



# HYBRID CERMET

Grades for Steel Machining



Hybrid Cermet Technology for High Quality Surface Finish Machining

Three Types of Reinforcement Techniques Create a Unique Hybrid Cermet Technology

Full Lineup for a Wide Range of Machining Applications

Kyocera's Toughest Cermet Grade - New PV730

MEGACOAT NANO CERMET

**PV710 / PV720 / PV730** NEW

Uncoated CERMET

**TN610 / TN620**



MEGACOAT NANO CERMET

# PV710 / PV720 / PV730 <sup>NEW</sup>

Hybrid Cermet for Steel Machining

3 Hybrid Technology attributes maintain superior surface finish  
New stability oriented PV730 is Kyocera' toughest cermet grade yet

Uncoated CERMET

# TN610 / TN620

## 1 Full Lineup Including Kyocera's Toughest Cermet Grade - New PV730

New high-stability PV730 added to lineup. Full lineup covers numerous machining applications.

High Speed

**PV710**

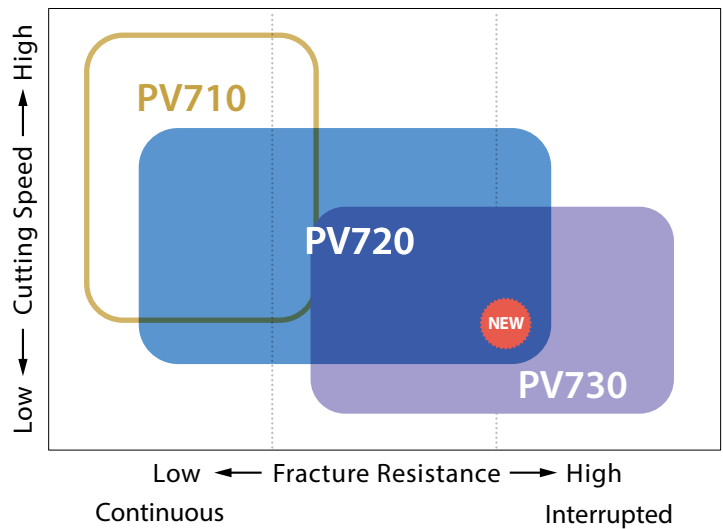
General Use

**PV720** <sup>1st Recommendation</sup>  
-Excellent Wear Resistance-

Stability Oriented

**PV730** <sup>NEW</sup> Tough Cermet  
- High Stability -

Fracture resistance: 2X more than competitors  
(Based on internal evaluations)



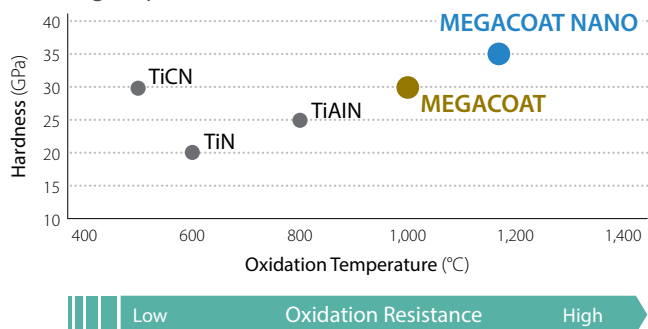
## TN610 / TN620 Uncoated Type is also Available

## MEGACOAT NANO

Improved performance with composite lamination of MEGACOAT NANO and special TiN coating to combine high adhesion resistance and great visibility of the used cutting edge even in dim light



Coating Properties



# 2

## Key Elements to Unique Strengthening Technology (Hybrid Technology)

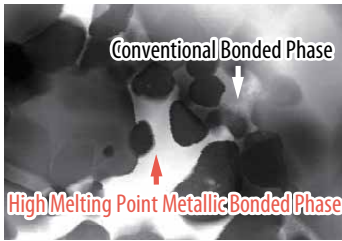
### 1. High Quality Surface Finish

-High Melting Point "Hybrid Bonded Phase"-

Combining the conventional cermet bonded phase (nickel, cobalt) and the special high melting point metallic bonded phase.

Provides high adhesion resistance to eliminate galling of the workpiece.

#### High Melting Point "Hybrid Bonded Phase"



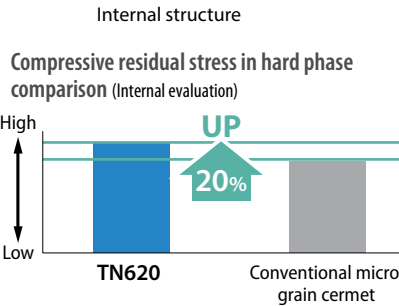
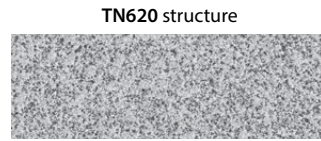
### 2. Excellent Fracture Resistance

- Micro Grain "Hybrid Hard Phase" -

Improved strength with uniform micro grain hard phase and superior compressive stress with high melting point bonded phase.

This combination yields greater fracture resistance.

#### Micro Grain "Hybrid Hard Phase"



### 3. Superior Wear Resistance

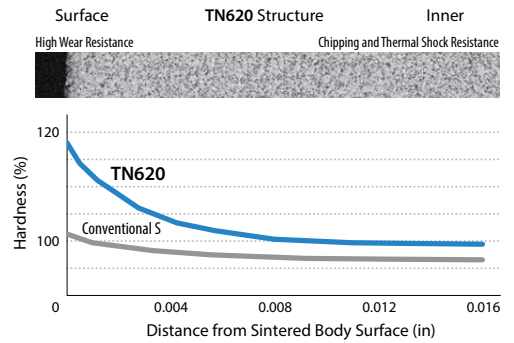
-Surface-Hardened "Hybrid Structure"-

Excellent fracture resistance with surface-hardened layer using gradient composition technology.

Continuously-varied hardness provides wear and fracture resistance.

\*No applicable to PV730.

#### Special Surface-Hardened "Hybrid Structure"

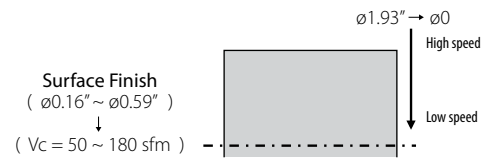


TN620's inner structure has high toughness and chipping resistance along with greater thermal shock and wear resistance than that of the conventional micro grain cermet. (Internal evaluation)



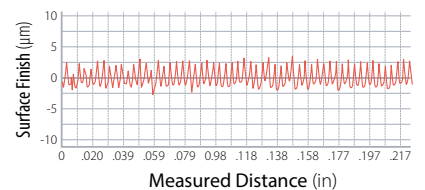
## Excellent Finish (Internal Evaluation)

Cutting Conditions: Vc = 590 ~ 0 sfm (Constant Rate), D.O.C. = 0.020" f = 0.004 ipr, Wet, CNMG431 type Workpiece: 1010



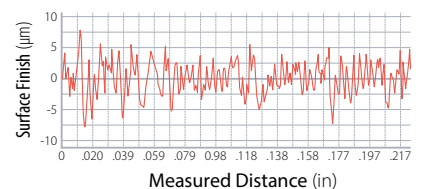
### Good Finish

PV720



### Finished Surface is Clouded

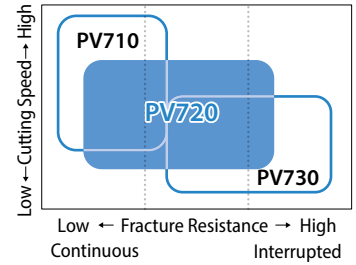
Competitor A



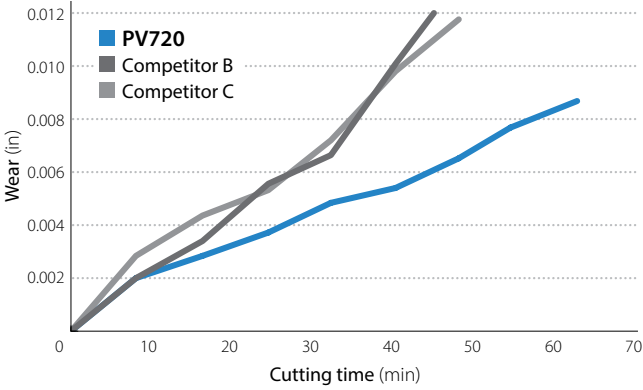
General Use

# PV720

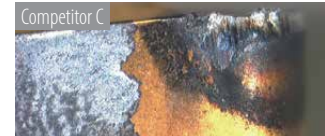
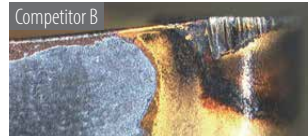
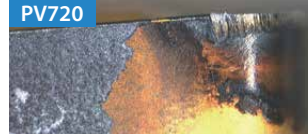
1st recommendation - Excellent Wear Resistance-  
High-efficiency Machining and High Quality Surface Finish



### Wear Resistance Comparison (Internal evaluation)

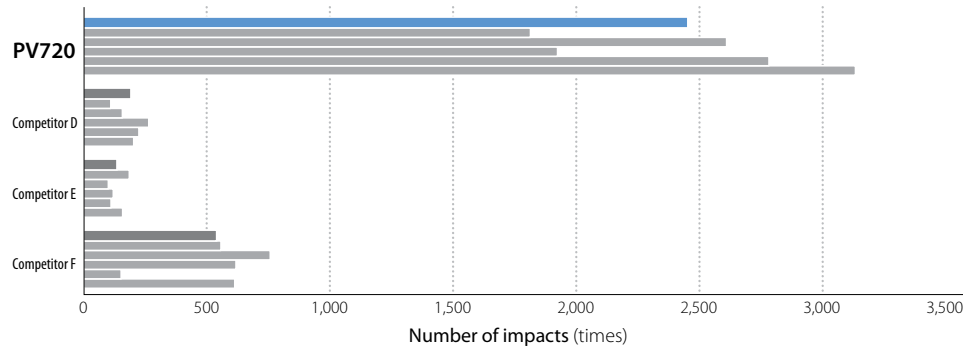


Cutting Time: after 48 minutes



Cutting Conditions: V = 820 sfm, D.O.C. = 0.039", f = 0.008 ipr, Wet, CNMG432 type Workpiece: 4137

### Fracture Resistance Comparison (Internal evaluation)



The top bar is the average value.

Cutting Conditions: V = 820 sfm, D.O.C. = 0.039", f = 0.008 ipr, Wet, CNMG432 type Workpiece: 1045 (4 Grooves in Workpiece)

### For High Speed and Continuous Machining

# PV710

Long Tool Life in High-Speed and Continuous Machining



## Uncoated Cermet **TN610/TN620** are also Available

### Recommended Cutting Conditions

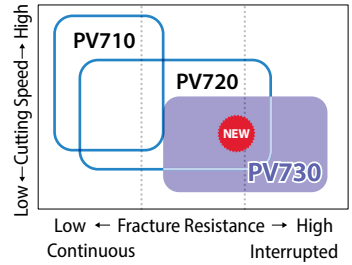
| Grade        | Vc (sfm)                                   |  |                         | Grade        | Vc (sfm)                                   |  |                         |
|--------------|--|--|-------------------------|--------------|--|--|-------------------------|
|              | Low Carbon Steel<br>Low Carbon Alloy Steel | Medium Carbon Steel<br>Medium Carbon Alloy Steel | High Carbon Alloy Steel |              | Low Carbon Steel<br>Low Carbon Alloy Steel | Medium Carbon Steel<br>Medium Carbon Alloy Steel | High Carbon Alloy Steel |
| <b>PV710</b> | 490 - 980 - 1,310                          |  |                         | <b>TN610</b> | 490 - 820 - 1,150                          |  |                         |
| <b>PV720</b> | 330 - 820 - 1,150                          |  |                         | <b>TN620</b> | 330 - 660 - 980                            |  |                         |
| <b>PV730</b> | 330 - 590 - 820                            |  |                         |              |  |  |                         |

Stability Oriented

NEW

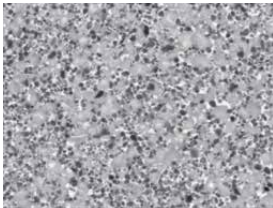
# PV730

The Toughest Cermet in Kyocera History - High Stability - Improved Stability and Excellent Finish

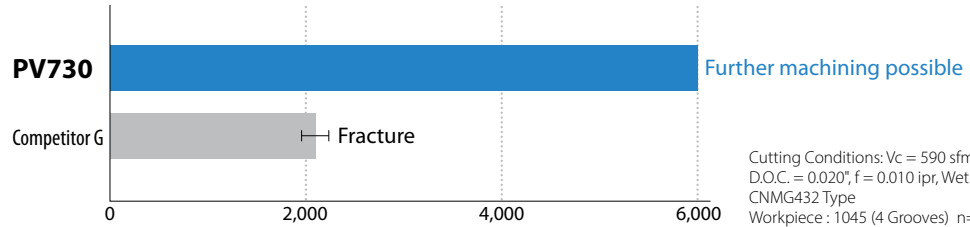


## New Tough Micro Grain Cermet Improves Fracture Resistance Good Surface Finish and Wear Resistance

Newly Developed Tough Cermet Technology

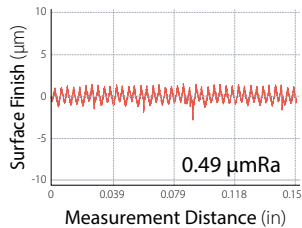


Fracture Resistance Comparison (Internal Evaluation)

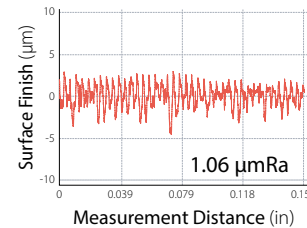


Surface Roughness Comparison (Internal Evaluation)

PV730



Competitor H



Cutting Conditions:  $V_c = 330$  sfm, D.O.C. = 0.020",  $f = 0.004$  ipr, Wet, CNMG432 Type Workpiece: 1010

Cutting Edge Conditions Comparison - after 40 min machining - (Internal Evaluation)

PV730



Competitor I



Cutting Conditions:  $V_c = 820$  sfm  
D.O.C. = 0.039",  $f = 0.008$  ipr, Wet  
CNMG432 Type Workpiece: 1045

Small Parts Machining

Molded G-class chipbreakers (sharp edge) with improved base material strength

Finishing

SKS Chipbreaker

D.O.C.: 0.008" to 0.059"  
Excellent chip control and surface finish



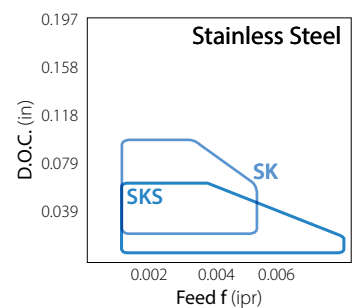
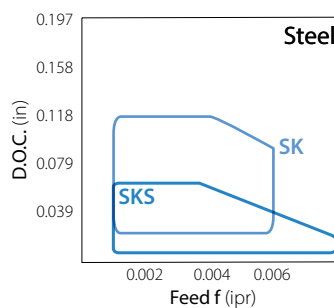
Semi-Finishing

SK Chipbreaker

D.O.C.: 0.020" to 0.118"  
Three-dimensional chipbreaker with both sharpness and chip control



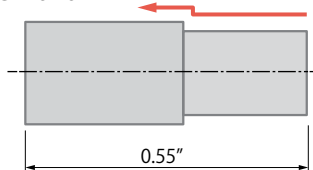
1st Recommended Chipbreaker (Low Cutting Force)



SOLUTION

Small Parts Machining: SK Chipbreaker (PV730) showed a good surface finish and 4X longer tool life

Valve 1020



Tool Life

PV730  
(SK Chipbreaker)

3,000 pcs/corner (4.0  $\mu\text{mRz}$ )

Tool Life

Competitor J  
(PVD Coated Cermet)

750 pcs/corner (5.0  $\mu\text{mRz}$ )

× 4.0

Cutting Conditions:  $V_c = 530$  sfm, D.O.C. = 0.020",  $f = 0.0012$  ipr Wet (oil), DCGT3205 MFP-SK PV730

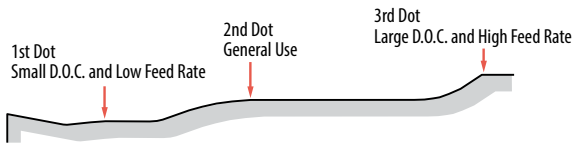
**Finishing****PP Chipbreaker**

Negative

**Features**

3-Step Smart Dot structure for a wide range of steel finishing feed rates  
 Smooth taper cutting edge reduces cutting forces  
 Corner-R( $\epsilon$ ) 0.008" - 3/64" are available

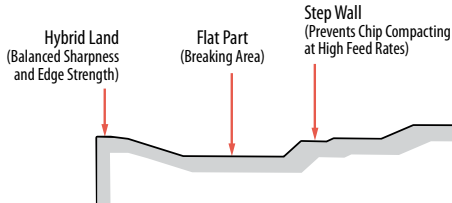
Each Dot Functions According to the Cutting Conditions

**Medium - Roughing****PG Chipbreaker**

Negative

**Features**

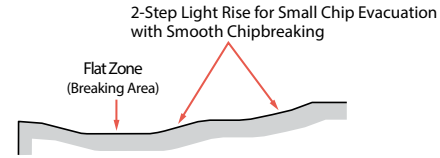
Stable machining with good balance of edge sharpness and strength  
 Prevents chip compacting at high feed rates with good chip control at low feed rates

**Finishing - Medium****PQ Chipbreaker**

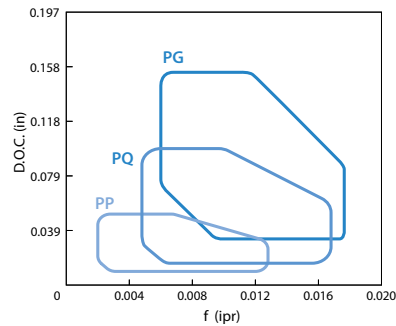
Negative

**Features**

Stable chip control in a wide range of medium-finishing applications with the newly developed "Flat Zone" (Breaking Area) and rising 2-step Smart Wall effect  
 Twin dots on the edge tip provide smooth chip control at smaller D.O.C. during high feed turning and facing  
 Continuous Variable Land (CVL) with well-balanced edge sharpness and toughness



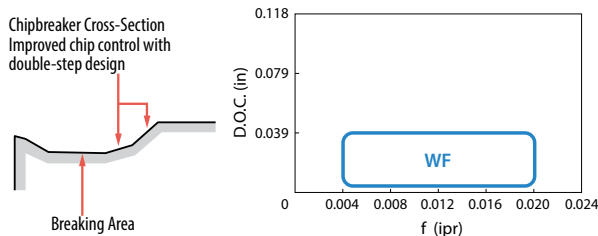
Steel C-type Edge Length = 1/2" I.C.

**Finishing****WF Chipbreaker (Wiper)**

Negative

**Features**

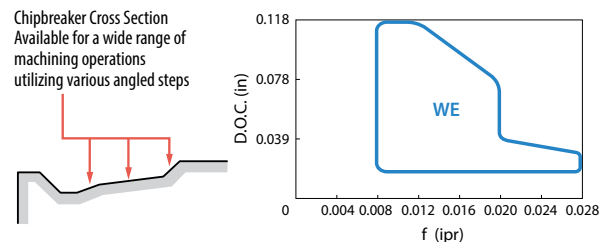
Unique wiper-edge design prevents peeling and provides superior surface finish  
 Provides excellent chip control with primary & secondary dots and improves cutting performance during finishing operations

**Finishing - Medium****WE Chipbreaker (Wiper)**

Negative

**Features**

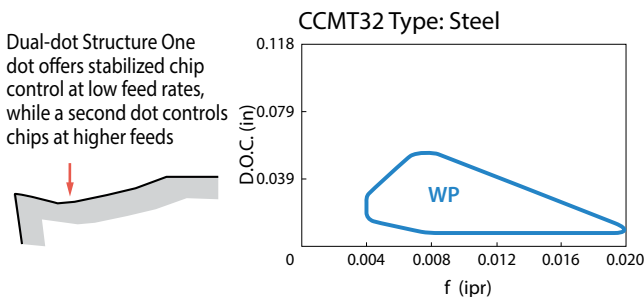
High-quality surface roughness even at high feed rates with unique wiper-edge design  
 Wide application range is available with improved chip control at low depths of cut preventing chip crunching and running over chipbreaker dots at high feed rates

**Finishing****WP Chipbreaker (Wiper Insert)**

Positive

**Features**

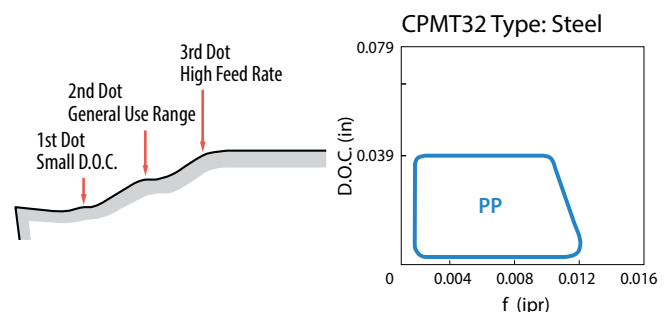
Excellent surface roughness and smooth chip control at high feed rates  
 High grade surface finish with no tear  
 High machining accuracy with low cutting forces

**Finishing****PP Chipbreaker**

Positive

**Features**

Stable chip control when finishing steel  
 Special edge designed for sharpness and improved strength for stable tool life during high feed machining operations



# Inserts (Negative)

| Shape<br>Right-hand Shown          | Part Number | Dimensions (in) |           |       |               |       | NEW   |       |       |       |  |
|------------------------------------|-------------|-----------------|-----------|-------|---------------|-------|-------|-------|-------|-------|--|
|                                    |             | I.C.            | Thickness | Hole  | Corner-R (RE) | PV710 | PV720 | PV730 | TN610 | TN620 |  |
| Finishing / with Wiper Edge        | CNMG 431WF  | 1/2             | 3/16      | 0.203 | 1/64          | ●     | ●     | ●     | ●     | ●     |  |
|                                    | 432WF       |                 |           |       | 1/32          | ●     | ●     | ●     | ●     | ●     |  |
| Finishing / with Wiper Edge        | CNMG 431WP  | 1/2             | 3/16      | 0.203 | 1/64          | ●     | ●     | ●     | ●     | ●     |  |
|                                    | 432WP       |                 |           |       | 1/32          | ●     | ●     | ●     | ●     | ●     |  |
| Finishing-Medium / with Wiper Edge | CNMG 431WE  | 1/2             | 3/16      | 0.203 | 1/64          | ●     | ●     | ●     | ●     | ●     |  |
|                                    | 432WE       |                 |           |       | 1/32          | ●     | ●     | ●     | ●     | ●     |  |
|                                    | 433WE       |                 |           |       | 3/64          | ●     | ●     | ●     | ●     | ●     |  |
| Finishing-Medium / with Wiper Edge | CNMG 431WQ  | 1/2             | 3/16      | 0.203 | 1/64          | ●     | ●     | ●     | ●     | ●     |  |
|                                    | 432WQ       |                 |           |       | 1/32          | ●     | ●     | ●     | ●     | ●     |  |
|                                    | 433WQ       |                 |           |       | 3/64          | ●     | ●     | ●     | ●     | ●     |  |
| Finishing                          | CNMG 4305PP | 1/2             | 3/16      | 0.203 | 0.008         | ●     | ●     | ●     | ●     | ●     |  |
|                                    | 431PP       |                 |           |       | 1/64          | ●     | ●     | ●     | ●     | ●     |  |
|                                    | 432PP       |                 |           |       | 1/32          | ●     | ●     | ●     | ●     | ●     |  |
|                                    | 433PP       |                 |           |       | 3/64          | ●     | ●     | ●     | ●     | ●     |  |
| Finishing                          | CNMG 331GP  | 3/8             | 3/16      | 0.150 | 1/64          | ●     | ●     | ●     | ●     | ●     |  |
|                                    | 332GP       |                 |           |       | 1/32          | ●     | ●     | ●     | ●     | ●     |  |
|                                    | CNMG 4305GP | 1/2             | 3/16      | 0.203 | 0.008         | ●     | ●     | ●     | ●     | ●     |  |
|                                    | 431GP       |                 |           |       | 1/64          | ●     | ●     | ●     | ●     | ●     |  |
| 432GP                              | 1/32        | ●               | ●         | ●     | ●             | ●     | ●     |       |       |       |  |
| Finishing-Medium                   | CNMG 431PQ  | 1/2             | 3/16      | 0.203 | 1/64          | ●     | ●     | ●     | ●     | ●     |  |
|                                    | 432PQ       |                 |           |       | 1/32          | ●     | ●     | ●     | ●     | ●     |  |
|                                    | 433PQ       |                 |           |       | 3/64          | ●     | ●     | ●     | ●     | ●     |  |
| Finishing-Medium                   | CNMG 331HQ  | 3/8             | 3/16      | 0.150 | 1/64          | ●     | ●     | ●     | ●     | ●     |  |
|                                    | 332HQ       |                 |           |       | 1/32          | ●     | ●     | ●     | ●     | ●     |  |
|                                    | CNMG 431HQ  | 1/2             | 3/16      | 0.203 | 1/64          | ●     | ●     | ●     | ●     | ●     |  |
|                                    | 432HQ       |                 |           |       | 1/32          | ●     | ●     | ●     | ●     | ●     |  |
|                                    | 433HQ       |                 |           |       | 3/64          | ●     | ●     | ●     | ●     | ●     |  |
| Finishing-Medium / Up Facing       | CNMG 431CQ  | 1/2             | 3/16      | 0.203 | 1/64          | ●     | ●     | ●     | ●     | ●     |  |
|                                    | 432CQ       |                 |           |       | 1/32          | ●     | ●     | ●     | ●     | ●     |  |
| Medium-Roughing                    | CNMG 331GS  | 3/8             | 3/16      | 0.150 | 1/64          | ●     | ●     | ●     | ●     | ●     |  |
|                                    | 332GS       |                 |           |       | 1/32          | ●     | ●     | ●     | ●     | ●     |  |
| Medium-Roughing                    | CNMG 431GS  | 1/2             | 3/16      | 0.203 | 1/64          | ●     | ●     | ●     | ●     | ●     |  |
|                                    | 432GS       |                 |           |       | 1/32          | ●     | ●     | ●     | ●     | ●     |  |
| Medium-Roughing                    | CNMG 431PG  | 1/2             | 3/16      | 0.203 | 1/64          | ●     | ●     | ●     | ●     | ●     |  |
|                                    | 432PG       |                 |           |       | 1/32          | ●     | ●     | ●     | ●     | ●     |  |
|                                    | 433PG       |                 |           |       | 3/64          | ●     | ●     | ●     | ●     | ●     |  |
| Medium-Roughing                    | CNMG 431PS  | 1/2             | 3/16      | 0.203 | 1/64          | ●     | ●     | ●     | ●     | ●     |  |
|                                    | 432PS       |                 |           |       | 1/32          | ●     | ●     | ●     | ●     | ●     |  |
| Roughing                           | CNMG 431    | 1/2             | 3/16      | 0.203 | 1/64          | ●     | ●     | ●     | ●     | ●     |  |
|                                    | 432         |                 |           |       | 1/32          | ●     | ●     | ●     | ●     | ●     |  |

| Shape<br>Right-hand Shown                   | Part Number       | Dimensions (in) |           |       |               |       | NEW   |       |       |       |  |
|---|-------------------|-----------------|-----------|-------|---------------|-------|-------|-------|-------|-------|--|
|   |                   | I.C.            | Thickness | Hole  | Corner-R (RE) | PV710 | PV720 | PV730 | TN610 | TN620 |  |
| Low Carbon Steel / Finishing / Small D.O.C. | CNMG 431XF        | 1/2             | 3/16      | 0.203 | 1/64          | ●     | ●     | ●     | ●     | ●     |  |
|   | 432XF             |                 |           |       | 1/32          | ●     | ●     | ●     | ●     | ●     |  |
| Low Carbon Steel / Finishing                | CNMG 431XP        | 1/2             | 3/16      | 0.203 | 1/64          | ●     | ●     | ●     | ●     | ●     |  |
|   | 432XP             |                 |           |       | 1/32          | ●     | ●     | ●     | ●     | ●     |  |
| Low Carbon Steel / Medium                   | CNMG 431XQ        | 1/2             | 3/16      | 0.203 | 1/64          | ●     | ●     | ●     | ●     | ●     |  |
|   | 432XQ             |                 |           |       | 1/32          | ●     | ●     | ●     | ●     | ●     |  |
| Low Carbon Steel / Roughing                 | CNMG 432XS        | 1/2             | 3/16      | 0.203 | 1/32          | ●     | ●     | ●     | ●     | ●     |  |
|   |                   |                 |           |       |               |       |       |       |       |       |  |
| Finishing / Sharp Edge / Polished           | CNGG 4305MFP-SK   | 1/2             | 3/16      | 0.203 | <0.008        |       | ●     |       |       |       |  |
|   | 431MFP-SK         |                 |           |       | <1/64         |       | ●     |       |       |       |  |
| Finishing / Surface Roughness Oriented      | CNGG 3305 P/L -S  | 3/8             | 3/16      | 0.150 | 0.008         | ●     | ●     | ●     | ●     | ●     |  |
|   | 331 P/L -S        |                 |           |       | 1/64          | ●     | ●     | ●     | ●     | ●     |  |
|   | 332 P/L -S        |                 |           |       | 1/32          | ●     | ●     | ●     | ●     | ●     |  |
| Medium                                      | CNGG 431 P/L      | 1/2             | 3/16      | 0.203 | 1/64          | ●     | ●     | ●     | ●     | ●     |  |
|   | 432 P/L           |                 |           |       | 1/32          | ●     | ●     | ●     | ●     | ●     |  |
| Medium-Roughing / Low Cutting Resistance    | CNGG 431 P/L -25R | 1/2             | 3/16      | 0.203 | 1/64          | ●     | ●     | ●     | ●     | ●     |  |
|   | 432 P/L -25R      |                 |           |       | 1/32          | ●     | ●     | ●     | ●     | ●     |  |
| Finishing / with Wiper Edge                 | DNMX 431WF        | 1/2             | 3/16      | 0.203 | 1/64          | ●     | ●     | ●     | ●     | ●     |  |
|   | 432WF             |                 |           |       | 1/32          | ●     | ●     | ●     | ●     | ●     |  |
|   | 433WF             |                 |           |       | 3/64          | ●     | ●     | ●     | ●     | ●     |  |
|   | DNMX 441WF        | 1/2             | 1/4       | 0.203 | 1/64          | ●     | ●     | ●     | ●     | ●     |  |
| 442WF                                       | 1/32              |                 |           |       | ●             | ●     | ●     | ●     | ●     |       |  |
| 443WF                                       | 3/64              |                 |           |       | ●             | ●     | ●     | ●     | ●     |       |  |
| Finishing                                   | DNMG 4305PP       | 1/2             | 3/16      | 0.203 | 0.008         | ●     | ●     | ●     | ●     | ●     |  |
|   | 431PP             |                 |           |       | 1/64          | ●     | ●     | ●     | ●     | ●     |  |
|   | 432PP             |                 |           |       | 1/32          | ●     | ●     | ●     | ●     | ●     |  |
|   | 433PP             |                 |           |       | 3/64          | ●     | ●     | ●     | ●     | ●     |  |
| Finishing                                   | DNMG 4405PP       | 1/2             | 1/4       | 0.203 | 0.008         | ●     | ●     | ●     | ●     | ●     |  |
|   | 441PP             |                 |           |       | 1/64          | ●     | ●     | ●     | ●     | ●     |  |
|   | 442PP             |                 |           |       | 1/32          | ●     | ●     | ●     | ●     | ●     |  |
|   | 443PP             |                 |           |       | 3/64          | ●     | ●     | ●     | ●     | ●     |  |
| Finishing                                   | DNMG 331GP        | 3/8             | 3/16      | 0.150 | 1/64          | ●     | ●     | ●     | ●     | ●     |  |
|   | 332GP             |                 |           |       | 1/32          | ●     | ●     | ●     | ●     | ●     |  |
| Finishing                                   | DNMG 4305GP       | 1/2             | 3/16      | 0.203 | 0.008         | ●     | ●     | ●     | ●     | ●     |  |
|   | 431GP             |                 |           |       | 1/64          | ●     | ●     | ●     | ●     | ●     |  |
| 432GP                                       | 1/32              | ●               | ●         | ●     | ●             | ●     | ●     |       |       |       |  |
| Finishing                                   | DNMG 4405GP       | 1/2             | 1/4       | 0.203 | 0.008         | ●     | ●     | ●     | ●     | ●     |  |
|   | 441GP             |                 |           |       | 1/64          | ●     | ●     | ●     | ●     | ●     |  |
| 442GP                                       | 1/32              | ●               | ●         | ●     | ●             | ●     | ●     |       |       |       |  |

Inserts with Corner-R (RE) dimension expressed with "less than" sign (ex. <0.004, <0.008, etc.) indicates models with minus tolerance for Corner-R (RE) ● : Standard Item ◐ : Right-hand Only ◑ : Left-hand Only

# Inserts (Negative)

| Shape<br>Right-hand Shown | Part Number     | Dimensions (in) |           |       |               |       | NEW   |       |       |       |  |
|---------------------------|-----------------|-----------------|-----------|-------|---------------|-------|-------|-------|-------|-------|--|
|                           |                 | I.C.            | Thickness | Hole  | Corner-R (RE) | PV710 | PV720 | PV730 | TN610 | TN620 |  |
|                           | DNMG 431PQ      | 1/2             | 3/16      | 0.203 | 1/64          | ●     | ●     | ●     | ●     | ●     |  |
|                           | 432PQ           |                 |           |       | 1/32          | ●     | ●     | ●     | ●     | ●     |  |
|                           | 433PQ           |                 |           |       | 3/64          | ●     | ●     | ●     | ●     | ●     |  |
|                           | DNMG 441PQ      | 1/2             | 1/4       | 0.203 | 1/64          | ●     | ●     | ●     | ●     | ●     |  |
|                           | 442PQ           |                 |           |       | 1/32          | ●     | ●     | ●     | ●     | ●     |  |
| 443PQ                     | 3/64            |                 |           |       | ●             | ●     | ●     | ●     | ●     |       |  |
|                           | DNMG 3305HQ     | 3/8             | 3/16      | 0.150 | 0.008         | ●     | ●     | ●     | ●     | ●     |  |
|                           | 331HQ           |                 |           |       | 1/64          | ●     | ●     | ●     | ●     | ●     |  |
|                           | DNMG 431HQ      | 1/2             | 3/16      | 0.203 | 1/64          | ●     | ●     | ●     | ●     | ●     |  |
|                           | 432HQ           |                 |           |       | 1/32          | ●     | ●     | ●     | ●     | ●     |  |
|                           | 433HQ           |                 |           |       | 3/64          | ●     | ●     | ●     | ●     | ●     |  |
| DNMG 441HQ                | 1/2             | 1/4             | 0.203     | 1/64  | ●             | ●     | ●     | ●     | ●     |       |  |
| 442HQ                     |                 |                 |           | 1/32  | ●             | ●     | ●     | ●     | ●     |       |  |
| 443HQ                     |                 |                 |           | 3/64  | ●             | ●     | ●     | ●     | ●     |       |  |
|                           | DNMG 431CQ      | 1/2             | 3/16      | 0.203 | 1/64          | ●     | ●     | ●     | ●     | ●     |  |
|                           | 432CQ           |                 |           |       | 1/32          | ●     | ●     | ●     | ●     | ●     |  |
|                           | 433CQ           |                 |           |       | 3/64          | ●     | ●     | ●     | ●     | ●     |  |
| DNMG 441CQ                | 1/2             | 1/4             | 0.203     | 1/64  | ●             | ●     | ●     | ●     | ●     |       |  |
|                           | DNMG 331GS      | 3/8             | 3/16      | 0.150 | 1/64          | ●     | ●     | ●     | ●     | ●     |  |
|                           | 332GS           |                 |           |       | 1/32          | ●     | ●     | ●     | ●     | ●     |  |
|                           | DNMG 431GS      | 1/2             | 3/16      | 0.203 | 1/64          | ●     | ●     | ●     | ●     | ●     |  |
|                           | 432GS           |                 |           |       | 1/32          | ●     | ●     | ●     | ●     | ●     |  |
|                           | DNMG 431PG      | 1/2             | 3/16      | 0.203 | 1/64          | ●     | ●     | ●     | ●     | ●     |  |
|                           | 432PG           |                 |           |       | 1/32          | ●     | ●     | ●     | ●     | ●     |  |
|                           | 433PG           |                 |           |       | 3/64          | ●     | ●     | ●     | ●     | ●     |  |
|                           | DNMG 441PG      | 1/2             | 1/4       | 0.203 | 1/64          | ●     | ●     | ●     | ●     | ●     |  |
| 442PG                     | 1/32            |                 |           |       | ●             | ●     | ●     | ●     | ●     |       |  |
| 443PG                     | 3/64            | ●               | ●         | ●     | ●             | ●     | ●     |       |       |       |  |
|                           | DNMG 431PS      | 1/2             | 3/16      | 0.203 | 1/64          | ●     | ●     | ●     | ●     | ●     |  |
|                           | 432PS           |                 |           |       | 1/32          | ●     | ●     | ●     | ●     | ●     |  |
|                           | DNMG 431        | 1/2             | 3/16      | 0.203 | 1/64          | ●     | ●     | ●     | ●     | ●     |  |
|                           | 432             |                 |           |       | 1/32          | ●     | ●     | ●     | ●     | ●     |  |
|                           | DNMG 431XF      | 1/2             | 3/16      | 0.203 | 1/64          | ●     | ●     | ●     | ●     | ●     |  |
|                           | 432XF           |                 |           |       | 1/32          | ●     | ●     | ●     | ●     | ●     |  |
|                           | DNMG 431XP      | 1/2             | 3/16      | 0.203 | 1/64          | ●     | ●     | ●     | ●     | ●     |  |
|                           | 432XP           |                 |           |       | 1/32          | ●     | ●     | ●     | ●     | ●     |  |
|                           | DNMG 441XP      | 1/2             | 1/4       | 0.203 | 1/64          | ●     | ●     | ●     | ●     | ●     |  |
| 442XP                     | 1/32            |                 |           |       | ●             | ●     | ●     | ●     | ●     |       |  |
|                           | DNMG 431XQ      | 1/2             | 3/16      | 0.203 | 1/64          | ●     | ●     | ●     | ●     | ●     |  |
|                           | 432XQ           |                 |           |       | 1/32          | ●     | ●     | ●     | ●     | ●     |  |
|                           | DNMG 432XS      | 1/2             | 3/16      | 0.203 | 1/32          | ●     | ●     | ●     | ●     | ●     |  |
|                           | DNGG 4305MFP-SK | 1/2             | 3/16      | 0.203 | <0.008        | ●     | ●     | ●     | ●     | ●     |  |
|                           | 431MFP-SK       |                 |           |       | <1/64         | ●     | ●     | ●     | ●     | ●     |  |

| Shape<br>Right-hand Shown | Part Number                 | Dimensions (in) |           |       |               |       | NEW   |       |       |       |  |
|---------------------------|-----------------------------|-----------------|-----------|-------|---------------|-------|-------|-------|-------|-------|--|
|                           |                             | I.C.            | Thickness | Hole  | Corner-R (RE) | PV710 | PV720 | PV730 | TN610 | TN620 |  |
|                           | DNGG 431 <sup>PL</sup>      | 1/2             | 3/16      | 0.203 | 1/64          | ●     | ●     | ●     | ●     | ●     |  |
|                           | 432 <sup>PL</sup>           |                 |           |       | 1/32          | ●     | ●     | ●     | ●     | ●     |  |
|                           | RNMG 32                     | 3/8             | 1/8       | 0.150 | -             | ●     | ●     | ●     | ●     | ●     |  |
|                           | RNMG 43                     | 1/2             | 3/16      | 0.203 | -             | ●     | ●     | ●     | ●     | ●     |  |
|                           | SNMG 431PQ                  | 1/2             | 3/16      | 0.203 | 1/64          | ●     | ●     | ●     | ●     | ●     |  |
|                           | 432PQ                       |                 |           |       | 1/32          | ●     | ●     | ●     | ●     | ●     |  |
|                           | SNMG 431HQ                  | 1/2             | 3/16      | 0.203 | 1/64          | ●     | ●     | ●     | ●     | ●     |  |
|                           | 432HQ                       |                 |           |       | 1/32          | ●     | ●     | ●     | ●     | ●     |  |
|                           | 433HQ                       |                 |           |       | 3/64          | ●     | ●     | ●     | ●     | ●     |  |
|                           | SNMG 432PG                  | 1/2             | 3/16      | 0.203 | 1/32          | ●     | ●     | ●     | ●     | ●     |  |
|                           | 433PG                       |                 |           |       | 3/64          | ●     | ●     | ●     | ●     | ●     |  |
|                           | 434PG                       |                 |           |       | 1/16          | ●     | ●     | ●     | ●     | ●     |  |
|                           | SNMG 321                    | 3/8             | 1/8       | 0.150 | 1/64          | ●     | ●     | ●     | ●     | ●     |  |
|                           | 322                         |                 |           |       | 1/32          | ●     | ●     | ●     | ●     | ●     |  |
|                           | SNMG 431                    | 1/2             | 3/16      | 0.203 | 1/64          | ●     | ●     | ●     | ●     | ●     |  |
|                           | 432                         |                 |           |       | 1/32          | ●     | ●     | ●     | ●     | ●     |  |
|                           | 433                         |                 |           |       | 3/64          | ●     | ●     | ●     | ●     | ●     |  |
| 434                       | 1/16                        | ●               | ●         | ●     | ●             | ●     | ●     |       |       |       |  |
| 435                       | 5/64                        | ●               | ●         | ●     | ●             | ●     | ●     |       |       |       |  |
|                           | SNMG 432XP                  | 1/2             | 3/16      | 0.203 | 1/32          | ●     | ●     | ●     | ●     | ●     |  |
|                           | SNMG 432XQ                  | 1/2             | 3/16      | 0.203 | 1/32          | ●     | ●     | ●     | ●     | ●     |  |
|                           | SNMG 432XS                  | 1/2             | 3/16      | 0.203 | 1/32          | ●     | ●     | ●     | ●     | ●     |  |
|                           | SNGG 321 <sup>PL</sup> -B   | 3/8             | 1/8       | 0.150 | 1/64          | ●     | ●     | ●     | ●     | ●     |  |
|                           | 322 <sup>PL</sup> -B        |                 |           |       | 1/32          | ●     | ●     | ●     | ●     | ●     |  |
|                           | SNGG 431 <sup>PL</sup> -C   | 1/2             | 3/16      | 0.203 | 1/64          | ●     | ●     | ●     | ●     | ●     |  |
|                           | 432 <sup>PL</sup> -C        |                 |           |       | 1/32          | ●     | ●     | ●     | ●     | ●     |  |
| SNMG 431 <sup>PL</sup> -C | 1/2                         | 3/16            | 0.203     | 1/64  | ●             | ●     | ●     | ●     | ●     |       |  |
| 432 <sup>PL</sup> -C      |                             |                 |           | 1/32  | ●             | ●     | ●     | ●     | ●     |       |  |
|                           | SNGG 431 <sup>PL</sup> -25R | 1/2             | 3/16      | 0.203 | 1/64          | ●     | ●     | ●     | ●     | ●     |  |
|                           | 432 <sup>PL</sup> -25R      |                 |           |       | 1/32          | ●     | ●     | ●     | ●     | ●     |  |
|                           | TNMX 331WF                  | 3/8             | 3/16      | 0.150 | 1/64          | ●     | ●     | ●     | ●     | ●     |  |
|                           | 332WF                       |                 |           |       | 1/32          | ●     | ●     | ●     | ●     | ●     |  |
|                           | 333WF                       |                 |           |       | 3/64          | ●     | ●     | ●     | ●     | ●     |  |

Inserts with Corner-R (RE) dimension expressed with "less than" sign (ex. <0.004, <0.008, etc.) indicates models with minus tolerance for Corner-R (RE) ● : Standard Item ⊕ : Right-hand Only ⊖ : Left-hand Only









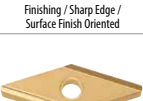






# Inserts (Negative)












| Shape<br>Right-hand Shown                   | Part Number | Dimensions (in) |           |       |               |       | NEW   |       |       |       |  |
|---|-------------|-----------------|-----------|-------|---------------|-------|-------|-------|-------|-------|--|
|   |             | I.C.            | Thickness | Hole  | Corner-R (RE) | PV710 | PV720 | PV730 | TN610 | TN620 |  |
| Finishing                                   | TNMG 3305PP | 3/8             | 3/16      | 0.150 | 0.008         | ●     | ●     | ●     | ●     | ●     |  |
|   | 331PP       |                 |           |       | 1/64          | ●     | ●     | ●     | ●     | ●     |  |
|   | 332PP       |                 |           |       | 1/32          | ●     | ●     | ●     | ●     | ●     |  |
|   | 333PP       |                 |           |       | 3/64          | ●     | ●     | ●     | ●     | ●     |  |
| Finishing                                   | TNMG 231GP  | 1/4             | 3/16      | 0.089 | 1/64          | ●     | ●     | ●     | ●     |       |  |
|   | 232GP       |                 |           |       | 1/32          | ●     | ●     | ●     | ●     |       |  |
|   | TNMG 3305GP | 3/8             | 3/16      | 0.150 | 0.008         | ●     | ●     | ●     | ●     |       |  |
|   | 331GP       |                 |           |       | 1/64          | ●     | ●     | ●     | ●     |       |  |
| 332GP                                       | 1/32        | ●               | ●         | ●     | ●             | ●     |       |       |       |       |  |
| Finishing-Medium                            | TNMG 331PQ  | 3/8             | 3/16      | 0.150 | 1/64          | ●     | ●     | ●     | ●     |       |  |
|   | 332PQ       |                 |           |       | 1/32          | ●     | ●     | ●     | ●     |       |  |
|   | 333PQ       |                 |           |       | 3/64          | ●     | ●     | ●     | ●     |       |  |
| Finishing-Medium                            | TNMG 231HQ  | 1/4             | 3/16      | 0.089 | 1/64          | ●     | ●     | ●     | ●     |       |  |
|   | 232HQ       |                 |           |       | 1/32          | ●     | ●     | ●     | ●     |       |  |
|   | TNMG 331HQ  | 3/8             | 3/16      | 0.150 | 1/64          | ●     | ●     | ●     | ●     |       |  |
|   | 332HQ       |                 |           |       | 1/32          | ●     | ●     | ●     | ●     |       |  |
| 333HQ                                       | 3/64        | ●               | ●         | ●     | ●             | ●     |       |       |       |       |  |
| Finishing-Medium / Up Facing                | TNMG 331CQ  | 3/8             | 3/16      | 0.150 | 1/64          | ●     | ●     | ●     | ●     |       |  |
|   | 332CQ       |                 |           |       | 1/32          | ●     | ●     | ●     | ●     |       |  |
|   | 333CQ       |                 |           |       | 3/64          | ●     | ●     | ●     | ●     |       |  |
| Medium-Roughing                             | TNMG 231GS  | 1/4             | 3/16      | 0.089 | 1/64          | ●     | ●     | ●     | ●     |       |  |
|   | TNMG 331GS  |                 |           |       | 1/64          | ●     | ●     | ●     | ●     |       |  |
|   | TNMG 332GS  | 3/8             | 3/16      | 0.150 | 1/32          | ●     | ●     | ●     | ●     |       |  |
| Medium-Roughing                             | TNMG 331PG  | 3/8             | 3/16      | 0.150 | 1/64          | ●     | ●     | ●     | ●     |       |  |
|   | 332PG       |                 |           |       | 1/32          | ●     | ●     | ●     | ●     |       |  |
|   | 333PG       |                 |           |       | 3/64          | ●     | ●     | ●     | ●     |       |  |
| Medium-Roughing                             | TNMG 331PS  | 3/8             | 3/16      | 0.150 | 1/64          | ●     | ●     | ●     | ●     |       |  |
|   | 332PS       |                 |           |       | 1/32          | ●     | ●     | ●     | ●     |       |  |
| Roughing                                    | TNMG 331    | 3/8             | 3/16      | 0.150 | 1/64          | ●     | ●     | ●     | ●     |       |  |
|   | 332         |                 |           |       | 1/32          | ●     | ●     | ●     | ●     |       |  |
|   | 333         |                 |           |       | 3/64          | ●     | ●     | ●     | ●     |       |  |
| TNMG 432                                    | 1/2         | 3/16            | 0.203     | 1/32  | ●             | ●     | ●     | ●     |       |       |  |
| Low Carbon Steel / Finishing / Small D.O.C. | TNMG 331XF  | 3/8             | 3/16      | 0.150 | 1/64          | ●     | ●     | ●     | ●     |       |  |
|   | 332XF       |                 |           |       | 1/32          | ●     | ●     | ●     | ●     |       |  |
| Low Carbon Steel / Finishing                | TNMG 331XP  | 3/8             | 3/16      | 0.150 | 1/64          | ●     | ●     | ●     | ●     |       |  |
|   | 332XP       |                 |           |       | 1/32          | ●     | ●     | ●     | ●     |       |  |
| Low Carbon Steel / Medium                   | TNMG 331XQ  | 3/8             | 3/16      | 0.150 | 1/64          | ●     | ●     | ●     | ●     |       |  |
|   | 332XQ       |                 |           |       | 1/32          | ●     | ●     | ●     | ●     |       |  |
| Low Carbon Steel / Roughing                 | TNMG 332XS  | 3/8             | 3/16      | 0.150 | 1/32          | ●     | ●     | ●     | ●     |       |  |

| Shape<br>Right-hand Shown                        | Part Number        | Dimensions (in) |           |       |               |       | NEW   |       |       |       |  |
|--|--------------------|-----------------|-----------|-------|---------------|-------|-------|-------|-------|-------|--|
|  |                    | I.C.            | Thickness | Hole  | Corner-R (RE) | PV710 | PV720 | PV730 | TN610 | TN620 |  |
| Finishing-Medium                                 | TNGG 3305M-SK      | 3/8             | 3/16      | 0.150 | <0.008        | ●     | ●     | ●     | ●     | ●     |  |
|  | 331M-SK            |                 |           |       | <1/64         | ●     | ●     | ●     | ●     |       |  |
| Finishing / Sharp Edge / Polished                | TNGG 3302MFP-SK    | 3/8             | 3/16      | 0.150 | <0.004        | ●     | ●     | ●     | ●     |       |  |
|  | 3305MFP-SK         |                 |           |       | <0.008        | ●     | ●     | ●     | ●     |       |  |
|  | 331MFP-SK          |                 |           |       | <1/64         | ●     | ●     | ●     | ●     |       |  |
| Medium-Roughing                                  | TNMG 331 1/2 -ST   | 3/8             | 3/16      | 0.150 | 1/64          | ●     | ●     | ●     | ●     |       |  |
|  | 332 1/2 -ST        |                 |           |       | 1/32          | ●     | ●     | ●     | ●     |       |  |
| Without Chipbreaker Super Fine                   | TNMA 331           | 3/8             | 3/16      | 0.150 | 1/64          | ●     | ●     | ●     | ●     |       |  |
|  | 332                |                 |           |       | 1/32          | ●     | ●     | ●     | ●     |       |  |
| Finishing / Sharp Edge / Precision Machining     | TNEG 3305 1/2 -SSF | 3/8             | 3/16      | 0.150 | 0.008         | ●     | ●     | ●     | ●     |       |  |
|  | 331 1/2 -SSF       |                 |           |       | 1/64          | ●     | ●     | ●     | ●     |       |  |
| Finishing / Sharp Edge / Surface Finish Oriented | TNGG 3302 1/2 -S   | 3/8             | 3/16      | 0.150 | 0.004         | ●     | ●     | ●     | ●     |       |  |
|  | 3305 1/2 -S        |                 |           |       | 0.008         | ●     | ●     | ●     | ●     |       |  |
|  | 331 1/2 -S         |                 |           |       | 1/64          | ●     | ●     | ●     | ●     |       |  |
|  | 332 1/2 -S         |                 |           |       | 1/32          | ●     | ●     | ●     | ●     |       |  |
| B: Finishing-Medium C: Medium-Roughing           | TNGG 2205 1/2 -B   | 1/4             | 1/8       | 0.089 | 0.008         | ●     | ●     | ●     | ●     |       |  |
|  | 221 1/2 -B         |                 |           |       | 1/64          | ●     | ●     | ●     | ●     |       |  |
|  | TNGG 3305 1/2 -B   | 3/8             | 3/16      | 0.150 | 0.008         | ●     | ●     | ●     | ●     |       |  |
|  | 331 1/2 -B         |                 |           |       | 1/64          | ●     | ●     | ●     | ●     |       |  |
|  | 332 1/2 -B         |                 |           |       | 1/32          | ●     | ●     | ●     | ●     |       |  |
|  | TNGG 3305 1/2 -C   | 3/8             | 3/16      | 0.150 | 0.008         | ●     | ●     | ●     | ●     |       |  |
| 331 1/2 -C                                       | 1/64               |                 |           |       | ●             | ●     | ●     | ●     |       |       |  |
| 332 1/2 -C                                       | 1/32               |                 |           |       | ●             | ●     | ●     | ●     |       |       |  |
| TNGG 431 1/2 -C                                  | 1/2                | 3/16            | 0.203     | 1/64  | ●             | ●     | ●     | ●     |       |       |  |
| 432 1/2 -C                                       |                    |                 |           | 1/32  | ●             | ●     | ●     | ●     |       |       |  |
| TNMG 331 1/2 -C                                  | 3/8                | 3/16            | 0.150     | 1/64  | ●             | ●     | ●     | ●     |       |       |  |
| 332 1/2 -C                                       |                    |                 |           | 1/32  | ●             | ●     | ●     | ●     |       |       |  |
| Medium-Roughing / Low Cutting Resistance         | TNGG 331 1/2 -25R  | 3/8             | 3/16      | 0.150 | 1/64          | ●     | ●     | ●     | ●     |       |  |
|  | 332 1/2 -25R       |                 |           |       | 1/32          | ●     | ●     | ●     | ●     |       |  |
| Finishing  | VNMG 3305PP        | 3/8             | 3/16      | 0.150 | 0.008         | ●     | ●     | ●     | ●     |       |  |
|  | 331PP              |                 |           |       | 1/64          | ●     | ●     | ●     | ●     |       |  |
|  | 332PP              |                 |           |       | 1/32          | ●     | ●     | ●     | ●     |       |  |
|  | 333PP              |                 |           |       | 3/64          | ●     | ●     | ●     | ●     |       |  |
| Finishing  | VNMG 3305GP        | 3/8             | 3/16      | 0.150 | 0.008         | ●     | ●     | ●     | ●     |       |  |
|  | 331GP              |                 |           |       | 1/64          | ●     | ●     | ●     | ●     |       |  |
|  | 332GP              |                 |           |       | 1/32          | ●     | ●     | ●     | ●     |       |  |
| Finishing-Medium                                 | VNMG 331 1/2 -VC   | 3/8             | 3/16      | 0.150 | 1/64          | ●     | ●     | ●     | ●     |       |  |
|  | 332 1/2 -VC        |                 |           |       | 1/32          | ●     | ●     | ●     | ●     |       |  |
|  | 333 1/2 -VC        |                 |           |       | 3/64          | ●     | ●     | ●     | ●     |       |  |

Inserts with Corner-R (RE) dimension expressed with "less than" sign (ex. <0.004, <0.008, etc.) indicates models with minus tolerance for Corner-R (RE) ● : Standard Item Ⓢ : Right-hand Only Ⓛ : Left-hand Only


















# Inserts (Negative)

| Shape<br>Right-hand Shown   | Part Number                 | Dimensions (in) |           |       |               |       | NEW   |       |       |       |  |
|---|-----------------------------|-----------------|-----------|-------|---------------|-------|-------|-------|-------|-------|--|
|   |                             | I.C.            | Thickness | Hole  | Corner-R (RE) | PV710 | PV720 | PV730 | TN610 | TN620 |  |
| <br>Finishing-Medium                                  | VNMG 331VF                  | 3/8             | 3/16      | 0.150 | 1/64          | ●     | ●     | ●     | ●     | ●     |  |
|   | 332VF                       |                 |           |       | 1/32          | ●     | ●     | ●     | ●     | ●     |  |
|   | 333VF                       |                 |           |       | 3/64          | ●     | ●     | ●     | ●     | ●     |  |
| <br>Finishing-Medium                                  | VNMG 331PQ                  | 3/8             | 3/16      | 0.150 | 1/64          | ●     | ●     | ●     | ●     | ●     |  |
|   | 332PQ                       |                 |           |       | 1/32          | ●     | ●     | ●     | ●     | ●     |  |
|   | 333PQ                       |                 |           |       | 3/64          | ●     | ●     | ●     | ●     | ●     |  |
| <br>Finishing-Medium                                  | VNMG 331HQ                  | 3/8             | 3/16      | 0.150 | 1/64          | ●     | ●     | ●     | ●     | ●     |  |
|   | 332HQ                       |                 |           |       | 1/32          | ●     | ●     | ●     | ●     | ●     |  |
|   | 333HQ                       |                 |           |       | 3/64          | ●     | ●     | ●     | ●     | ●     |  |
| <br>Roughing  | VNMG 331                    | 3/8             | 3/16      | 0.150 | 1/64          | ●     | ●     | ●     | ●     | ●     |  |
|   | 332                         |                 |           |       | 1/32          | ●     | ●     | ●     | ●     | ●     |  |
|   |                             |                 |           |       |               |       |       |       |       |       |  |
| <br>Finishing-Medium                                  | VNGG 3305M-SK               | 3/8             | 3/16      | 0.150 | 0.008         | ●     | ●     | ●     | ●     | ●     |  |
|   | 331M-SK                     |                 |           |       | 1/64          | ●     | ●     | ●     | ●     | ●     |  |
| <br>Finishing / Sharp Edge / Polished                 | VNGG 3305MFP-SK             | 3/8             | 3/16      | 0.150 | <0.008        |       | ●     |       |       |       |  |
|   | 331MFP-SK                   |                 |           |       | <1/64         |       | ●     |       |       |       |  |
| <br>Finishing / Sharp Edge / Surface Finish Oriented | VNGG 3305 <sup>R/L</sup> -S | 3/8             | 3/16      | 0.150 | 0.008         |       | ●     |       |       |       |  |
|   | 331 <sup>R/L</sup> -S       |                 |           |       | 1/64          |       | ●     |       |       |       |  |
|   |                             |                 |           |       |               |       |       |       |       |       |  |
| <br>Medium  | VNGG 3305 <sup>R/L</sup>    | 3/8             | 3/16      | 0.150 | 0.008         | ●     | ●     | ●     | ●     | ●     |  |
|   | 331 <sup>R/L</sup>          |                 |           |       | 1/64          | ●     | ●     | ●     | ●     | ●     |  |
|   | 332 <sup>R/L</sup>          |                 |           |       | 1/32          | ●     | ●     | ●     | ●     | ●     |  |
| <br>Finishing / with Wiper Edge                     | WNMG 431WF                  | 1/2             | 3/16      | 0.203 | 1/64          | ●     | ●     | ●     | ●     | ●     |  |
|   | 432WF                       |                 |           |       | 1/32          | ●     | ●     | ●     | ●     | ●     |  |
| <br>Finishing / with Wiper Edge                     | WNMG 431WP                  | 1/2             | 3/16      | 0.203 | 1/64          | ●     | ●     | ●     | ●     | ●     |  |
|   | 432WP                       |                 |           |       | 1/32          | ●     | ●     | ●     | ●     | ●     |  |
| <br>Finishing-Medium / with Wiper Edge              | WNMG 431WE                  | 1/2             | 3/16      | 0.203 | 1/64          | ●     | ●     | ●     | ●     | ●     |  |
|   | 432WE                       |                 |           |       | 1/32          | ●     | ●     | ●     | ●     | ●     |  |
|   | 433WE                       |                 |           |       | 3/64          | ●     | ●     | ●     | ●     | ●     |  |
| <br>Finishing-Medium / with Wiper Edge              | WNMG 431WQ                  | 1/2             | 3/16      | 0.203 | 1/64          | ●     | ●     | ●     | ●     | ●     |  |
|   | 432WQ                       |                 |           |       | 1/32          | ●     | ●     | ●     | ●     | ●     |  |
|   | 433WQ                       |                 |           |       | 3/64          | ●     | ●     | ●     | ●     | ●     |  |
| <br>Finishing                                       | WNMG 4305PP                 | 1/2             | 3/16      | 0.203 | 0.008         | ●     | ●     | ●     | ●     | ●     |  |
|   | 431PP                       |                 |           |       | 1/64          | ●     | ●     | ●     | ●     | ●     |  |
|   | 432PP                       |                 |           |       | 1/32          | ●     | ●     | ●     | ●     | ●     |  |
|   | 433PP                       |                 |           |       | 3/64          | ●     | ●     | ●     | ●     | ●     |  |

| Shape<br>Right-hand Shown   | Part Number | Dimensions (in) |           |       |               |       | NEW   |       |       |       |  |
|---|-------------|-----------------|-----------|-------|---------------|-------|-------|-------|-------|-------|--|
|   |             | I.C.            | Thickness | Hole  | Corner-R (RE) | PV710 | PV720 | PV730 | TN610 | TN620 |  |
| <br>Finishing                      | WNMG 331GP  | 3/8             | 3/16      | 0.150 | 1/64          | ●     | ●     | ●     | ●     | ●     |  |
|   | 332GP       |                 |           |       | 1/32          | ●     | ●     | ●     | ●     | ●     |  |
|   | WNMG 431GP  | 1/2             | 3/16      | 0.203 | 1/64          | ●     | ●     | ●     | ●     | ●     |  |
|   | 432GP       |                 |           |       | 1/32          | ●     | ●     | ●     | ●     | ●     |  |
| <br>Finishing-Medium               | WNMG 431PQ  | 1/2             | 3/16      | 0.203 | 1/64          | ●     | ●     | ●     | ●     | ●     |  |
|   | 432PQ       |                 |           |       | 1/32          | ●     | ●     | ●     | ●     | ●     |  |
| <br>Finishing-Medium               | WNMG 3251HQ | 3/8             | 5/32      | 0.150 | 1/64          | ●     | ●     | ●     | ●     | ●     |  |
|   | WNMG 331HQ  | 3/8             | 3/16      | 0.150 | 1/64          | ●     | ●     | ●     | ●     | ●     |  |
|   | 332HQ       |                 |           |       | 1/32          | ●     | ●     | ●     | ●     | ●     |  |
|   | WNMG 431HQ  | 1/2             | 3/16      | 0.203 | 1/64          | ●     | ●     | ●     | ●     | ●     |  |
| 432HQ   | 1/32        |                 |           |       | ●             | ●     | ●     | ●     | ●     |       |  |
| 433HQ   |             |                 |           | 3/64  | ●             | ●     | ●     | ●     | ●     |       |  |
| <br>Finishing-Medium               | WNMG 431CQ  | 1/2             | 3/16      | 0.203 | 1/64          | ●     | ●     | ●     | ●     | ●     |  |
|   | 432CQ       |                 |           |       | 1/32          | ●     | ●     | ●     | ●     | ●     |  |
|   | 433CQ       |                 |           |       | 3/64          | ●     | ●     | ●     | ●     | ●     |  |
| <br>Medium-Roughing                | WNMG 331GS  | 3/8             | 3/16      | 0.150 | 1/64          | ●     | ●     | ●     | ●     | ●     |  |
|   | 332GS       |                 |           |       | 1/32          | ●     | ●     | ●     | ●     | ●     |  |
|   | WNMG 431GS  | 1/2             | 3/16      | 0.203 | 1/64          | ●     | ●     | ●     | ●     | ●     |  |
| 432GS   | 1/32        |                 |           |       | ●             | ●     | ●     | ●     | ●     |       |  |
| <br>Medium-Roughing                | WNMG 431PG  | 1/2             | 3/16      | 0.203 | 1/64          | ●     | ●     | ●     | ●     | ●     |  |
|   | 432PG       |                 |           |       | 1/32          | ●     | ●     | ●     | ●     | ●     |  |
| <br>Medium-Roughing               | WNMG 431PS  | 1/2             | 3/16      | 0.203 | 1/64          | ●     | ●     | ●     | ●     | ●     |  |
|   | 432PS       |                 |           |       | 1/32          | ●     | ●     | ●     | ●     | ●     |  |
| <br>Roughing                     | WNMG 431    | 1/2             | 3/16      | 0.203 | 1/64          | ●     | ●     | ●     | ●     | ●     |  |
|   | 432         |                 |           |       | 1/32          | ●     | ●     | ●     | ●     | ●     |  |
| <br>Low Carbon Steel / Finishing | WNMG 431XP  | 1/2             | 3/16      | 0.203 | 1/64          | ●     | ●     | ●     | ●     | ●     |  |
|   | 432XP       |                 |           |       | 1/32          | ●     | ●     | ●     | ●     | ●     |  |
| <br>Low Carbon Steel / Medium    | WNMG 431XQ  | 1/2             | 3/16      | 0.203 | 1/64          | ●     | ●     | ●     | ●     | ●     |  |
|   | 432XQ       |                 |           |       | 1/32          | ●     | ●     | ●     | ●     | ●     |  |
|   |             |                 |           |       |               |       |       |       |       |       |  |
| <br>Low Carbon Steel / Roughing  | WNMG 432XS  | 1/2             | 3/16      | 0.203 | 1/32          | ●     | ●     | ●     | ●     | ●     |  |

Inserts with Corner-R (RE) dimension expressed with "less than" sign (ex. <0.004, <0.008, etc.) indicates models with minus tolerance for Corner-R (RE) ● : Standard Item ◐ : Right-hand Only ◑ : Left-hand Only

# Inserts (Positive)

| Shape<br>Left-hand Shown  | Part Number   | Dimensions (in)             |           |       |                  |                 |       |       |       |       |       |   |
|---|---|-----------------------------|-----------|-------|------------------|-----------------|-------|-------|-------|-------|-------|---|
|   |   | I.C.                        | Thickness | Hole  | Corner-R<br>(RE) | Relief<br>Angle | PV710 | PV720 | PV730 | TN610 | TN620 |   |
|    | CCMT 21505WP  | 1/4                         | 3/32      | 0.110 | 0.008            | 7°              | ●     | ●     |       | ●     | ●     |   |
|   | 2151WP  |                             |           |       | 1/64             |                 | ●     | ●     |       | ●     | ●     |   |
|   | 2152WP  |                             |           |       | 1/32             |                 | ●     | ●     |       | ●     | ●     |   |
|   | CCMT 32505WP  | 3/8                         | 5/32      | 0.173 | 0.008            | 7°              | ●     | ●     |       | ●     | ●     |   |
|   | 3251WP  |                             |           |       | 1/64             |                 | ●     | ●     |       | ●     | ●     |   |
|   | 3252WP  |                             |           |       | 1/32             |                 | ●     | ●     |       | ●     | ●     |   |
| Finishing / with Wiper Edge   |   |                             |           |       |                  |                 |       |       |       |       |       |   |
|    | CCMT 21505PP  | 1/4                         | 3/32      | 0.110 | 0.008            | 7°              | ●     | ●     |       | ●     | ●     |   |
|   | 2151PP  |                             |           |       | 1/64             |                 | ●     | ●     |       | ●     | ●     |   |
|   | CCMT 32505PP  | 3/8                         | 5/32      | 0.173 | 0.008            | 7°              | ●     | ●     |       | ●     | ●     |   |
|   | 3251PP  |                             |           |       | 1/64             |                 | ●     | ●     |       | ●     | ●     |   |
|   | 3252PP  |                             |           |       | 1/32             |                 | ●     | ●     |       | ●     | ●     |   |
|   | Finishing   |                             |           |       |                  |                 |       |       |       |       |       |   |
|    | CCMT 21505GK  | 1/4                         | 3/32      | 0.110 | 0.008            | 7°              | ●     | ●     |       | ●     | ●     |   |
|   | 2151GK  |                             |           |       | 1/64             |                 | ●     | ●     |       | ●     | ●     |   |
|   | CCMT 32505GK  | 3/8                         | 5/32      | 0.173 | 0.008            | 7°              | ●     | ●     |       | ●     | ●     |   |
|   | 3251GK  |                             |           |       | 1/64             |                 | ●     | ●     |       | ●     | ●     |   |
|   | CCMT 431GK  | 1/2                         | 3/16      | 0.217 | 1/64             | 7°              | ●     | ●     |       | ●     | ●     |   |
|   | 432GK   |                             |           |       | 1/32             |                 | ●     | ●     |       | ●     | ●     |   |
| Finishing-Medium  |   |                             |           |       |                  |                 |       |       |       |       |       |   |
|   | CCMT 21505HQ  | 1/4                         | 3/32      | 0.110 | 0.008            | 7°              | ●     | ●     |       | ●     | ●     |   |
|   | 2151HQ  |                             |           |       | 1/64             |                 | ●     | ●     |       | ●     | ●     |   |
|   | CCMT 32505HQ  | 3/8                         | 5/32      | 0.173 | 0.008            | 7°              | ●     | ●     |       | ●     | ●     |   |
|   | 3251HQ  |                             |           |       | 1/64             |                 | ●     | ●     |       | ●     | ●     |   |
|   | 3252HQ  |                             |           |       | 1/32             |                 | ●     | ●     |       | ●     | ●     |   |
|   | Finishing-Medium  |                             |           |       |                  |                 |       |       |       |       |       |   |
|  | CCGT 21502  | 1/4                         | 3/32      | 0.110 | 0.004            | 7°              | ●     | ●     |       | ●     | ●     |   |
|   | 21505   |                             |           |       | 0.008            |                 | ●     | ●     |       | ●     | ●     |   |
|   | 2151  |                             |           |       | 1/64             |                 | ●     | ●     |       | ●     | ●     |   |
|   | CCGT 32502  | 3/8                         | 5/32      | 0.173 | 0.004            | 7°              | ●     | ●     |       | ●     | ●     |   |
|   | 32505   |                             |           |       | 0.008            |                 | ●     | ●     |       | ●     | ●     |   |
|   | 3251  |                             |           |       | 1/64             |                 | ●     | ●     |       | ●     | ●     |   |
| Medium  |   |                             |           |       |                  |                 |       |       |       |       |       |   |
|  | CCGT 21502MFP-SK  | 1/4                         | 3/32      | 0.110 | <0.004           | 7°              |       |       |       | ●     |       |   |
|   | 21505MFP-SK   |                             |           |       | <0.008           |                 |       |       |       | ●     |       |   |
|   | 2151MFP-SK  |                             |           |       | <1/64            |                 |       |       |       | ●     |       |   |
|   | CCGT 32502MFP-SK  | 3/8                         | 5/32      | 0.173 | <0.004           | 7°              |       |       |       | ●     |       |   |
|   | 32505MFP-SK   |                             |           |       | <0.008           |                 |       |       |       | ●     |       |   |
|   | 3251MFP-SK  |                             |           |       | <1/64            |                 |       |       |       | ●     |       |   |
| Finishing-Medium Sharp Edge / Polished  |   |                             |           |       |                  |                 |       |       |       |       |       |   |
|  | CCGT 215013MFP-SKS  | 1/4                         | 3/32      | 0.110 | <0.002           | 7°              |       |       |       | ●     |       |   |
|   | 21502MFP-SKS  |                             |           |       | <0.004           |                 |       |       |       | ●     |       |   |
|   | 21505MFP-SKS  |                             |           |       | <0.008           |                 |       |       |       | ●     |       |   |
|   | CCGT 325013MFP-SKS  | 3/8                         | 5/32      | 0.173 | <0.002           | 7°              |       |       |       | ●     |       |   |
|   | 32502MFP-SKS  |                             |           |       | <0.004           |                 |       |       |       | ●     |       |   |
|   | 32505MFP-SKS  |                             |           |       | <0.008           |                 |       |       |       | ●     |       |   |
| 3251MFP-SKS   | <1/64   |                             |           |       | ●                |                 |       |       |       |       |       |   |
| Finishing Sharp Edge / Polished   |   |                             |           |       |                  |                 |       |       |       |       |       |   |
|  | CCET 110902M <sup>PL</sup> -F   | 0.138                       | 0.055     | 0.075 | <0.004           | 7°              | ●     | ●     | ●     | ●     | ●     |   |
|   | 110905M <sup>PL</sup> -F  |                             |           |       | <0.008           |                 | ●     | ●     | ●     | ●     | ●     |   |
|   | 11091M <sup>PL</sup> -F   |                             |           |       | <1/64            |                 | ●     | ●     | ●     | ●     | ●     |   |
|   | CCET 141102M <sup>PL</sup> -F   | 0.169                       | 0.071     | 0.091 | <0.004           | 7°              | ●     | ●     | ●     | ●     | ●     |   |
|   | 141105M <sup>PL</sup> -F  |                             |           |       | <0.008           |                 | ●     | ●     | ●     | ●     | ●     |   |
|   | 14111M <sup>PL</sup> -F   |                             |           |       | <1/64            |                 | ●     | ●     | ●     | ●     | ●     |   |
| Finishing / Sharp Edge  |   |                             |           |       |                  |                 |       |       |       |       |       |   |
|    | CCET 21502M <sup>PL</sup> -U  | 1/4                         | 3/32      | 0.110 | <0.004           | 7°              | ●     | ●     | ●     | ●     | ●     |   |
|   | 21505M <sup>PL</sup> -U   |                             |           |       | <0.008           |                 | ●     | ●     | ●     | ●     | ●     |   |
|   | CCET 32502M <sup>PL</sup> -U  | 3/8                         | 5/32      | 0.173 | <0.004           | 7°              | ●     | ●     | ●     | ●     | ●     |   |
|   | 32505M <sup>PL</sup> -U   |                             |           |       | <0.008           |                 | ●     | ●     | ●     | ●     | ●     |   |
|   | CCGT 21502E <sup>PL</sup> -U  | 1/4                         | 3/32      | 0.110 | 0.004            | 7°              | ●     | ●     | ●     | ●     | ●     |   |
|   | 21505E <sup>PL</sup> -U   |                             |           |       | 0.008            |                 | ●     | ●     | ●     | ●     | ●     |   |
| CCGT 32502E <sup>PL</sup> -U  | 3/8   | 5/32                        | 0.173     | 0.004 | 7°               | ●               | ●     | ●     | ●     | ●     |       |   |
| 32505E <sup>PL</sup> -U   |   |                             |           | 0.008 |                  | ●               | ●     | ●     | ●     | ●     |       |   |
| 3251E <sup>PL</sup> -U  | 1/64  | ●                           | ●         | ●     | ●                | ●               |       |       |       |       |       |   |
| Low Feed / Sharp Edge   |   |                             |           |       |                  |                 |       |       |       |       |       |   |
|    | CPMT 251505PP   | 5/16                        | 3/32      | 0.130 | 0.008            | 11°             | ●     | ●     | ●     | ●     | ●     |   |
|   | 25151PP   |                             |           |       | 1/64             |                 | ●     | ●     | ●     | ●     | ●     |   |
|   | CPMT 3205PP   | 3/8                         | 1/8       | 0.173 | 0.008            | 11°             | ●     | ●     | ●     | ●     | ●     |   |
|   | 321PP   |                             |           |       | 1/64             |                 | ●     | ●     | ●     | ●     | ●     |   |
|   | 322PP   |                             |           |       | 1/32             |                 | ●     | ●     | ●     | ●     | ●     |   |
|   | Finishing   |                             |           |       |                  |                 |       |       |       |       |       |   |
|    | CPMT 25151GP  | 5/16                        | 3/32      | 0.130 | 1/64             | 11°             | ●     | ●     | ●     | ●     | ●     |   |
|   | CPMT 321GP  | 3/8                         | 1/8       | 0.173 | 1/64             | 11°             | ●     | ●     | ●     | ●     | ●     |   |
|   | 322GP   |                             |           |       | 1/32             |                 | ●     | ●     | ●     | ●     | ●     |   |
|   | Finishing   |                             |           |       |                  |                 |       |       |       |       |       |   |
|   |    | CPMH 25151HQ                | 5/16      | 3/32  | 0.138            | 1/64            | 11°   | ●     | ●     | ●     | ●     | ● |
|   |   | 25152HQ                     |           |       |                  | 1/32            |       | ●     | ●     | ●     | ●     | ● |
| CPMH 321HQ  |   | 3/8                         | 1/8       | 0.177 | 1/64             | 11°             | ●     | ●     | ●     | ●     | ●     |   |
| 322HQ   |   |                             |           |       | 1/32             |                 | ●     | ●     | ●     | ●     | ●     |   |
| Finishing-Medium  |   |                             |           |       |                  |                 |       |       |       |       |       |   |
|   |   | CPMH 25151                  | 5/16      | 3/32  | 0.138            | 1/64            | 11°   | ●     | ●     | ●     | ●     | ● |
|   | 25152   | 1/32                        |           |       |                  | ●               |       | ●     | ●     | ●     | ●     |   |
|   | CPMH 321  | 3/8                         | 1/8       | 0.177 | 1/64             | 11°             | ●     | ●     | ●     | ●     | ●     |   |
|   | 322   |                             |           |       | 1/32             |                 | ●     | ●     | ●     | ●     | ●     |   |
|   | Medium  |                             |           |       |                  |                 |       |       |       |       |       |   |
|   |  | CPMT 25151XP                | 5/16      | 3/32  | 0.130            | 1/64            | 11°   | ●     | ●     | ●     | ●     | ● |
| CPMT 321XP  |   | 3/8                         | 1/8       | 0.173 | 1/64             | 11°             | ●     | ●     | ●     | ●     | ●     |   |
| 322XP   |   |                             |           |       | 1/32             |                 | ●     | ●     | ●     | ●     | ●     |   |
| Low Carbon Steel / Finishing  |   |                             |           |       |                  |                 |       |       |       |       |       |   |
|  |   | CPMT 321XQ                  | 3/8       | 1/8   | 0.173            | 1/64            | 11°   | ●     | ●     | ●     | ●     | ● |
|   |   | 322XQ                       |           |       |                  | 1/32            |       | ●     | ●     | ●     | ●     | ● |
|   | CPMT 321XQ  | 3/8                         | 1/8       | 0.173 | 1/64             | 11°             | ●     | ●     | ●     | ●     | ●     |   |
|   | 322XQ   |                             |           |       | 1/32             |                 | ●     | ●     | ●     | ●     | ●     |   |
|   | Low Carbon Steel / Finishing-Medium   |                             |           |       |                  |                 |       |       |       |       |       |   |
|   |  | CPMH 25151 <sup>PL</sup> -Y | 5/16      | 3/32  | 0.138            | 1/64            | 11°   | ●     | ●     | ●     | ●     | ● |
| CPMH 321 <sup>PL</sup> -Y   |   | 3/8                         | 1/8       | 0.177 | 1/64             | 11°             | ●     | ●     | ●     | ●     | ●     |   |
| Finishing-Medium  |   |                             |           |       |                  |                 |       |       |       |       |       |   |
|  |   | DCMX 21505WP                | 1/4       | 3/32  | 0.110            | 0.008           | 7°    | ●     | ●     | ●     | ●     | ● |
|   |   | 2151WP                      |           |       |                  | 1/64            |       | ●     | ●     | ●     | ●     | ● |
|   |   | 2152WP                      |           |       |                  | 1/32            |       | ●     | ●     | ●     | ●     | ● |
|   | DCMX 32505WP  | 3/8                         | 5/32      | 0.173 | 0.008            | 7°              | ●     | ●     | ●     | ●     | ●     |   |
|   | 3251WP  |                             |           |       | 1/64             |                 | ●     | ●     | ●     | ●     | ●     |   |
|   | 3252WP  |                             |           |       | 1/32             |                 | ●     | ●     | ●     | ●     | ●     |   |
| Finishing / with Wiper Edge   |   |                             |           |       |                  |                 |       |       |       |       |       |   |

















Inserts with Corner-R (RE) dimension expressed with "less than" sign (ex. <0.004, <0.008, etc.) indicates models with minus tolerance for Corner-R (RE) ● : Standard Item ◐ : Right-hand Only ◑ : Left-hand Only

Inserts (Positive)

| Shape<br>Left-hand Shown | Part Number      | Dimensions (in)  |           |       |                    |              |       | NEW   |       |        |       |   |
|--------------------------|------------------|------------------|-----------|-------|--------------------|--------------|-------|-------|-------|--------|-------|---|
|                          |                  | I.C.             | Thickness | Hole  | Corner-R (RE)      | Relief Angle | PV710 | PV720 | PV730 | TN610  | TN620 |   |
|                          | DCMT 21505PP     | 1/4              | 3/32      | 0.110 | 0.008              | 7°           | ●     | ●     | ●     | ●      | ●     |   |
|                          | 2151PP           |                  |           |       | 1/64               |              | ●     | ●     | ●     | ●      | ●     |   |
|                          | DCMT 32505PP     | 3/8              | 5/32      | 0.173 | 0.008              | 7°           | ●     | ●     | ●     | ●      | ●     |   |
|                          | 3251PP           |                  |           |       | 1/64               |              | ●     | ●     | ●     | ●      | ●     |   |
| 3252PP                   | 1/32             | ●                | ●         | ●     | ●                  | ●            |       |       |       |        |       |   |
|                          | DCMT 21505GP     | 1/4              | 3/32      | 0.110 | 0.008              | 7°           | ●     | ●     | ●     | ●      | ●     |   |
|                          | 2151GP           |                  |           |       | 1/64               |              | ●     | ●     | ●     | ●      | ●     |   |
|                          | DCMT 3251GP      | 3/8              | 5/32      | 0.016 | 1/64               | 7°           | ●     | ●     | ●     | ●      | ●     |   |
|                          | 3252GP           |                  |           |       | 1/32               |              | ●     | ●     | ●     | ●      | ●     |   |
|                          | DCMT 21505GK     | 1/4              | 3/32      | 0.110 | 0.008              | 7°           | ●     | ●     | ●     | ●      | ●     |   |
|                          | 2151GK           |                  |           |       | 1/64               |              | ●     | ●     | ●     | ●      | ●     |   |
|                          | 2152GK           |                  |           |       | 1/32               |              | ●     | ●     | ●     | ●      | ●     |   |
|                          | DCMT 32505GK     | 3/8              | 5/32      | 0.173 | 0.008              | 7°           | ●     | ●     | ●     | ●      | ●     |   |
|                          | 3251GK           |                  |           |       | 1/64               |              | ●     | ●     | ●     | ●      | ●     |   |
|                          | 3252GK           |                  |           |       | 1/32               |              | ●     | ●     | ●     | ●      | ●     |   |
|                          | DCMT 21505HQ     | 1/4              | 3/32      | 0.110 | 0.008              | 7°           | ●     | ●     | ●     | ●      | ●     |   |
|                          | 2151HQ           |                  |           |       | 1/64               |              | ●     | ●     | ●     | ●      | ●     |   |
|                          | 2152HQ           |                  |           |       | 1/32               |              | ●     | ●     | ●     | ●      | ●     |   |
|                          | DCMT 32505HQ     |                  |           |       | 3/8                |              | 5/32  | 0.173 | 0.008 | 7°     | ●     | ● |
| 3251HQ                   | 1/64             | ●                | ●         | ●     |                    | ●            |       |       | ●     |        |       |   |
| 3252HQ                   | 1/32             | ●                | ●         | ●     | ●                  | ●            |       |       |       |        |       |   |
|                          | DCGT 21502       | 1/4              | 3/32      | 0.110 | 0.004              | 7°           | ●     | ●     | ●     | ●      | ●     |   |
|                          | 21505            |                  |           |       | 0.008              |              | ●     | ●     | ●     | ●      | ●     |   |
|                          | 2151             |                  |           |       | 1/64               |              | ●     | ●     | ●     | ●      | ●     |   |
|                          | DCGT 32502       |                  |           |       | 3/8                |              | 5/32  | 0.173 | 0.004 | 7°     | ●     | ● |
| 32505                    | 0.008            | ●                | ●         | ●     |                    | ●            |       |       | ●     |        |       |   |
| 3251                     | 1/64             | ●                | ●         | ●     |                    | ●            |       |       | ●     |        |       |   |
|                          | DCMT 3252        | 3/8              | 5/32      | 0.173 | 1/32               | 7°           | ●     | ●     | ●     | ●      | ●     |   |
|                          |                  | DCGT 21502MFP-SK | 1/4       | 3/32  | 0.110              | <0.004       | 7°    | ●     | ●     | ●      | ●     | ● |
| 21505MFP-SK              |                  | <0.008           |           |       |                    | ●            |       | ●     | ●     | ●      | ●     |   |
| 2151MFP-SK               |                  | <1/64            |           |       |                    | ●            |       | ●     | ●     | ●      | ●     |   |
|                          | DCGT 32502MFP-SK | 3/8              | 5/32      | 0.173 | <0.004             | 7°           | ●     | ●     | ●     | ●      | ●     |   |
|                          | 32505MFP-SK      |                  |           |       | <0.008             |              | ●     | ●     | ●     | ●      | ●     |   |
|                          | 3251MFP-SK       |                  |           |       | <1/64              |              | ●     | ●     | ●     | ●      | ●     |   |
|                          |                  |                  |           |       | DCGT 215013MFP-SKS |              | 1/4   | 3/32  | 0.110 | <0.002 | 7°    | ● |
| 21502MFP-SKS             |                  | <0.004           | ●         | ●     | ●                  | ●            |       |       |       | ●      |       |   |
| 21505MFP-SKS             |                  | <0.008           | ●         | ●     | ●                  | ●            |       |       |       | ●      |       |   |
| DCGT 325013MFP-SKS       |                  | 3/8              | 5/32      | 0.173 | <0.002             | 7°           |       |       |       | ●      |       | ● |
| 32502MFP-SKS             | <0.004           |                  |           |       | ●                  |              | ●     | ●     | ●     | ●      |       |   |
| 32505MFP-SKS             | <0.008           |                  |           |       | ●                  |              | ●     | ●     | ●     | ●      |       |   |
| 3251MFP-SKS              | <1/64            | ●                | ●         | ●     | ●                  | ●            |       |       |       |        |       |   |
|                          | DCMT 2151XP      | 1/4              | 3/32      | 0.110 | 1/64               | 7°           | ●     | ●     | ●     | ●      | ●     |   |
|                          | DCMT 32505XP     | 3/8              | 5/32      | 0.173 | 0.008              | 7°           | ●     | ●     | ●     | ●      | ●     |   |
|                          |                  |                  |           |       | 1/64               |              | ●     | ●     | ●     | ●      | ●     |   |
| 3252XP                   | 1/32             | ●                | ●         | ●     | ●                  | ●            |       |       |       |        |       |   |

| Shape<br>Left-hand Shown | Part Number                   | Dimensions (in) |           |       |               |              |       | NEW   |       |       |       |   |
|--------------------------|-------------------------------|-----------------|-----------|-------|---------------|--------------|-------|-------|-------|-------|-------|---|
|                          |                               | I.C.            | Thickness | Hole  | Corner-R (RE) | Relief Angle | PV710 | PV720 | PV730 | TN610 | TN620 |   |
|                          | DCMT 3251XQ                   | 3/8             | 5/32      | 0.173 | 1/64          | 7°           | ●     | ●     | ●     | ●     | ●     |   |
|                          | 3252XQ                        |                 |           |       | 1/32          |              | ●     | ●     | ●     | ●     | ●     |   |
|                          | DCET 21502M <sup>PL</sup> -F  | 1/4             | 3/32      | 0.110 | <0.004        | 7°           | ●     | ●     | ●     | ●     | ●     |   |
|                          | 21505M <sup>PL</sup> -F       |                 |           |       | <0.008        |              | ●     | ●     | ●     | ●     | ●     |   |
|                          | 2151M <sup>PL</sup> -F        |                 |           |       | <1/64         |              | ●     | ●     | ●     | ●     | ●     |   |
|                          | DCET 32502M <sup>PL</sup> -F  | 3/8             | 5/32      | 0.173 | <0.004        | 7°           | ●     | ●     | ●     | ●     | ●     |   |
|                          | 32505M <sup>PL</sup> -F       |                 |           |       | <0.008        |              | ●     | ●     | ●     | ●     | ●     |   |
| 3251M <sup>PL</sup> -F   | <1/64                         | ●               | ●         | ●     | ●             | ●            |       |       |       |       |       |   |
|                          | DCET 21502MF <sup>PL</sup> -U | 1/4             | 3/32      | 0.110 | <0.004        | 7°           | ●     | ●     | ●     | ●     | ●     |   |
|                          | 21505MF <sup>PL</sup> -U      |                 |           |       | <0.008        |              | ●     | ●     | ●     | ●     | ●     |   |
|                          | DCET 32502MF <sup>PL</sup> -U | 3/8             | 5/32      | 0.173 | <0.004        | 7°           | ●     | ●     | ●     | ●     | ●     |   |
|                          | 32505MF <sup>PL</sup> -U      |                 |           |       | <0.008        |              | ●     | ●     | ●     | ●     | ●     |   |
|                          | DCGT 21502E <sup>PL</sup> -U  |                 |           |       | 1/4           |              | 3/32  | 0.110 | 0.004 | 7°    | ●     | ● |
| 21505E <sup>PL</sup> -U  | 0.008                         | ●               | ●         | ●     |               | ●            |       |       | ●     |       |       |   |
| 2151E <sup>PL</sup> -U   | 1/64                          | ●               | ●         | ●     |               | ●            |       |       | ●     |       |       |   |
|                          | DCGT 32502E <sup>PL</sup> -U  | 3/8             | 5/32      | 0.173 | 0.004         | 7°           | ●     | ●     | ●     | ●     | ●     |   |
|                          | 32505E <sup>PL</sup> -U       |                 |           |       | 0.008         |              | ●     | ●     | ●     | ●     | ●     |   |
|                          | 3251E <sup>PL</sup> -U        |                 |           |       | 1/64          |              | ●     | ●     | ●     | ●     | ●     |   |
|                          | DCET 32502MF <sup>PL</sup> -J | 3/8             | 5/32      | 0.173 | <0.004        | 7°           | ●     | ●     | ●     | ●     | ●     |   |
|                          | 32505MF <sup>PL</sup> -J      |                 |           |       | <0.008        |              | ●     | ●     | ●     | ●     | ●     |   |
|                          | DCGT 32502E <sup>PL</sup> -J  | 3/8             | 5/32      | 0.173 | 0.004         | 7°           | ●     | ●     | ●     | ●     | ●     |   |
|                          | 32505E <sup>PL</sup> -J       |                 |           |       | 0.008         |              | ●     | ●     | ●     | ●     | ●     |   |
|                          | 3251E <sup>PL</sup> -J        |                 |           |       | 1/64          |              | ●     | ●     | ●     | ●     | ●     |   |
|                          | RCMX 1003M0                   | 0.394           | 1/8       | 0.142 | -             | 7°           | ●     | ●     | ●     | ●     | ●     |   |
|                          | RCMX 1204M0                   | 0.472           | 3/16      | 0.165 | -             | 7°           | ●     | ●     | ●     | ●     | ●     |   |
|                          | SCMT 3251HQ                   | 3/8             | 5/32      | 0.173 | 1/64          | 7°           | ●     | ●     | ●     | ●     | ●     |   |
|                          | 3252HQ                        |                 |           |       | 1/32          |              | ●     | ●     | ●     | ●     | ●     |   |
|                          | SPMR 321G                     | 3/8             | 1/8       | -     | 1/64          | 11°          | ●     | ●     | ●     | ●     | ●     |   |
|                          | 322G                          |                 |           |       | 1/32          |              | ●     | ●     | ●     | ●     | ●     |   |
|                          | SPMR 421G                     | 1/2             | 1/8       | -     | 1/64          | 11°          | ●     | ●     | ●     | ●     | ●     |   |
|                          | 422G                          |                 |           |       | 1/32          |              | ●     | ●     | ●     | ●     | ●     |   |
|                          | SPGR 321 <sup>PL</sup>        | 3/8             | 1/8       | -     | 1/64          | 11°          | ●     | ●     | ●     | ●     | ●     |   |
|                          | 322 <sup>PL</sup>             |                 |           |       | 1/32          |              | ●     | ●     | ●     | ●     | ●     |   |
|                          | SPGR 421 <sup>PL</sup>        | 1/2             | 1/8       | -     | 1/64          | 11°          | ●     | ●     | ●     | ●     | ●     |   |
|                          | 422 <sup>PL</sup>             |                 |           |       | 1/32          |              | ●     | ●     | ●     | ●     | ●     |   |
|                          | SPM 422                       | 1/2             | 1/8       | -     | 1/32          | 11°          | ●     | ●     | ●     | ●     | ●     |   |
|                          | 423                           |                 |           |       | 3/64          |              | ●     | ●     | ●     | ●     | ●     |   |

Inserts with Corner-R (RE) dimension expressed with "less than" sign (ex. <0.004, <0.008, etc.) indicates models with minus tolerance for Corner-R (RE) ● : Standard Item ⊕ : Right-hand Only ⊖ : Left-hand Only

| Shape<br>Left-hand Shown  | Part Number  | Dimensions (in) |           |       |                  |                 |         |                 |       |       |                 | Shape<br>Left-hand Shown   | Part Number   | Dimensions (in) |   |           |                  |                 |       |       |       |       |       |   |
|---|--|-----------------|-----------|-------|------------------|-----------------|---------|-----------------|-------|-------|-----------------|--|---------------|-----------------|---|-----------|------------------|-----------------|-------|-------|-------|-------|-------|---|
|   |  | I.C.            | Thickness | Hole  | Corner-R<br>(RE) | Relief<br>Angle | PV710   | PV720           | PV730 | TN610 | TN620           |  |               | I.C.            | Thickness   | Hole      | Corner-R<br>(RE) | Relief<br>Angle | PV710 | PV720 | PV730 | TN610 | TN620 |   |
| <br>Finishing                    | TBMT 12105DP   | 5/32            | 1/16      | 0.091 | 0.008            | 5°              | ●       | ●               | ●     | ●     | ●               | <br>Low Carbon Steel / Finishing        | TPMT 18151XP  | 7/32            | 3/32  | 0.110     | 1/64             | 11°             | ●     | ●     | ●     | ●     | ●     |   |
|   | 1211DP   |                 |           |       | 1/64             |                 | ●       | ●               | ●     | ●     | ●               |  | TPMT 221XP    | 1/4             | 1/8   | 0.130     | 1/64             | 11°             | ●     | ●     | ●     | ●     | ●     |   |
| <br>Finishing                    | TBGT 12105 5/8   | 5/32            | 1/16      | 0.091 | 0.008            | 5°              | ●       | ●               | ●     | ●     | ●               | <br>Low Carbon Steel / Finishing        | TPMT 222XP    |                 |   |           | 3/8              |                 | 1/8   | 0.173 | 1/64  | 11°   | ●     | ● |
|   | 1211 5/8   |                 |           |       | 1/64             |                 | ●       | ●               | ●     | ●     | ●               |  | TPMT 321XP    | 1/4             | 1/8   | 0.130     |                  | 1/64            |       |       | 11°   |       | ●     | ● |
| <br>Finishing / with Wiper Edge  | TCMX 18151WP   | 7/32            | 3/32      | 0.098 | 1/64             | 7°              | ●       | ●               | ●     | ●     | ●               | <br>Low Carbon Steel / Finishing-Medium | TPMT 322XP    |                 |   |           | 3/8              | 1/8             | 0.173 | 1/64  |       | 11°   | ●     | ● |
|   | TCMX 2151WP  | 1/4             | 3/32      | 0.110 | 1/64             | 7°              | ●       | ●               | ●     | ●     | ●               |  | TPMT 221XQ    | 1/4             | 1/8   | 0.130     |                  |                 |       | 1/64  | 11°   |       | ●     | ● |
| <br>Finishing-Medium             | TCMT 181505HQ  | 7/32            | 3/32      | 0.098 | 0.008            | 7°              | ●       | ●               | ●     | ●     | ●               | <br>Low Carbon Steel / Finishing-Medium | TPMT 221XQ    |                 |   |           | 1/4              | 1/8             | 0.130 | 1/64  |       | 11°   | ●     | ● |
|   | 18151HQ  |                 |           |       | 1/64             |                 | ●       | ●               | ●     | ●     | ●               |  | TPMT 222XQ    | 3/8             | 1/8   | 0.173     |                  |                 |       | 1/64  | 11°   |       | ●     | ● |
|   | TCMT 21505HQ   | 1/4             | 3/32      | 0.110 | 0.008            | 7°              | ●       | ●               | ●     | ●     | ●               |  | TPMT 321XQ    |                 |   |           | 1/4              | 1/8             | 0.130 | 1/64  |       | 11°   | ●     | ● |
|   | 2151HQ   |                 |           |       | 1/64             |                 | ●       | ●               | ●     | ●     | ●               |  | TPMT 322XQ    | 3/8             | 1/8   | 0.173     |                  |                 |       | 1/64  | 11°   |       | ●     | ● |
|   | 2152HQ   | 1/32            | ●         | ●     | ●                | ●               | ●       | TPGH 151505 5/8 | 3/16  | 3/32  | 0.091           |  | 0.008         |                 |   |           | 11°              | ●               | ●     | ●     |       | ●     | ●     |   |
|   | TCMT 3251HQ  | 3/8             | 5/32      | 0.173 | 1/64             | 7°              | ●       | ●               |       |       |                 |  | ●             | ●               | ●   | 15151 5/8 |                  | 1/64            | ●     | ●     | ●     | ●     | ●     |   |
| 3252HQ  | 1/32   |                 |           |       | ●                |                 | ●       | ●               | ●     | ●     | TPGH 181505 5/8 | 7/32   | 3/32          | 0.118           | 0.008   | 11°       | ●                | ●               | ●     | ●     | ●     |       |       |   |
| <br>Finishing / with Wiper Edge | TPMX 181505WP  | 7/32            | 3/32      | 0.110 | 0.008            | 11°             | ●       | ●               | ●     | ●     | ●               |  |               |                 | <br>Finishing |           | TPGH 21505 5/8   | 1/4             | 3/32  | 0.138 | 0.008 | 11°   | ●     | ● |
|   | 18151WP  |                 |           |       | 1/64             |                 | ●       | ●               | ●     | ●     | ●               | 18151 5/8  | 1/64          | ●               |   | ●         | ●                |                 |       |       | ●     |       | ●     |   |
|   | 18152WP  |                 |           |       | 1/32             |                 | ●       | ●               | ●     | ●     | ●               | TPGH 181505 5/8  | 7/32          | 3/32            |   | 0.118     | 0.008            | 11°             | ●     | ●     | ●     | ●     | ●     |   |
|   | TPMX 2205WP  | 1/4             | 1/8       | 0.130 | 0.008            | 11°             | ●       | ●               | ●     | ●     | ●               | 18151 5/8  |               |                 |   |           | 1/64             |                 | ●     | ●     | ●     | ●     | ●     |   |
|   | 221WP  |                 |           |       | 1/64             |                 | ●       | ●               | ●     | ●     | ●               | TPGH 21505 5/8   | 1/4           | 3/32            |   | 0.138     | 0.008            | 11°             | ●     | ●     | ●     | ●     | ●     |   |
|   | 222WP  |                 |           |       | 1/32             |                 | ●       | ●               | ●     | ●     | ●               | 2151 5/8   |               |                 |   |           | 1/64             |                 | ●     | ●     | ●     | ●     | ●     |   |
| <br>Finishing                  | TPMT 181505PP  | 7/32            | 3/32      | 0.110 | 0.008            | 11°             | ●       | ●               | ●     | ●     | ●               | <br>Medium                            | TPGH 2205 5/8 | 1/4             | 1/8   | 0.130     | 0.008            | 11°             | ●     | ●     | ●     | ●     | ●     |   |
|   | 18151PP  |                 |           |       | 1/64             |                 | ●       | ●               | ●     | ●     | ●               |  | 221 5/8       |                 |   |           | 1/64             |                 | ●     | ●     | ●     | ●     | ●     |   |
|   | TPMT 2205PP  | 1/4             | 1/8       | 0.130 | 0.008            | 11°             | ●       | ●               | ●     | ●     | ●               |  | 222 5/8       | 1/32            | ●   | ●         | ●                | ●               | ●     |       |       |       |       |   |
|   | 221PP  |                 |           |       | 1/64             |                 | ●       | ●               | ●     | ●     | ●               |  | TPGH 3205 5/8 | 3/8             | 1/8   | 0.177     | 0.008            | 11°             | ●     | ●     | ●     | ●     | ●     |   |
| 222PP   | 1/32   | ●               | ●         | ●     | ●                | ●               | 321 5/8 | 1/64            | ●     | ●     | ●               | ●  | ●             |                 |   |           |                  |                 |       |       |       |       |       |   |
| <br>Finishing                  | TPMT 181505GP  | 7/32            | 3/32      | 0.110 | 0.008            | 11°             | ●       | ●               | ●     | ●     | ●               | <br>Without Chipbreaker               | TPGH 321 5/8  | 3/8             | 1/8   | 0.177     | 1/64             | 11°             | ●     | ●     | ●     | ●     | ●     |   |
|   | 18151GP  |                 |           |       | 1/64             |                 | ●       | ●               | ●     | ●     | ●               |  | 322 5/8       |                 |   |           | 1/32             |                 | ●     | ●     | ●     | ●     | ●     |   |
|   | TPMT 221GP   | 1/4             | 1/8       | 0.130 | 1/64             | 11°             | ●       | ●               | ●     | ●     | ●               |  | TPGB 15151    | 3/16            | 3/32  | 0.091     | 1/64             | 11°             | ●     | ●     | ●     | ●     | ●     |   |
|   | 222GP  |                 |           |       | 1/32             |                 | ●       | ●               | ●     | ●     | ●               |  | TPGB 18151    | 7/32            | 3/32  | 0.118     | 1/64             | 11°             | ●     | ●     | ●     | ●     | ●     |   |
|   | <br>Finishing | TPMT 321GP      | 3/8       | 1/8   | 0.173            | 1/64            | 11°     | ●               | ●     | ●     | ●               |  | ●             | TPGB 2151       | 1/4   | 3/32      | 0.138            | 1/64            | 11°   | ●     | ●     | ●     | ●     | ● |
|   |  | TPMT 181505HQ   | 7/32      | 3/32  | 0.110            | 0.008           | 11°     | ●               | ●     | ●     | ●               |  | ●             | TPGB 2205       | 1/4   | 1/8       | 0.130            | 0.008           | 11°   | ●     | ●     | ●     | ●     | ● |
| 18151HQ   |  | 1/64            |           |       |                  | ●               |         | ●               | ●     | ●     | ●               | 221  | 1/64          | ●               |   |           |                  | ●               |       | ●     | ●     | ●     |       |   |
| TPMT 2205HQ   |  | 1/4             | 1/8       | 0.130 | 0.008            | 11°             | ●       | ●               | ●     | ●     | ●               | 222  | 1/32          | ●               | ●   | ●         | ●                | ●               |       |       |       |       |       |   |
| 221HQ   |  |                 |           |       | 1/64             |                 | ●       | ●               | ●     | ●     | ●               | TPGB 321   | 3/8           | 1/8             | 0.177   | 1/64      | 11°              | ●               | ●     | ●     | ●     | ●     |       |   |
| 222HQ   |  | 1/32            | ●         | ●     | ●                | ●               | ●       | 322             | 1/32  | ●     | ●               | ●  |               |                 |   | ●         |                  | ●               |       |       |       |       |       |   |
| <br>Finishing-Medium           | TPMT 3205HQ  | 3/8             | 1/8       | 0.173 | 0.008            | 11°             | ●       | ●               | ●     | ●     | ●               | TPMR 221GP   | 1/4           | 1/8             | -   | 1/64      | 11°              | ●               | ●     | ●     | ●     | ●     |       |   |
|   | 321HQ  |                 |           |       | 1/64             |                 | ●       | ●               | ●     | ●     | ●               | TPMR 321GP   | 3/8           | 1/8             | -   | 1/64      | 11°              | ●               | ●     | ●     | ●     | ●     |       |   |
|   | 322HQ  | 1/32            | ●         | ●     | ●                | ●               | ●       | TPMR 221HQ      | 1/4   | 1/8   | -               | 1/64   | 11°           | ●               | ●   | ●         | ●                | ●               |       |       |       |       |       |   |
|   |  |                 |           |       |                  |                 |         | 222HQ           |       |       |                 | 1/32   |               | ●               | ●   | ●         | ●                | ●               |       |       |       |       |       |   |

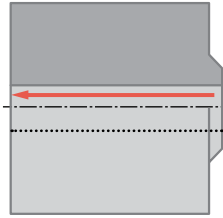
Inserts with Corner-R (RE) dimension expressed with "less than" sign (ex. <0.004, <0.008, etc.) indicates models with minus tolerance for Corner-R (RE) ● : Standard Item ◐ : Right-hand Only ◑ : Left-hand Only



## Case Studies

### Oil Pump - Sintered Steel

Vc = 530 sfm  
D.O.C. = 0.008"  
f = 0.004 ipr  
Wet  
TPGH18151L



Tool Life

**PV720**

Avg. **800 pcs/edge**

x 2.7  
Tool Life

Competitor P  
(PVD Coated Cermet)

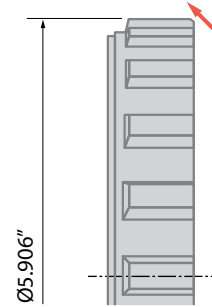
**300 pcs/edge**

PV720 shows 2.7 times longer tool life compared to Competitor P (PVD Coated Cermet).

(User Evaluation)

### Ring Gear - Special Alloy Steel

Vc = 980 sfm  
D.O.C. = 0.008"  
f = 0.008 ~ 0.016 ipr  
Wet  
WNMG431PP



Tool Life

**PV720**

Avg. **10,000 pcs/edge**

x 3.3  
Tool Life

Competitor Q  
(PVD Coated Cermet)

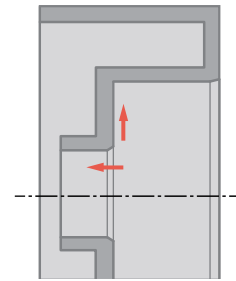
**3,000 pcs/edge**

PV720 shows 3.3 times longer tool life compared to Competitor Q (PVD Coated Cermet).

(User Evaluation)

### Drum - 1030

Vc = 980 sfm  
D.O.C. = 0.002"  
f = 0.008 ~ 0.012 ipr  
Wet  
CNMG332HQ



Tool Life

**TN620**

**800 pcs/edge**

x 1.1  
~ 1.4  
Tool Life

Competitor M  
(Cermet)

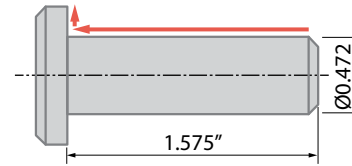
**550 ~ 750 pcs/edge**

TN620 shows 1.1 to 1.4 times longer tool life compared to Competitor M (Cermet).

(User Evaluation)

### Yoke Pin - 1035

Vc = 250 sfm  
D.O.C. = 0.006"  
f = 0.005 ipr  
Wet  
TNGG331R-S



Tool Life

**TN620**

**450 pcs/edge**

x 1.5  
Tool Life

Competitor N  
(Cermet)

**300 pcs/edge**

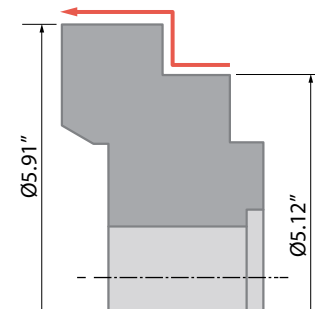
TN620 shows 1.5 times longer tool life compared to Competitor N (Cermet).

Stable surface roughness and shiny surface finish. No chipping and stable machining.

(User Evaluation)

### Piston - 1045 Normalized

Vc = 1480 sfm  
D.O.C. = 0.006" ~ 0.008"  
f = 0.002 ipr  
Wet (Water Soluble)  
CNMG431PP



Tool Life

**PV710**

**200 pcs/edge**

x 2.2  
Tool Life

Conventional U  
(PVD Coated Cermet)

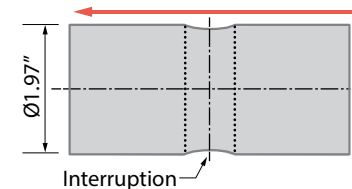
**90 pcs/edge**

PV710 shows 2.2 times longer tool life compared to Conventional U (PVD Coated Cermet).

(User Evaluation)

### Piston - 4115

Vc = 820 sfm  
D.O.C. = 0.004" ~ 0.008"  
f = 0.003 ipr  
Wet (Water Soluble)  
CNMG431PP



Tool Life

**PV710**

**250 pcs/edge**

x 1.3  
Tool Life

Competitor O  
(PVD Coated Cermet)

**180 pcs/edge**

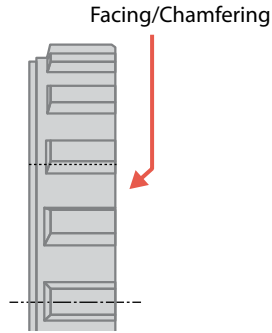
PV710 shows 1.3 times longer tool life compared to Competitor O (PVD Coated Cermet).

(User Evaluation)

## Case Studies

### Sprocket 4118H

Vc = 460 sfm  
 f = 0.0035 ipr  
 D.O.C. = 0.006"-0.012" Wet  
 TPMT221PP PV730



Tool Life

**PV730**

**300 pcs/edge (Stable)**

Stability



Competitor Q  
 (PVD Coated Cermet)

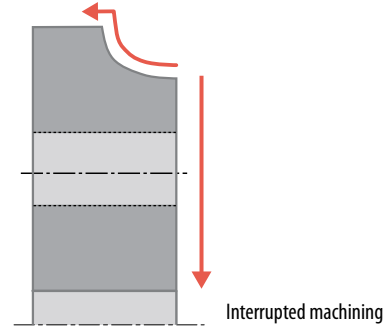
**300 pcs/edge (Unstable)**

Competitor Q (PVD coated cermet) showed unstable machining with adhesion to the insert and chipping.

PV730 maintained a good cutting edge after stable machining of the same number of parts as Competitor Q. (User Evaluation)

### Flange 1050

Vc = 480-760 sfm  
 f = 0.0087 ipr  
 D.O.C. = 0.008" Wet  
 TNMG332HQ PV730



Tool Life

**PV730**

**500 pcs/edge**

Tool Life



Competitor R  
 (PVD Coated Cermet)

**200 pcs/edge**

PV730 shows 2.5 times longer tool life compared to Competitor R (PVD Coated Cermet) with superior surface finish. (User Evaluation)



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