

THE NEW VALUE FRONTIER



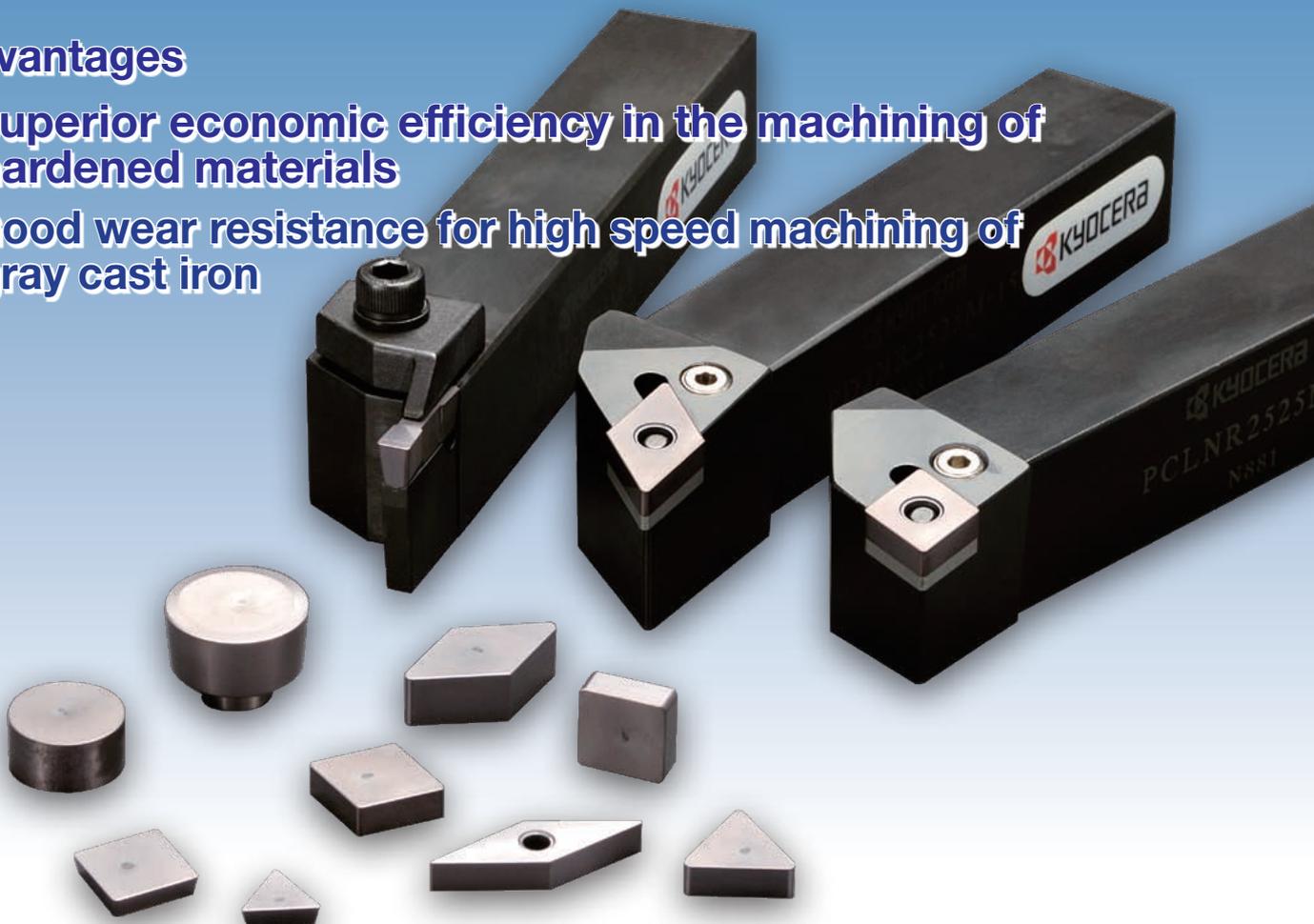
MEGACOAT Ceramic

PT600M

New MEGACOAT ceramic achieves significantly longer tool life, approaching that of CBN

Advantages

- Superior economic efficiency in the machining of hardened materials
- Good wear resistance for high speed machining of gray cast iron



ADVANCING PRODUCTIVITY

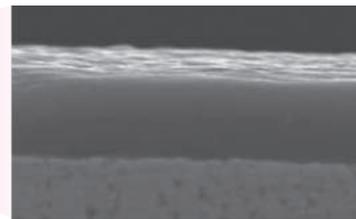
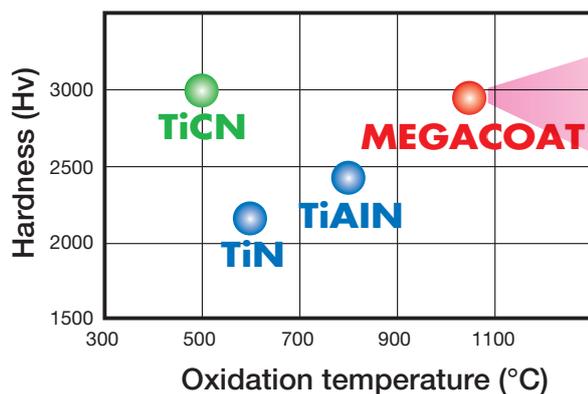
■ Advantages

1. With the use of MEGACOAT, it achieves a significantly longer tool life approaching that of CBN
2. Achieves superior economic efficiency in the machining of hardened materials
3. Good wear resistance for high speed machining of gray cast iron

■ MEGACOAT

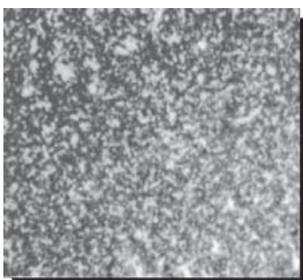
Special PVD coating

Controls crater wear and achieves stable machining with superior oxidation resistance

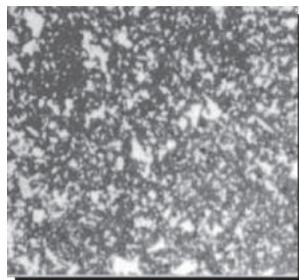


High oxidation resistance ($\geq 1000^{\circ}\text{C}$)
→ Controlling oxidation wear

■ Ceramic substrate characteristics



PT600M



Conventional Black Ceramic

PT600M achieves miniaturization of the structure

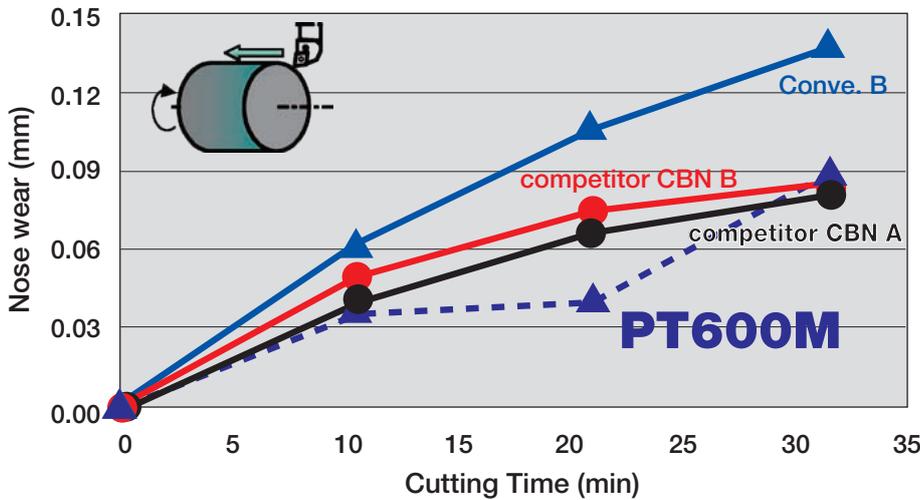
- Compared to conventional black ceramic, the hardness, fracture toughness strength and oxidation resistance have been improved to achieve longer tool life
- Sudden fracturing is controlled through miniaturization of the ceramic structure

Static property comparison of PT600M and Conve. A

| grade | Hv (GPa) | K_{IC} (MPam ^{1/2}) | Strength (MPa) | Oxidation resistance ^{*1} (mg/cm ²) |
|----------|----------|---------------------------------|----------------|--|
| PT600M | 20.0 | 4.1 | 1000 | 2.1 |
| Conve. A | 19.0 | 4.3 | 850 | 2.8 |

*Oxidation resistance: The increase in weight per unit area when atmospherically oxidized for one hour at 1200°C

■Wear comparison (for machining of hardened materials)

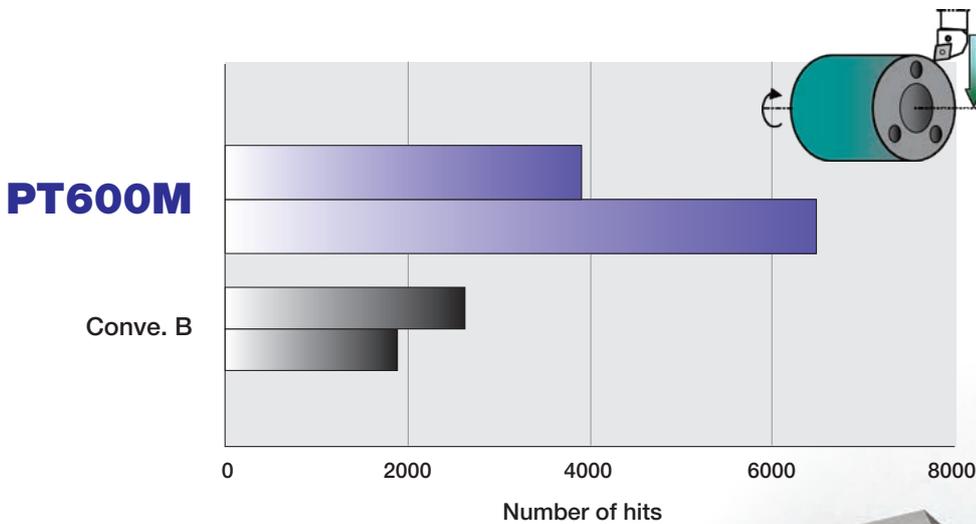


Cutting condition:
 $V_c=100\text{m/min}$, $a_p=0.2\text{mm}$,
 $f=0.1\text{mm/rev}$, Wet
 Work material:
 SCM415H(Hardened) 58~62HRC

(Internal evaluation)

The wear resistance of PT600M is similar to that of competitor's CBN A and B for low speed machining of hardened materials

■Chipping resistance comparison (for machining of hardened materials)



Cutting condition:
 $V_c=150\text{m/min}$, $a_p=0.2\text{mm}$,
 $f=0.15\text{mm/rev}$, Dry
 Work material:
 SCM415H (Hardened) 58~62HRC

(Internal evaluation)

Chipping resistance is significantly improved compared to conventional black ceramic.



Ceramic structure miniaturization plus MEGACOAT allow PT600M to achieve significantly longer tool life for machining of hardened materials and gray cast iron.

Case study

| | |
|--|---------------------|
| SUJ2(Hardened) | |
| <ul style="list-style-type: none"> • Bearing • $V_c=200\text{m/min}$ • $a_p=0.3\text{mm}$ • $f=0.15\text{mm/rev.}$ • Wet • DNGA150412S02025 (special order) | |
| PT600M | 84min/insert |
| Competitor C (CBN) | 40min/insert |
| <p>Under cutting conditions equivalent to those of Competitor C (CBN), the tool life of PT600M was approximately twice as long and cost was reduced by about 70%</p> | |
| (Evaluation by the user) | |

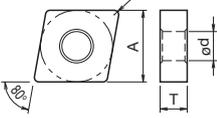
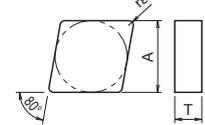
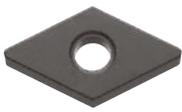
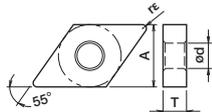
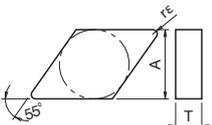
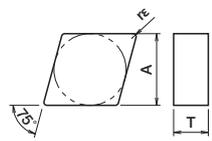
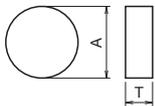


Edge preparation

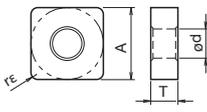
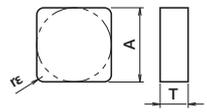
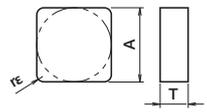
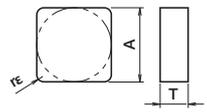
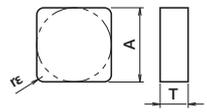
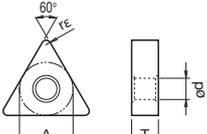
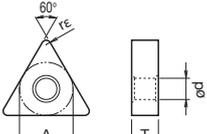
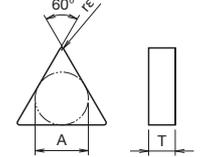
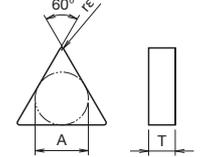
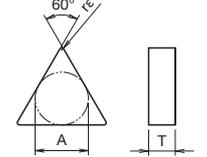
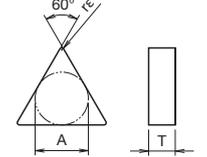
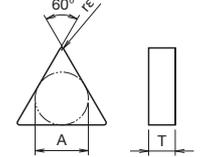
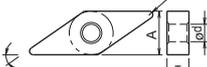
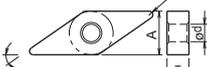
| Symbol/Cutting edge Condition | Classification | | Example | | Shape |
|-------------------------------------|----------------|---------------------|---------|-----------------------------------|-------|
| | gray cast iron | high hard materials | | | |
| T Chamfered Cutting Edge | ★ | ☆ | T00520 | 0.05mm×20° Chamfered Cutting Edge | |
| | | | T00820 | 0.08mm×20° Chamfered Cutting Edge | |
| | | | T01020 | 0.10mm×20° Chamfered Cutting Edge | |
| | | | T02025 | 0.20mm×25° Chamfered Cutting Edge | |
| S Chamfered and hone | ☆ | ★ | S00820 | 0.08mm×20° Chamfer and hone | |
| | | | S02025 | 0.20mm×25° Chamfer and hone | |
| K Double Chamfered Cutting Edges | | ★ | K15015 | 1.50mm×15° Chamfered Cutting Edge | |
| | | | K20003 | 2.00mm×3° Chamfered Cutting Edge | |
| P Double Chamfered and hone | | | P20015 | 2.00mm×15° Chamfered and hone | |

★:1st. Choice ☆:2nd. Choice

■ Stock Items(Negative Inserts)

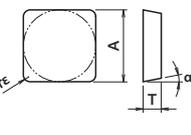
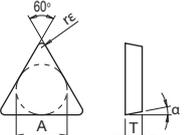
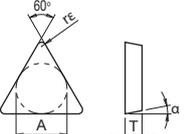
| Shape | | Description | Stock | Edge Preparation | Dimension(mm) | | | | | |
|---|---|---|---|-------------------|---------------|--------|-------|------|---|---|
| | | | | | A | T | ød | rε | | |
|  |  | CNGA 120404S02025 | ● | S02025 | 12.70 | 4.76 | 5.16 | 0.4 | | |
| | | 120408S02025 | ● | | | | | 0.8 | | |
| | | 120412S02025 | ● | | | | | 1.2 | | |
| | | CNGA 120404T02025 | ● | T02025 | 12.70 | 4.76 | 5.16 | 0.4 | | |
| | | 120408T02025 | ● | | | | | 0.8 | | |
| | | 120412T02025 | ● | | | | | 1.2 | | |
|  |  | CNGN 120404T00520 | ● | T00520 | 12.70 | 4.76 | - | 0.4 | | |
| | | 120404T02025 | ● | T02025 | | | | 0.4 | | |
| | | 120408T00520 | ● | T00520 | | | | 0.8 | | |
| | | 120408T02025 | ● | T02025 | | | | 0.8 | | |
| | | 120412T02025 | ● | | | | | 1.2 | | |
|  |  | DNGA 150404S02025 | ● | S02025 | 12.70 | 4.76 | 5.16 | 0.4 | | |
| | | 150408S02025 | ● | | | | | 0.8 | | |
| | | DNGA 150404T02025 | ● | T02025 | 12.70 | 4.76 | 5.16 | 0.4 | | |
| | | 150408T02025 | ● | | | | | 0.8 | | |
| | | 150412T02025 | ● | | | | | 1.2 | | |
| | | DNGA 150604T02025 | ● | T02025 | 12.70 | 6.35 | 5.16 | 0.4 | | |
| | | 150608T02025 | ● | | | | | 0.8 | | |
| | | 150612T02025 | ● | | | | | 1.2 | | |
|  |  | DNGN 150408T02025 | ● | T02025 | 12.70 | 4.76 | - | 0.8 | | |
| | | DNGN 150704S02025 | ● | S02025 | 12.70 | 7.94 | - | 0.4 | | |
| | | 150708S02025 | ● | | | | | 0.8 | | |
| | | 150712S02025 | ● | | | | | 1.2 | | |
|  |  | ENGN 130708S02025 | ● | S02025 | 12.70 | 7.94 | - | 0.8 | | |
| | | 130712S02025 | ● | | | | | 1.2 | | |
| | | ENGN 130704T02025 | ● | T02025 | 12.70 | 7.94 | - | 0.4 | | |
| | | 130708T02025 | ● | | | | | 0.8 | | |
| | | 130712T02025 | ● | | | | | 1.2 | | |
| | | 130716T02025 | ● | | | | | 1.6 | | |
| | | 130720T02025 | ● | | | | | 2.0 | | |
| | | 130730T02025 | ● | | | | | 3.0 | | |
| | |  |  | RNGN 090400S02025 | ● | S02025 | 9.525 | 4.76 | - | - |
| | | | | 120400S02025 | ● | | | | | - |
| 120700S02025 | ● | | | 12.70 | 7.94 | | - | - | | |
| 150700S02025 | ● | | | | | | | - | | |
| RNGN 090400T02025 | ● | | | T02025 | 9.525 | 4.76 | - | - | | |
| 120400T02025 | ● | | | | | | | - | | |
| 120700T02025 | ● | | | | 12.70 | 7.94 | - | - | | |
| 150700T02025 | ● | | | | | | | - | | |
| RNGN 120700K15015 | ● | | | K15015 | 12.70 | 7.94 | - | - | | |

Stock Items(Negative Inserts)

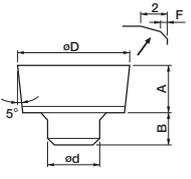
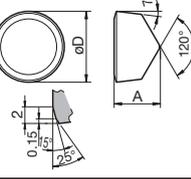
| Shape | | Description | Stock | Edge Preparation | Dimension(mm) | | | | |
|---|---|-------------------|---|------------------|---------------|------|------|-----|-----|
| | | | | | A | T | ød | rε | |
|  |  | SNGA 120408S02025 | ● | S02025 | 12.70 | 4.76 | 5.16 | 0.8 | |
| | | | ● | | | | | 1.2 | |
| | | SNGA 120408T02025 | ● | T02025 | 12.70 | 4.76 | 5.16 | 0.8 | |
| | | | ● | | | | | 1.2 | |
| | | | ● | | | | 1.6 | | |
|  |  | SNGN 120408S02025 | ● | S02025 | 12.70 | 4.76 | - | 0.8 | |
| | | | ● | | | | | 1.2 | |
| | | | ● | | | | | 1.6 | |
| | | SNGN 120404T02025 | ● | T02025 | 12.70 | 4.76 | - | 0.4 | |
| | | | ● | | | | | 0.8 | |
| | | | ● | | | | | 1.2 | |
| | | | ● | | | | | 1.6 | |
| | | | ● | | | | | 2.0 | |
| | | | ● | | | | | 2.0 | |
| | | SNGN 120704S02025 |  | S02025 | 12.70 | 7.94 | - | 0.4 | |
| | | | | | | | | ● | 0.8 |
| | | | | | | | | ● | 1.2 |
| | | | | | | | | ● | 1.6 |
| | | | | | | | | ● | 2.0 |
| | | SNGN 120704T02025 |  | T02025 | 12.70 | 7.94 | - | 0.4 | |
| | | | | | | | | ● | 0.8 |
| | | | | | | | | ● | 1.2 |
| | | | | | | | | ● | 1.6 |
| ● | 2.0 | | | | | | | | |
| SNGN 150712T02025 |  | T02025 | 15.875 | 7.94 | - | 1.2 | | | |
| | | | | | | ● | 1.6 | | |
|  |  | TNGA 160404S02025 | ● | S02025 | 9.525 | 4.76 | 3.81 | 0.4 | |
| | | | ● | | | | | 0.8 | |
| | | | ● | | | | | 1.2 | |
| | | TNGA 160404T02025 |  | T02025 | 9.525 | 4.76 | 3.81 | 0.4 | |
| | | | | | | | | ● | 0.8 |
| | | | | | | | | ● | 1.2 |
|  |  | TNGN 110304T00520 | ● | T00520 | 6.35 | 3.18 | - | 0.4 | |
| | | | ● | | | | | 0.8 | |
| | | | ● | | | | | 1.2 | |
| | | TNGN 160404S02025 |  | S02025 | 9.525 | 4.76 | - | 0.4 | |
| | | | | | | | | ● | 0.8 |
| | | | | | | | | ● | 1.2 |
| | | TNGN 160404T02025 |  | T02025 | 9.525 | 4.76 | - | 0.4 | |
| | | | | | | | | ● | 0.8 |
| | | | | | | | | ● | 1.2 |
| | | TNGN 160708S02025 |  | S02025 | 9.525 | 7.94 | - | 0.8 | |
| | | TNGN 160704T02025 |  | T02025 | 9.525 | 7.94 | - | 0.4 | |
| | | | | | | | | ● | 0.8 |
| ● | 1.2 | | | | | | | | |
|  |  | VNGA 160404S02025 | ● | S02025 | 9.525 | 4.76 | 3.81 | 0.4 | |
| | | | ● | | | | | 0.8 | |
| | | VNGA 160404T02025 |  | T02025 | 9.525 | 4.76 | 3.81 | 0.4 | |
| | | | | | | | | ● | 0.8 |
| | | | ● | | | | 1.2 | | |

●:Std. Stock

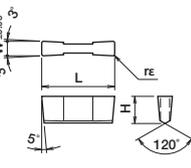
■ Stock Items(Positive Inserts)

| Shape | | Description | Stock | Edge Preparation | Dimension(mm) | | | |
|---|---|-------------------|-------|------------------|---------------|------|-----|-----|
| | | | | | A | T | rε | α |
|  |  | SPGN 090308T00820 | ● | T00820 | 9.525 | 3.18 | 0.8 | 11° |
| | | SPGN 120308S00820 | ● | S00820 | 12.70 | 3.18 | 0.8 | |
| | | SPGN 120308T00820 | ● | T00820 | 12.70 | 3.18 | 0.8 | |
| | | 120312T00820 | ● | | | | 1.2 | |
| | | 120316T00820 | ● | | | | 1.6 | |
|  |  | TBGN 060104S00820 | ● | S00820 | 3.97 | 1.59 | 0.4 | 5° |
| | | TBGN 060108S00820 | ● | | | | 0.8 | |
| | | TBGN 060104T00820 | ● | T00820 | 3.97 | 1.59 | 0.4 | |
| | | TBGN 060108T00820 | ● | | | | 0.8 | |
|  |  | TPGN 090204T00820 | ● | T00820 | 5.56 | 2.38 | 0.4 | 11° |
| | | TPGN 090208T00820 | ● | | | | 0.8 | |
| | | TPGN 110304S00820 | ● | S00820 | 6.35 | 3.18 | 0.4 | |
| | | TPGN 110308S00820 | ● | | | | 0.8 | |
| | | TPGN 110304T00820 | ● | T00820 | 6.35 | 3.18 | 0.4 | |
| | | TPGN 110308T00820 | ● | | | | 0.8 | |
| | | TPGN 160304S00820 | ● | S00820 | 9.525 | 3.18 | 0.4 | |
| | | TPGN 160308S00820 | ● | | | | 0.8 | |
| | | TPGN 160312S00820 | ● | | | | 1.2 | |
| | | TPGN 160304T00820 | ● | T00820 | 9.525 | 3.18 | 0.4 | |
| | | TPGN 160308T00820 | ● | | | | 0.8 | |
| | | TPGN 160312T00820 | ● | | | | 1.2 | |

■ Stock Items(Inserts for High Hardened Roll)

| Shape | | Description | Stock | Edge Preparation | Dimension(mm) | | | | |
|---|---|-------------------|-------|------------------|---------------|----|----|---|-----|
| | | | | | øD | ød | A | B | F |
|  |  | RBG 12K20003 | ● | K20003 | 12 | 6 | 6 | 3 | 0.2 |
| | | 16K20003 | ● | | 16 | 8 | 8 | 5 | 0.2 |
| | | 20K20003 | ● | | 20 | 10 | 10 | 5 | 0.3 |
|  |  | RCGX 090700P20015 | ● | P20015 | 9.525 | - | 8 | - | - |
| | | 120700P20015 | ● | | 12.70 | - | 8 | - | - |

■ Stock Items(Grooving Inserts)

| Shape | | Description | Stock | Edge Preparation | Dimension(mm) | | | |
|---|---|-------------|-------|------------------|---------------|-----|----|-----|
| | | | | | W | rε | L | H |
|  |  | GH 4020-05 | ● | T01020 | 4.0 | 0.5 | 20 | 7.5 |
| | | 5020-05 | ● | T01020 | 5.0 | | | |
| | | 6020-05 | ● | T01020 | 6.0 | | | |
| | | 7020-05 | ● | T01020 | 7.0 | | | |

●:Std. Stock

Recommended cutting conditions

Hardened ($r\epsilon=0.8\text{mm}$)

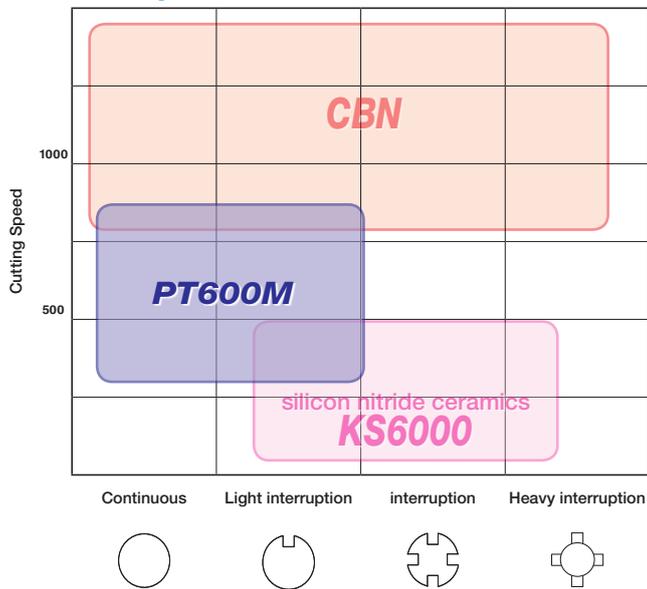
| hardness of work material | Vc (m/min) | ap (mm) | f (mm/rev.) |
|---------------------------|------------|-------------|---------------|
| 40-50HRC | 60-80-100 | 0.2-0.5-0.7 | 0.05-0.1-0.15 |
| 50-65HRC | 30-40-60 | 0.2-0.5-0.7 | 0.05-0.1-0.15 |

Gray cast iron ($r\epsilon=0.8\text{mm}$)

| work material | Vc (m/min) | ap (mm) | f (mm/rev.) |
|---------------|-------------|-------------|-------------|
| FC250~FC300 | 300-450-600 | 0.3-0.5-1.0 | 0.1-0.2-0.3 |

Application range of PT600M

Gray cast iron



High hard materials (Hardened)

