|-------------------------------------------------------------------------------------|-------|------|------|-----------|-----------|------|-----|----------|-----|------|------|----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|           |              | feed rate $f_n$ (mm/rev)                                                            |       |      |      |           |           |      |     |          |     |      |      |    |                                                                                                                                                                                                                                                                                                                                                                 |
|           |              | 0.04                                                                                | 0.063 | 0.10 | 0.16 | 0.25      | 0.4       | 0.63 | 1.0 | 1.6      | 2.5 | 4.0  | 6.3  |    |                                                                                                                                                                                                                                                                                                                                                                 |
|           |              | depth of cut $a_p$ (mm)                                                             |       |      |      |           |           |      |     |          |     |      |      |    |                                                                                                                                                                                                                                                                                                                                                                 |
|           |              | 0.1                                                                                 | 0.16  | 0.25 | 0.4  | 0.63      | 1.0       | 1.6  | 2.5 | 4.0      | 6.3 | 10.0 | 11.6 | 13 |                                                                                                                                                                                                                                                                                                                                                                 |
| -M series | MM           |    |       |      |      |           | 0.12~0.45 |      |     | 0.5~5.5  |     |      |      |    | <b>For Medium cutting</b> <ul style="list-style-type: none"><li>The first recommended chip breaker for continuous stainless applications cutting</li><li>Improved tool life and surface finish due to dual lands combining both machinability and toughness</li><li>Wide chip pockets for stable chip evacuation at high depth of cuts and high feeds</li></ul> |
|           | RM           |    |       |      |      |           | 0.15~0.55 |      |     | 2.0~6.0  |     |      |      |    | <b>For Roughing</b> <ul style="list-style-type: none"><li>The first recommended chip breaker for interrupted cutting or roughing of stainless steel</li><li>Inhibited notch wear and burr creation at high depth of cuts and feeds</li><li>Reduced cutting loads and longer tool life at high feeds</li></ul>                                                   |
| -K series | MK           |    |       |      |      |           | 0.10~0.50 |      |     | 1.0~5.0  |     |      |      |    | <b>For Medium cutting</b> <ul style="list-style-type: none"><li>1st recommended chip breaker for cast iron continuous cutting</li><li>Suitable for continuous cutting of ductile and gray cast iron</li><li>Excellent tool life and surface finish thanks to angle lands improving cutting performance</li></ul>                                                |
|           | RK           |  |       |      |      |           | 0.20~0.60 |      |     | 1.5~6.0  |     |      |      |    | <b>For Roughing</b> <ul style="list-style-type: none"><li>1st recommended chip breaker in cast iron continuous cutting and roughing</li><li>Suitable for machining ductile and gray cast iron at high speeds and high feeds</li><li>Improved toughness and chipping resistance due to flat lands</li></ul>                                                      |
| H series  | HA           |  |       |      |      | 0.03~0.30 |           |      |     | 0.5~2.5  |     |      |      |    | <b>For Medium to finish cutting</b> <ul style="list-style-type: none"><li>Sharp cutting edge generates low cutting force</li><li>Specially designed tough main cutting edge</li><li>Suitable for cutting of low carbon steel, stainless steel, aluminum</li></ul>                                                                                               |
| G series  | GR           |  |       |      |      |           | 0.30~0.80 |      |     | 3.0~8.0  |     |      |      |    | <b>For Roughing</b> <ul style="list-style-type: none"><li>Suitable for deep depth of cut and high feed cutting of steel and cast iron</li><li>Suitable for intermittent cutting</li></ul>                                                                                                                                                                       |
|           | GH           |  |       |      |      |           | 0.30~1.30 |      |     | 3.0~11.0 |     |      |      |    | <b>For Heavy duty cutting</b> <ul style="list-style-type: none"><li>Suitable for heavy duty cutting due to strong cutting edge</li><li>Wide chip control range with low cutting force</li></ul>                                                                                                                                                                 |
| B series  | B25          |  |       |      |      |           | 0.50~1.00 |      |     | 4.0~10.0 |     |      |      |    | <b>For General cutting</b> <ul style="list-style-type: none"><li>Suitable for general cutting condition cutting</li></ul>                                                                                                                                                                                                                                       |

Notice: Application ranges are based on main cutting material

## Chip breaker for turning

| Geometry      |     | Cutting edge                                                                        | Application range                                                                   |       |      |      |      |           |      |     |         |     |      |      |    | Features                                                                                                                                                                                                                                                                     |
|---------------|-----|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------|------|------|------|-----------|------|-----|---------|-----|------|------|----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               |     |                                                                                     | feed rate $f_n$ (mm/rev)                                                            |       |      |      |      |           |      |     |         |     |      |      |    |                                                                                                                                                                                                                                                                              |
|               |     |                                                                                     | 0.04                                                                                | 0.063 | 0.10 | 0.16 | 0.25 | 0.4       | 0.63 | 1.0 | 1.6     | 2.5 | 4.0  | 6.3  |    |                                                                                                                                                                                                                                                                              |
|               |     |                                                                                     | depth of cut $a_p$ (mm)                                                             |       |      |      |      |           |      |     |         |     |      |      |    |                                                                                                                                                                                                                                                                              |
|               |     |                                                                                     | 0.1                                                                                 | 0.16  | 0.25 | 0.4  | 0.63 | 1.0       | 1.6  | 2.5 | 4.0     | 6.3 | 10.0 | 11.6 | 13 |                                                                                                                                                                                                                                                                              |
| C-Posi series | C25 |    |    |       |      |      |      | 0.10~0.35 |      |     | 1.0~3.0 |     |      |      |    | <b>For Roughing</b> <ul style="list-style-type: none"><li>• Suitable for interrupted cutting and cast iron machining</li><li>• Good surface finish due to low cutting force</li><li>• Suitable for both boring and outer diameter turning</li></ul>                          |
|               | HMP |    |    |       |      |      |      | 0.08~0.40 |      |     | 0.5~3.5 |     |      |      |    | <b>For Medium cutting</b> <ul style="list-style-type: none"><li>• Excellent chip control at wide range of cutting conditions</li><li>• Machining versatility over a wide range of materials</li></ul>                                                                        |
| V-Posi series | VF  |    |    |       |      |      |      | 0.05~0.25 |      |     | 0.1~1.5 |     |      |      |    | <b>For Finishing</b> <ul style="list-style-type: none"><li>• Improved surface finish and size accuracy due to stable inner boring</li></ul>                                                                                                                                  |
|               | VL  |  |  |       |      |      |      | 0.05~0.20 |      |     | 0.1~1.0 |     |      |      |    | <b>For Finishing</b> <ul style="list-style-type: none"><li>• Superior chip control in low carbon steel, pipes, and steel plates</li></ul>                                                                                                                                    |
| P-Posi series | MP  |  |  |       |      |      |      | 0.05~0.30 |      |     | 0.3~3.0 |     |      |      |    | <b>For Medium cutting</b> <ul style="list-style-type: none"><li>• Sharp cutting edge and wide chip pocket for low cutting load</li><li>• Stable chip control at varying depth of cuts</li><li>• Excellent cutting performance when machining automobile components</li></ul> |
| AL series     | FP  |  |  |       |      |      |      | 0.01~0.20 |      |     | 0.1~1.0 |     |      |      |    | <b>For Finishing</b> <ul style="list-style-type: none"><li>• For chip control in low depth of cut mild cutting</li><li>• Enhanced surface finish and reduced cutting load</li></ul>                                                                                          |
|               | AK  |  |  |       |      |      |      | 0.03~0.40 |      |     | 0.1~4.0 |     |      |      |    | <b>For Medium to finish cutting</b> <ul style="list-style-type: none"><li>• Exclusive chip breaker for aluminum and aluminum alloy cutting</li></ul>                                                                                                                         |
|               | AR  |  |  |       |      |      |      | 0.05~0.50 |      |     | 0.5~4.0 |     |      |      |    | <b>For Medium to finish cutting</b> <ul style="list-style-type: none"><li>• High stability of cutting edge secures great performance in high speed and interrupted machining</li><li>• High speed of medium and interrupted operation</li></ul>                              |

Notice: Application ranges are based on main cutting material

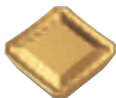


## Chip breaker for turning

| Geometry         | Cutting edge | Application range        |           |      |          |         |     |      |     |     |     |      |      |    | Features |                                            |
|------------------|--------------|--------------------------|-----------|------|----------|---------|-----|------|-----|-----|-----|------|------|----|----------|--------------------------------------------|
|                  |              | feed rate $f_n$ (mm/rev) |           |      |          |         |     |      |     |     |     |      |      |    |          |                                            |
|                  |              | 0.04                     | 0.063     | 0.10 | 0.16     | 0.25    | 0.4 | 0.63 | 1.0 | 1.6 | 2.5 | 4.0  | 6.3  |    |          |                                            |
|                  |              | depth of cut $a_p$ (mm)  |           |      |          |         |     |      |     |     |     |      |      |    |          |                                            |
|                  |              | 0.1                      | 0.16      | 0.25 | 0.4      | 0.63    | 1.0 | 1.6  | 2.5 | 4.0 | 6.3 | 10.0 | 11.6 | 13 |          |                                            |
| Auto tool series | KF           |                          | 0.01~0.12 |      | 0.01~1.0 |         |     |      |     |     |     |      |      |    |          | For Finishing                              |
|                  | KM           |                          | 0.04~0.15 |      | 0.05~1.5 |         |     |      |     |     |     |      |      |    |          | For Medium to finish cutting               |
|                  | VP1          |                          | 0.05~0.3  |      |          | 0.5~4.0 |     |      |     |     |     |      |      |    |          | For Medium cutting                         |
|                  | MS           |                          | 0.03~0.25 |      |          | 0.3~3.0 |     |      |     |     |     |      |      |    |          | For medium cutting (for surface roughness) |
|                  | FS           |                          | 0.01~0.20 |      | 0.1~2.0  |         |     |      |     |     |     |      |      |    |          | For Finishing                              |
| Wiper series     | LW           |                          | 0.15~0.60 |      |          | 1.0~5.0 |     |      |     |     |     |      |      |    |          | For Medium cutting                         |
|                  | VW           |                          | 0.15~0.50 |      |          | 0.5~3.5 |     |      |     |     |     |      |      |    |          | For Medium to finish cutting               |
| Shaft series     | SR           |                          | 0.12~0.45 |      |          | 1.0~4.5 |     |      |     |     |     |      |      |    |          | For Medium to finish cutting               |
|                  | SH           |                          | 0.15~0.50 |      |          | 1.5~5.0 |     |      |     |     |     |      |      |    |          | For Medium cutting                         |

Notice: Application ranges are based on main cutting material

## Chip breaker for milling

| Geometry             |    | Cutting edge                                                                        | Application range        |      |      |      |      |      |      |      |      |      |      |      |  |  |  |                                                                                                                                                                                                                      | Features |
|----------------------|----|-------------------------------------------------------------------------------------|--------------------------|------|------|------|------|------|------|------|------|------|------|------|--|--|--|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
|                      |    |                                                                                     | feed rate $f_n$ (mm/rev) |      |      |      |      |      |      |      |      |      |      |      |  |  |  |                                                                                                                                                                                                                      |          |
|                      |    |                                                                                     | 0.05                     | 0.10 | 0.15 | 0.20 | 0.25 | 0.30 | 0.35 | 0.40 | 0.80 | 1.20 | 1.40 | 1.60 |  |  |  |                                                                                                                                                                                                                      |          |
|                      |    |                                                                                     | depth of cut $a_p$ (mm)  |      |      |      |      |      |      |      |      |      |      |      |  |  |  |                                                                                                                                                                                                                      |          |
|                      |    |                                                                                     | 0.1                      | 0.5  | 1    | 2    | 3    | 4    | 5    | 6    | 8    | 10   | 15   | 20   |  |  |  |                                                                                                                                                                                                                      |          |
| MX series            | MX |    |                          |      |      |      |      |      |      |      |      |      |      |      |  |  |  | For Roughing                                                                                                                                                                                                         |          |
|                      |    |                                                                                     |                          |      |      |      |      |      |      |      |      |      |      |      |  |  |  | <ul style="list-style-type: none"><li>• Possible to increase productivity through increase feed and depth</li><li>• Excellent heat resistance due to the special chip breaker design of top face of insert</li></ul> |          |
| Mill-max Heavy       | MM |    |                          |      |      |      |      |      |      |      |      |      |      |      |  |  |  | For Roughing                                                                                                                                                                                                         |          |
|                      |    |                                                                                     |                          |      |      |      |      |      |      |      |      |      |      |      |  |  |  | <ul style="list-style-type: none"><li>• Specialized tool for high depth of cut roughing with high rigidity cutting edge ensures stable machining.</li></ul>                                                          |          |
| Rich Mill series-RM3 | MA |    |                          |      |      |      |      |      |      |      |      |      |      |      |  |  |  | For Aluminum machining                                                                                                                                                                                               |          |
|                      |    |                                                                                     |                          |      |      |      |      |      |      |      |      |      |      |      |  |  |  | <ul style="list-style-type: none"><li>• Sharp cutting edge for low cutting load, which is ideal for machining steel, hard-to-cut materials and aluminum</li></ul>                                                    |          |
|                      | ML |  |                          |      |      |      |      |      |      |      |      |      |      |      |  |  |  | For machining hard-to-cut materials                                                                                                                                                                                  |          |
|                      |    |                                                                                     |                          |      |      |      |      |      |      |      |      |      |      |      |  |  |  | <ul style="list-style-type: none"><li>• Low cutting resistance for light cutting and machining hard-to-cut materials with excellent tool life and surface roughness</li></ul>                                        |          |
|                      | MM |  |                          |      |      |      |      |      |      |      |      |      |      |      |  |  |  | For General cutting                                                                                                                                                                                                  |          |
|                      |    |                                                                                     |                          |      |      |      |      |      |      |      |      |      |      |      |  |  |  | <ul style="list-style-type: none"><li>• Available for most of applications with universal design for general milling</li></ul>                                                                                       |          |
| Rich Mill series-RM4 | MA |  |                          |      |      |      |      |      |      |      |      |      |      |      |  |  |  | For Aluminum machining                                                                                                                                                                                               |          |
|                      |    |                                                                                     |                          |      |      |      |      |      |      |      |      |      |      |      |  |  |  | <ul style="list-style-type: none"><li>• Sharp cutting edge design ensures low cutting resistance and excellent machining in difficult- tocut materials, aluminum and light machining</li></ul>                       |          |
|                      | MF |  |                          |      |      |      |      |      |      |      |      |      |      |      |  |  |  | For Light cutting                                                                                                                                                                                                    |          |
|                      |    |                                                                                     |                          |      |      |      |      |      |      |      |      |      |      |      |  |  |  | <ul style="list-style-type: none"><li>• Low cutting force chip breaker design ensures longer tool life and excellent machining in difficult-to-cut material and light machining</li></ul>                            |          |
|                      | MM |  |                          |      |      |      |      |      |      |      |      |      |      |      |  |  |  | For General cutting                                                                                                                                                                                                  |          |
|                      |    |                                                                                     |                          |      |      |      |      |      |      |      |      |      |      |      |  |  |  | <ul style="list-style-type: none"><li>• Suitable geometry design for general milling has wider ranges of machining</li></ul>                                                                                         |          |

Notice: Application ranges are based on main cutting material

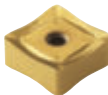
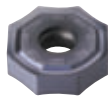


## Chip breaker for milling

| Geometry              |                                                                                     | Cutting edge                                                                        | Application range        |      |      |      |      |      |      |      |      |      |      |      |  |                                                                                                                                                                                                                                                     | Features |
|-----------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------|------|------|------|------|------|------|------|------|------|------|------|--|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
|                       |                                                                                     |                                                                                     | feed rate $f_n$ (mm/rev) |      |      |      |      |      |      |      |      |      |      |      |  |                                                                                                                                                                                                                                                     |          |
|                       |                                                                                     |                                                                                     | 0.05                     | 0.10 | 0.15 | 0.20 | 0.25 | 0.30 | 0.35 | 0.40 | 0.80 | 1.20 | 1.40 | 1.60 |  |                                                                                                                                                                                                                                                     |          |
|                       |                                                                                     |                                                                                     | depth of cut $a_p$ (mm)  |      |      |      |      |      |      |      |      |      |      |      |  |                                                                                                                                                                                                                                                     |          |
|                       |                                                                                     |                                                                                     | 0.1                      | 0.5  | 1    | 2    | 3    | 4    | 5    | 6    | 8    | 10   | 15   | 20   |  |                                                                                                                                                                                                                                                     |          |
| Rich Mill series-RM6  | MA                                                                                  |    |                          |      |      |      |      |      |      |      |      |      |      |      |  | <b>For Aluminum machining</b> <ul style="list-style-type: none"><li>Specialized sharp cutting edge for aluminum machining ensures machinability.</li><li>Buffing treatment on the surface realizes good chip flow and welding resistance.</li></ul> |          |
|                       |    |                                                                                     |                          |      |      |      |      |      |      |      |      |      |      |      |  |                                                                                                                                                                                                                                                     |          |
|                       | ML                                                                                  |    |                          |      |      |      |      |      |      |      |      |      |      |      |  | <b>For Machining hard-to-cut materials</b> <ul style="list-style-type: none"><li>Low cutting load chip breaker for light cutting</li><li>Long tool life and high quality of machining in hard-to-cut material cutting</li></ul>                     |          |
|                       |    |                                                                                     |                          |      |      |      |      |      |      |      |      |      |      |      |  |                                                                                                                                                                                                                                                     |          |
|                       | MM                                                                                  |    |                          |      |      |      |      |      |      |      |      |      |      |      |  | <b>For General cutting</b> <ul style="list-style-type: none"><li>Optimally designed shape for general shoulder milling in various cutting ranges</li></ul>                                                                                          |          |
|                       |    |                                                                                     |                          |      |      |      |      |      |      |      |      |      |      |      |  |                                                                                                                                                                                                                                                     |          |
| Rich Mill series-RM8  | MA                                                                                  |  |                          |      |      |      |      |      |      |      |      |      |      |      |  | <b>For Aluminum machining</b> <ul style="list-style-type: none"><li>Sharp cutting edge and lubricated top face show excellent chip flow and welding resistance in aluminum machining</li></ul>                                                      |          |
|                       |  |                                                                                     |                          |      |      |      |      |      |      |      |      |      |      |      |  |                                                                                                                                                                                                                                                     |          |
|                       | MF                                                                                  |  |                          |      |      |      |      |      |      |      |      |      |      |      |  | <b>For Light cutting</b> <ul style="list-style-type: none"><li>Low cutting force chip breaker design ensures longer tool life and excellent machining in difficult-to-cut material and light machining</li></ul>                                    |          |
|                       |  |                                                                                     |                          |      |      |      |      |      |      |      |      |      |      |      |  |                                                                                                                                                                                                                                                     |          |
|                       | ML                                                                                  |  |                          |      |      |      |      |      |      |      |      |      |      |      |  | <b>For Machining hard-to-cut materials</b> <ul style="list-style-type: none"><li>Chip breaker with low cutting load resistance ensures long tool life and high quality in light and hard-to-cut material cutting.</li></ul>                         |          |
|                       |  |                                                                                     |                          |      |      |      |      |      |      |      |      |      |      |      |  |                                                                                                                                                                                                                                                     |          |
|                       | MM                                                                                  |  |                          |      |      |      |      |      |      |      |      |      |      |      |  | <b>For General cutting</b> <ul style="list-style-type: none"><li>Suitable geometry design for general milling has wider ranges of machining</li></ul>                                                                                               |          |
|                       |  |                                                                                     |                          |      |      |      |      |      |      |      |      |      |      |      |  |                                                                                                                                                                                                                                                     |          |
| Rich Mill series-RMT8 | MF                                                                                  |  |                          |      |      |      |      |      |      |      |      |      |      |      |  | <b>For Light cutting</b> <ul style="list-style-type: none"><li>Low cutting force chip breaker design ensures longer tool life and excellent machining in difficult-to-cut material and light machining</li></ul>                                    |          |
|                       |  |                                                                                     |                          |      |      |      |      |      |      |      |      |      |      |      |  |                                                                                                                                                                                                                                                     |          |

Notice: Application ranges are based on main cutting material

## Chip breaker for milling

| Geometry               | Cutting edge | Application range                                                                   |                                                                                     |                                         |      |      |      |      |      |      |      |      |      | Features |  |                                                                                                                                                                                                                     |
|------------------------|--------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-----------------------------------------|------|------|------|------|------|------|------|------|------|----------|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                        |              | feed rate $f_n$ (mm/rev)                                                            |                                                                                     |                                         |      |      |      |      |      |      |      |      |      |          |  |                                                                                                                                                                                                                     |
|                        |              | 0.05                                                                                | 0.10                                                                                | 0.15                                    | 0.20 | 0.25 | 0.30 | 0.35 | 0.40 | 0.80 | 1.20 | 1.40 | 1.60 |          |  |                                                                                                                                                                                                                     |
|                        |              | depth of cut $a_p$ (mm)                                                             |                                                                                     |                                         |      |      |      |      |      |      |      |      |      |          |  |                                                                                                                                                                                                                     |
| 0.1                    | 0.5          | 1                                                                                   | 2                                                                                   | 3                                       | 4    | 5    | 6    | 8    | 10   | 15   | 20   |      |      |          |  |                                                                                                                                                                                                                     |
| Rich Mill series-RMT8  | MM           |    |    | <div>0.05~0.30</div> <div>0.5~8.0</div> |      |      |      |      |      |      |      |      |      |          |  | <div>For General cutting</div> <div>Suitable geometry design for general milling has wider ranges of machining</div>                                                                                                |
|                        | ML           |    |    | <div>0.05~0.30</div> <div>1.0~3.0</div> |      |      |      |      |      |      |      |      |      |          |  | <div>For Machining hard-to-cut materials</div> <div>Stable tool life and good cutting quality in hard-to-cut material cutting due to double reverse positive relief surface and low cutting load chip breaker</div> |
| Rich Mill series-RM8-X | MM           |    |    | <div>0.05~0.30</div> <div>1.0~3.0</div> |      |      |      |      |      |      |      |      |      |          |  | <div>For high hardness cutting</div> <div>Stable tool life and good cutting quality due to double reverse positive relief surface and high rigidity chip breaker</div>                                              |
|                        | MM           |  |  | <div>0.10~0.30</div> <div>1.0~3.0</div> |      |      |      |      |      |      |      |      |      |          |  | <div>For General cutting</div> <div>For general cutting range with optimal shape for general milling</div>                                                                                                          |
| Rich Mill series-RM14  | ML           |  |  | <div>0.05~0.30</div> <div>1.0~3.0</div> |      |      |      |      |      |      |      |      |      |          |  | <div>For HRSA cutting</div> <div>Excellent cutting performance in heat resistance STS cutting from neutral type flat cutting edge and sharp chip breaker</div>                                                      |
|                        | ML           |  |  | <div>0.05~0.30</div> <div>1.0~3.0</div> |      |      |      |      |      |      |      |      |      |          |  | <div>For cast iron and STS cutting</div> <div>Excellent cutting performance in general STS and cast iron cutting from right-handed helix cutting edge and sharp chip breaker</div>                                  |
| Rich Mill series-RM16  | MA           |  |  | <div>0.05~0.30</div> <div>0.3~5.5</div> |      |      |      |      |      |      |      |      |      |          |  | <div>For Aluminum machining</div> <div>Sharp cutting edge design ensures low cutting resistance and excellent machining in difficult-to-cut materials, aluminum and light machining</div>                           |
|                        | MF           |  |  | <div>0.05~0.40</div> <div>0.3~5.5</div> |      |      |      |      |      |      |      |      |      |          |  | <div>For Light cutting</div> <div>Low cutting force chip breaker design ensures longer tool life and excellent machining in difficult-to-cut material and light machining</div>                                     |

Notice: Application ranges are based on main cutting material

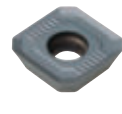


## Chip breaker for milling

| Geometry              | Cutting edge | Application range                                                                   |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  | Features                                                                                                                                                                          |
|-----------------------|--------------|-------------------------------------------------------------------------------------|------|------|------|------|------|------|------|------|------|------|------|--|--|--|--|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                       |              | feed rate $f_n$ (mm/rev)                                                            |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  |                                                                                                                                                                                   |
|                       |              | 0.05                                                                                | 0.10 | 0.15 | 0.20 | 0.25 | 0.30 | 0.35 | 0.40 | 0.80 | 1.20 | 1.40 | 1.60 |  |  |  |  |                                                                                                                                                                                   |
|                       |              | depth of cut ap (mm)                                                                |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  |                                                                                                                                                                                   |
|                       |              | 0.1                                                                                 | 0.5  | 1    | 2    | 3    | 4    | 5    | 6    | 8    | 10   | 15   | 20   |  |  |  |  |                                                                                                                                                                                   |
| Rich Mill series-RM16 | ML           |    |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  | For Machining hard-to-cut materials                                                                                                                                               |
|                       |              |                                                                                     |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  | • Low cutting resistance for excellent tool life and surface roughness in machining hard-to-cut materials                                                                         |
|                       | MM           |    |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  | For General cutting                                                                                                                                                               |
|                       |              |                                                                                     |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  | • Suitable geometry design for general milling has wider ranges of machining                                                                                                      |
|                       | W            |    |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  | For Finishing of milling (Wiper)                                                                                                                                                  |
|                       |              |                                                                                     |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  | • Wiper insert provides improved surface roughness due to special cutting edge                                                                                                    |
| Rich Mill series-RMR  | ML           |  |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  | For Machining hard-to-cut materials                                                                                                                                               |
|                       |              |                                                                                     |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  | • Stable tool life and cutting performance in hard-to-cut material cutting from hard clamping side preventing reverse positive revolution and low cutting resistance chip breaker |
| Alpha Mill series     | MA           |  |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  | For Aluminum machining                                                                                                                                                            |
|                       |              |                                                                                     |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  | • Sharp cutting edge and lubricated top face show excellent chip flow and welding resistance in aluminum machining                                                                |
|                       | MF           |  |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  | For Light cutting                                                                                                                                                                 |
|                       |              |                                                                                     |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  | • Low cutting force chip breaker design ensures longer tool life and excellent machining in difficult-to-cut material and light machining                                         |
|                       | MM           |  |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  | For General cutting                                                                                                                                                               |
|                       |              |                                                                                     |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  | • Suitable geometry design for general milling has wider ranges of machining                                                                                                      |
| Alpha Mill series     | ML           |  |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  | For Hard-to-cut material machining                                                                                                                                                |
|                       |              |                                                                                     |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  | • The chip breaker with low cutting resistance ensures superior machinability in hard-to-cut materials                                                                            |

Notice: Application ranges are based on main cutting material

## Chip breaker for milling

| Geometry                  |    | Cutting edge                                                                        | Application range                                                                   |      |      |      |      |      |      |      |      |      |      |      | Features |                                                                                                                                                                                                        |
|---------------------------|----|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|------|------|------|------|------|------|------|------|------|------|------|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                           |    |                                                                                     | feed rate $f_n$ (mm/rev)                                                            |      |      |      |      |      |      |      |      |      |      |      |          |                                                                                                                                                                                                        |
|                           |    |                                                                                     | 0.05                                                                                | 0.10 | 0.15 | 0.20 | 0.25 | 0.30 | 0.35 | 0.40 | 0.80 | 1.20 | 1.40 | 1.60 |          |                                                                                                                                                                                                        |
|                           |    |                                                                                     | depth of cut $a_p$ (mm)                                                             |      |      |      |      |      |      |      |      |      |      |      |          |                                                                                                                                                                                                        |
|                           |    |                                                                                     | 0.1                                                                                 | 0.5  | 1    | 2    | 3    | 4    | 5    | 6    | 8    | 10   | 15   | 20   |          |                                                                                                                                                                                                        |
| Alpha Mill series         | MN |    |    |      |      |      |      |      |      |      |      |      |      |      |          | For Roughing (nick)                                                                                                                                                                                    |
|                           |    |                                                                                     |                                                                                     |      |      |      |      |      |      |      |      |      |      |      |          | <ul style="list-style-type: none"><li>Design for easy chip cutting ensures high machinability in toughing</li></ul>                                                                                    |
| Alpha Mill-X series       | MM |    |    |      |      |      |      |      |      |      |      |      |      |      |          | For General cutting                                                                                                                                                                                    |
|                           |    |                                                                                     |                                                                                     |      |      |      |      |      |      |      |      |      |      |      |          | <ul style="list-style-type: none"><li>Shape for general milling with most cutting range</li></ul>                                                                                                      |
| Alpha Mill-X series       | ML |    |    |      |      |      |      |      |      |      |      |      |      |      |          | For Hard-to-cut material machining                                                                                                                                                                     |
|                           |    |                                                                                     |                                                                                     |      |      |      |      |      |      |      |      |      |      |      |          | <ul style="list-style-type: none"><li>Chip breaker for cutting with low cutting load guarantees long tool life and qualified machining in light cutting and HRSA machining</li></ul>                   |
| Future Mill series        | MF |  |  |      |      |      |      |      |      |      |      |      |      |      |          | For Light cutting                                                                                                                                                                                      |
|                           |    |                                                                                     |                                                                                     |      |      |      |      |      |      |      |      |      |      |      |          | <ul style="list-style-type: none"><li>Special design for light cutting of gummy materials like stainless steel and hard to machine material provide fine surface finish and longer tool life</li></ul> |
|                           | MM |  |  |      |      |      |      |      |      |      |      |      |      |      |          | For General cutting                                                                                                                                                                                    |
|                           |    |                                                                                     |                                                                                     |      |      |      |      |      |      |      |      |      |      |      |          | <ul style="list-style-type: none"><li>Chip breaker design to cover general cutting condition provides wide available application range</li><li>Ground type and as sintered type is available</li></ul> |
|                           | MR |  |  |      |      |      |      |      |      |      |      |      |      |      |          | For Roughing                                                                                                                                                                                           |
|                           |    |                                                                                     |                                                                                     |      |      |      |      |      |      |      |      |      |      |      |          | <ul style="list-style-type: none"><li>Strongest cutting edge strength provide stable tool life even in case of severe cutting with heavy intermittent and heavy roughing</li></ul>                     |
| Future Mill series        | MA |  |  |      |      |      |      |      |      |      |      |      |      |      |          | For Aluminum machining                                                                                                                                                                                 |
|                           |    |                                                                                     |                                                                                     |      |      |      |      |      |      |      |      |      |      |      |          | <ul style="list-style-type: none"><li>Sharp cutting edge and lubricated top face show excellent chip flow and welding resistance in aluminum machining</li></ul>                                       |
| Future Mill series P-posi | MA |  |  |      |      |      |      |      |      |      |      |      |      |      |          | For Aluminum machining                                                                                                                                                                                 |
|                           |    |                                                                                     |                                                                                     |      |      |      |      |      |      |      |      |      |      |      |          | <ul style="list-style-type: none"><li>Excellent surface roughness due to buffed surface in machining aluminum</li></ul>                                                                                |

Notice: Application ranges are based on main cutting material



## Chip breaker for milling

| Geometry                  | Cutting edge | Application range                                                                   |                                                                                     |      |      |      |      |      |           |      |      |      |      |          |                                                                                                                            | Features |
|---------------------------|--------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|------|------|------|------|------|-----------|------|------|------|------|----------|----------------------------------------------------------------------------------------------------------------------------|----------|
|                           |              | feed rate $f_n$ (mm/rev)                                                            |                                                                                     |      |      |      |      |      |           |      |      |      |      |          |                                                                                                                            |          |
|                           |              | 0.05                                                                                | 0.10                                                                                | 0.15 | 0.20 | 0.25 | 0.30 | 0.35 | 0.40      | 0.80 | 1.20 | 1.40 | 1.60 |          |                                                                                                                            |          |
|                           |              | depth of cut $a_p$ (mm)                                                             |                                                                                     |      |      |      |      |      |           |      |      |      |      |          |                                                                                                                            |          |
|                           |              | 0.1                                                                                 | 0.5                                                                                 | 1    | 2    | 3    | 4    | 5    | 6         | 8    | 10   | 15   | 20   |          |                                                                                                                            |          |
| Future Mill series P-posi | ML           |    |    |      |      |      |      |      | 0.30~0.50 |      |      |      |      | 0.3~3.0  | For Hard-to-cut material machining                                                                                         |          |
|                           |              |                                                                                     |                                                                                     |      |      |      |      |      |           |      |      |      |      |          | • Low cutting resistance and high hardness cutting edges for excellent surface roughness in machining titanium and Inconel |          |
|                           | MF           |    |    |      |      |      |      |      | 0.12~0.50 |      |      |      |      | 0.3~6.0  | For Light cutting                                                                                                          |          |
|                           |              |                                                                                     |                                                                                     |      |      |      |      |      |           |      |      |      |      |          | • Low cutting resistance for light cutting                                                                                 |          |
| Future Mill series P-posi | MM           |    |    |      |      |      |      |      | 0.20~0.70 |      |      |      |      | 0.3~6.0  | For General cutting                                                                                                        |          |
|                           |              |                                                                                     |                                                                                     |      |      |      |      |      |           |      |      |      |      |          | • Universal purpose for most of milling applications                                                                       |          |
|                           | None C/B     |  |  |      |      |      |      |      | 0.30~0.50 |      |      |      |      | 0.3~0.5  | For Machining high hardness steel                                                                                          |          |
|                           |              |                                                                                     |                                                                                     |      |      |      |      |      |           |      |      |      |      |          | • Ideal for machining high hardness mold steel and heat resistant alloy                                                    |          |
| Triple Mill series        | ML           |  |  |      |      |      |      |      | 0.10~0.30 |      |      |      |      | 1.0~15.5 | For Hard-to-cut material machining                                                                                         |          |
|                           |              |                                                                                     |                                                                                     |      |      |      |      |      |           |      |      |      |      |          | • Stable tool life and cutting performance in hard-to-cut material cutting due to low cutting load chip breaker            |          |
|                           | MM           |  |  |      |      |      |      |      | 0.10~0.30 |      |      |      |      | 1.0~15.5 | For General cutting                                                                                                        |          |
|                           |              |                                                                                     |                                                                                     |      |      |      |      |      |           |      |      |      |      |          | • For general cutting range with optimal shape for general milling                                                         |          |
| HFM                       | MF           |  |  |      |      |      |      |      | 0.30~1.0  |      |      |      |      | 0.1~0.4  | For Light cutting                                                                                                          |          |
|                           |              |                                                                                     |                                                                                     |      |      |      |      |      |           |      |      |      |      |          | • Chip breaker for cutting with low cutting load is optimal for light cutting                                              |          |
|                           | None C/B     |  |  |      |      |      |      |      | 0.30~0.80 |      |      |      |      | 0.1~0.4  | For Machining high hardness steel                                                                                          |          |
|                           |              |                                                                                     |                                                                                     |      |      |      |      |      |           |      |      |      |      |          | • Shape with hard cutting edge is optimal for high hardness alloy steel machining                                          |          |

Notice: Application ranges are based on main cutting material

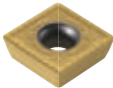
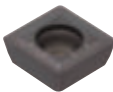
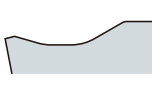
## Chip breaker for milling

| Geometry    |      | Cutting edge                                                                        | Application range                                                                   |                                                                                     |                                          |      |      |      |      |      |      |      |      |      | Features |                                                                                                                                                                 |                                                                                                                                                                                                 |
|-------------|------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|------------------------------------------|------|------|------|------|------|------|------|------|------|----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|             |      |                                                                                     | feed rate $f_n$ (mm/rev)                                                            |                                                                                     |                                          |      |      |      |      |      |      |      |      |      |          |                                                                                                                                                                 |                                                                                                                                                                                                 |
|             |      |                                                                                     | 0.05                                                                                | 0.10                                                                                | 0.15                                     | 0.20 | 0.25 | 0.30 | 0.35 | 0.40 | 0.80 | 1.20 | 1.40 | 1.60 |          |                                                                                                                                                                 |                                                                                                                                                                                                 |
|             |      |                                                                                     | depth of cut $a_p$ (mm)                                                             |                                                                                     |                                          |      |      |      |      |      |      |      |      |      |          |                                                                                                                                                                 |                                                                                                                                                                                                 |
|             |      |                                                                                     | 0.1                                                                                 | 0.5                                                                                 | 1                                        | 2    | 3    | 4    | 5    | 6    | 8    | 10   | 15   | 20   |          |                                                                                                                                                                 |                                                                                                                                                                                                 |
| HFMD        | ML   |    |    | <div>0.2~1.0</div> <div>0.30~0.80</div>                                             |                                          |      |      |      |      |      |      |      |      |      |          | <div>For Hard-to-cut material machining</div> <div>• Chip breaker for cutting with low cutting load and hard cutting edge ensure high qualified machining</div> |                                                                                                                                                                                                 |
|             | MF   |    |    | <div>0.2~1.0</div> <div>0.30~1.0</div>                                              |                                          |      |      |      |      |      |      |      |      |      |          | <div>For Light cutting</div> <div>• Chip breaker for cutting with low cutting load is for light cutting</div>                                                   |                                                                                                                                                                                                 |
|             | MM   |    |    | <div>0.2~1.0</div> <div>0.30~1.20</div>                                             |                                          |      |      |      |      |      |      |      |      |      |          | <div>For General cutting</div> <div>• Shape for general machining with high feed is available for most machining range</div>                                    |                                                                                                                                                                                                 |
|             | TP2P | MA                                                                                  |  |  | <div>0.05~0.25</div> <div>1.0~16.5</div> |      |      |      |      |      |      |      |      |      |          |                                                                                                                                                                 | <div>For Aluminum machining</div> <div>• Sharp cutting edge for aluminum machining ensures good machinability<br/>• Buffed surface realizes chip flow and welding resistance</div>              |
|             |      | ML                                                                                  |  |  | <div>0.05~0.25</div> <div>1.0~16.5</div> |      |      |      |      |      |      |      |      |      |          |                                                                                                                                                                 | <div>For Hard-to-cut material machining</div> <div>• Chip breaker for cutting with low cutting load guarantees long tool life and qualified machining in light cutting and HRSA machining</div> |
|             |      | MM                                                                                  |  |  | <div>0.05~0.25</div> <div>1.0~16.5</div> |      |      |      |      |      |      |      |      |      |          |                                                                                                                                                                 | <div>For General cutting</div> <div>• Specialized shape for general slotting is applicable in most cutting ranges</div>                                                                         |
| Pro-XL Mill | MA   |  |  | <div>0.05~0.20</div> <div>10~57</div>                                               |                                          |      |      |      |      |      |      |      |      |      |          | <div>For Aluminum machining</div> <div>• Sharp cutting edge with buffing on the surface for aluminum machining ensures chip flow and welding resistance</div>   |                                                                                                                                                                                                 |
| Pro-V Mill  | MA   |  |  | <div>0.10~0.30</div> <div>1.0~17</div>                                              |                                          |      |      |      |      |      |      |      |      |      |          | <div>For Aluminum machining</div> <div>• Shape for general slotting is applicable in most cutting ranges</div>                                                  |                                                                                                                                                                                                 |

Notice: Application ranges are based on main cutting material



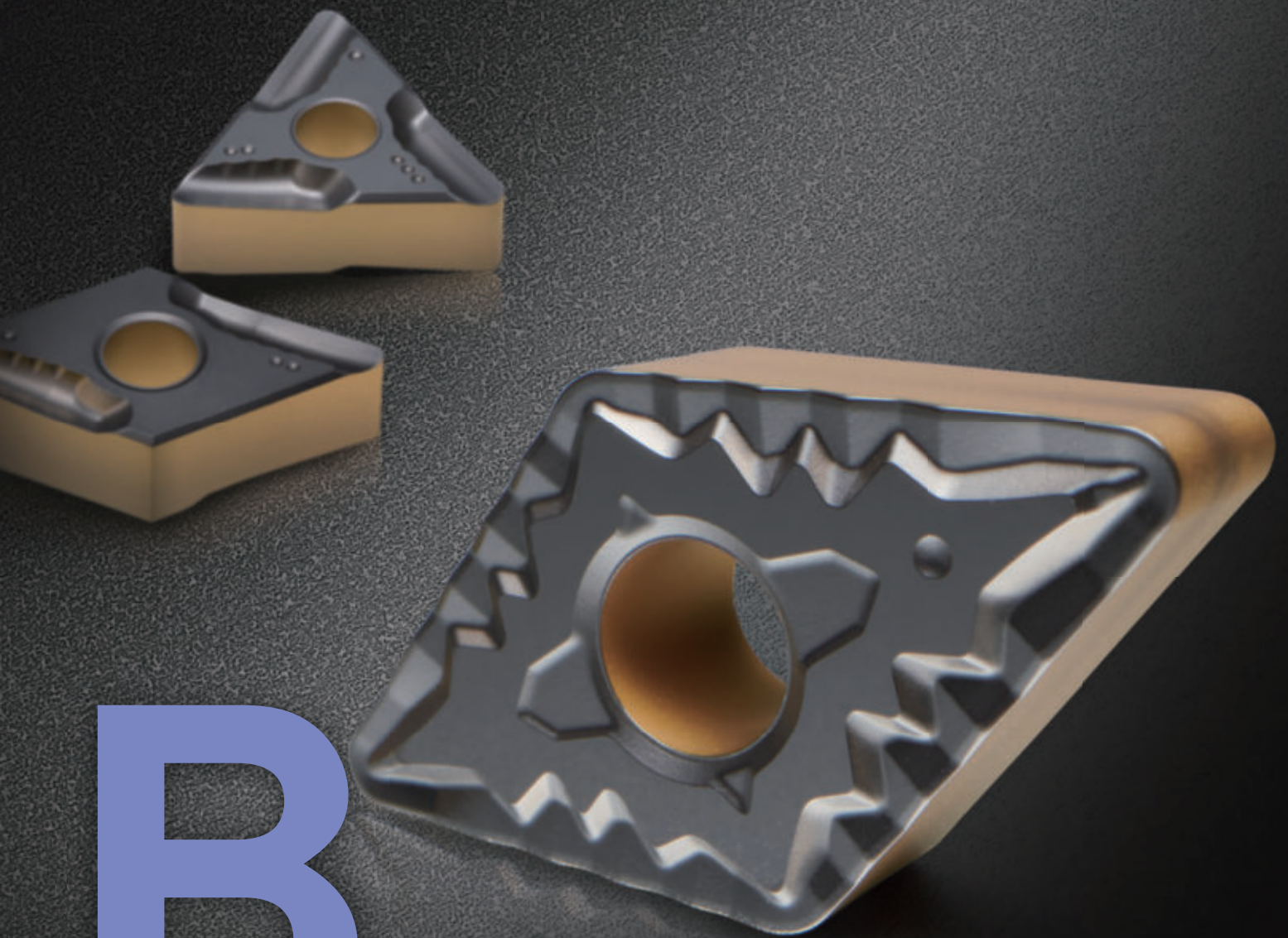
## Chip breaker for drilling

| Geometry          | Cutting edge | Application range                                                                                                                                                                                               |       |      |      |      |     |      |     |     |     |     |     |  | Features                                                                                                                                                                                                                                                                                                                                                                                                    |
|-------------------|--------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|------|------|------|-----|------|-----|-----|-----|-----|-----|--|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                   |              | feed rate $f_n$ (mm/rev)                                                                                                                                                                                        |       |      |      |      |     |      |     |     |     |     |     |  |                                                                                                                                                                                                                                                                                                                                                                                                             |
|                   |              | 0.04                                                                                                                                                                                                            | 0.063 | 0.10 | 0.16 | 0.25 | 0.4 | 0.63 | 1.0 | 1.6 | 2.5 | 4.0 | 6.3 |  |                                                                                                                                                                                                                                                                                                                                                                                                             |
|                   |              | depth of cut $a_p$ (mm)                                                                                                                                                                                         |       |      |      |      |     |      |     |     |     |     |     |  |                                                                                                                                                                                                                                                                                                                                                                                                             |
|                   |              | 30                                                                                                                                                                                                              | 60    | 90   | 120  | 150  | 180 | 210  | 240 | 270 | 300 | 330 | 900 |  |                                                                                                                                                                                                                                                                                                                                                                                                             |
| King Drill series | PD           |   <div>0.04~0.20</div> <div>60~300</div>      |       |      |      |      |     |      |     |     |     |     |     |  | <b>For General cutting</b> <ul style="list-style-type: none"><li>• Chip breaker with strong cutting edge for universal applications with steel, stainless steel, and cast iron</li></ul>                                                                                                                                                                                                                    |
|                   | LD           |   <div>0.04~0.15</div> <div>40~250</div>      |       |      |      |      |     |      |     |     |     |     |     |  | <b>For Light cutting</b> <ul style="list-style-type: none"><li>• Superior chip control in machining of mild steel, forged steel and stainless steel</li></ul>                                                                                                                                                                                                                                               |
|                   | RD           |   <div>0.04~0.20</div> <div>60~300</div>      |       |      |      |      |     |      |     |     |     |     |     |  | <b>Reinforced chipping resistance</b> <ul style="list-style-type: none"><li>• Improved central chipping resistance due to reinforced corners of the King Drill central inserts</li><li>• Excellent cutting performance even in machining where there is frequent corner breakage of central inserts</li><li>• e.g. Machining heat-treated steel or stainless steel, and high feed machining, etc.</li></ul> |
|                   | ND           |   <div>0.04~0.10</div> <div>100~400</div> |       |      |      |      |     |      |     |     |     |     |     |  | <b>Non-ferrous metals</b> <ul style="list-style-type: none"><li>• Chip breaker with sharp and polished cutting edge for aluminum and Non-ferrous metals. Machining with King Drill ensures good chip flow and resistance to chip welding</li></ul>                                                                                                                                                          |

Notice: Application ranges are based on main cutting material

# TURNING

Korloy turning tools cover a wide application range with a full line-up of ISO tools that produce high quality and high precision parts all for manufacturers' requirements.



# B