



PR115S/PR120S

PVD Coated Carbide for Heat-Resistant Alloy



Solves various machining issues for heat-resistant alloys and stainless steel

Longer tool life for heat-resistant alloy machining

Unique heat-resistant carbide substrate and newly developed PVD coating technology
"MEGACOAT TOUGH"



Specialized chipbreakers for heat-resistant alloys available (SQ/SG/SX)
Positive inserts for small parts machining also available



PR115S/PR120S

Unique carbide substrate with excellent heat-resistant properties and new coating technology "MEGACOAT TOUGH" provides longer tool life for heat-resistant alloy machining

Low cutting force and stable machining with specialized chipbreakers (SQ/SG/SX)

1 Longer tool life for heat-resistant alloy machining

Challenges of Machining Heat-Resistant Alloys

When machining heat-resistant alloys that can withstand high temperatures above 1,000 (°C), the workpiece is likely to harden and insert damage is extremely rapid.

Crater wear

Worsening chip control, etc.

Diminishing damage from notching

Burr occurs

Diminishing wear damage from notching

Surface roughness

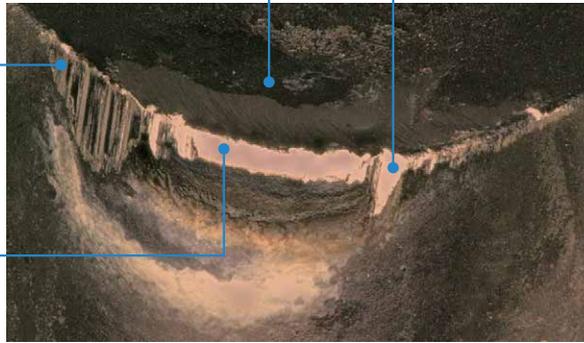
Deteriorating dimensional accuracy, etc.

Abrasive wear

Cutting force

Increased cutting heat

< Insert damaged image >



Kyocera's Solution

With excellent heat resistance, wear resistance and stability, Kyocera's MEGACOAT TOUGH coating technology achieves long tool life and stable machining of heat-resistant alloys

- Excellent heat resistance : Unique carbide substrate
- To control wear : New coating "MEGACOAT TOUGH"
- Low cutting force and stable machining
Specialized chipbreakers (SQ/SG/SX)

MEGACOAT
TOUGH | HRSA |



HRSA(Heat Resistant Super Alloy)

Exceptional Endurance. Maximum Tool Life.

Video

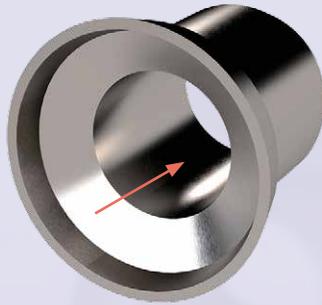


Case Studies

SOLUTION 1

Aerospace parts Ni-based heat-resistant alloy

Cutting conditions : Vc = 100 sfm, D.O.C. = 0.039", f = 0.003 ipt, Wet
CCGT3251MFP-GQ PR115S



Tool life

PR115S **20 pcs/edge**

Tool life

1.3x

Competitor A

15 pcs/edge

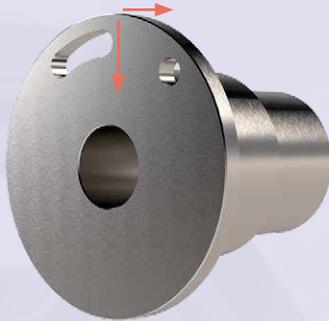
PR115S provides 1.3 times longer tool life in aerospace parts machining, which requires high heat resistance

(User evaluation)

SOLUTION 2

Agricultural machine engine parts Martensitic heat-resistant alloy

Cutting conditions : Vc = 150 sfm D.O.C. = 0.016", f = 0.006 ipt, Wet
WNMG432MQ PR120S



Tool life

PR120S **140 pcs/edge**

Tool life

1.5x

Competitor B

90 pcs/edge

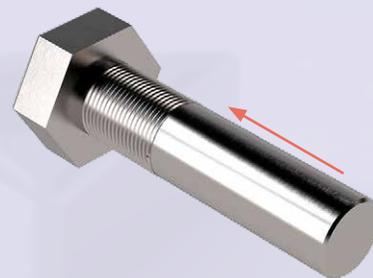
PR120S provides longer tool life in all six edges and ensures stable machining

(User evaluation)

SOLUTION 3

Bolt 304

Cutting conditions : Vc = 440 sfm, D.O.C. = 0.059", f = 0.010 ipt, Wet
TNMG332MQ PR120S



Tool life

PR120S **22 pcs/edge**

Tool life

1.5x

Competitor C

15 pcs/edge

Improved tool life of stainless steel

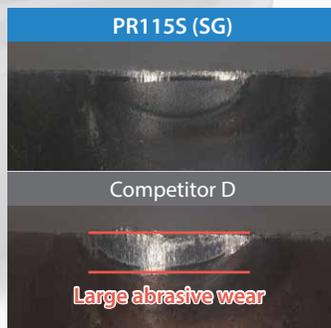
(User evaluation)

Longer tool life of heat-resistant alloys

INCONEL718® cutting performance

PR115S

Cutting edge condition after 7.4 min machining (Internal evaluation)



PR115S (SG)

Competitor D

Large abrasive wear

PR120S

Cutting edge condition after 15 min machining (Internal evaluation)



PR120S (SG)

Competitor E

Secondary diminishing damage from large notching

Cutting conditions :
Vc = 200 sfm, D.O.C. = 0.020", f = 0.004 ipt Wet
INCONEL718® CNMG432 Type

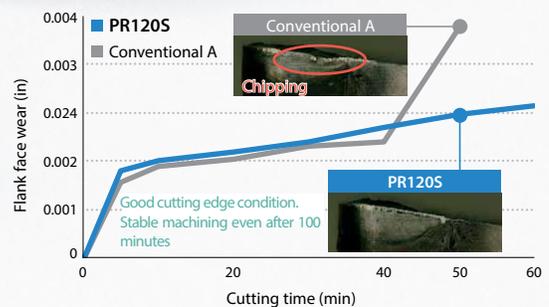
Cutting conditions :
Vc = 130 sfm, D.O.C. = 0.020", f = 0.004 ipt,
Wet INCONEL718® CNMG432 Type

Supports small parts machining of stainless steel

316L cutting performance

PR120S

Wear resistance comparison (Internal evaluation)
Cutting edge comparison (after 50 min)



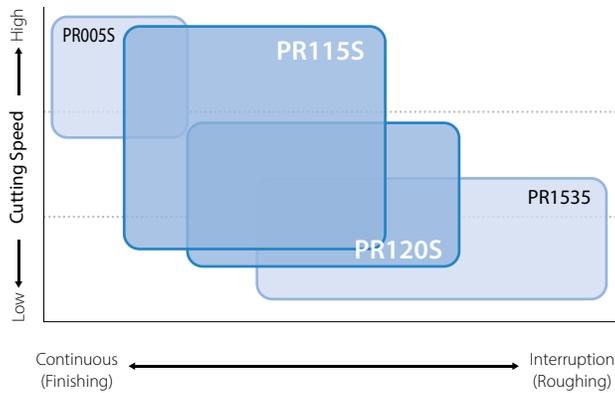
Cutting conditions : Vc = 490 sfm, D.O.C. = 0.039", f = 0.003 ipt
Wet, 316L, DCGT3251 Type

2 Unique carbide substrate with excellent heat resistance and New coating "MEGACOAT TOUGH"

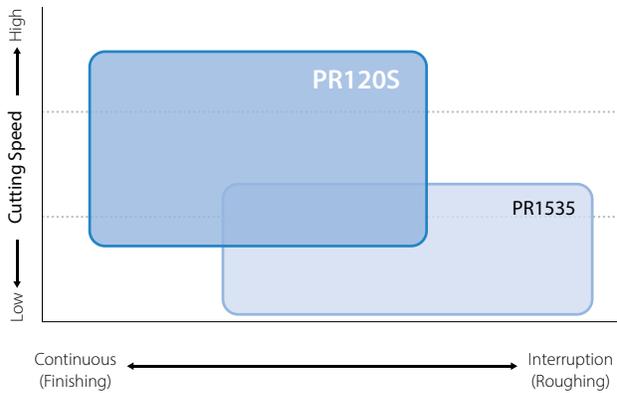
PR115S Covers a wide range of difficult-to-cut material machining applications
1st recommendation for continuous finishing of heat-resistant alloys

PR120S Long tool life and stable machining in interrupted machining of heat-resistant alloys
1st recommendation for continuous finishing to light interrupted machining of stainless steel
Longer tool life extension possible for stainless steel machining

S Heat-Resistant Alloys Application map



M Stainless Steel Application map



Carbide Substrate and Coating

< Section image >



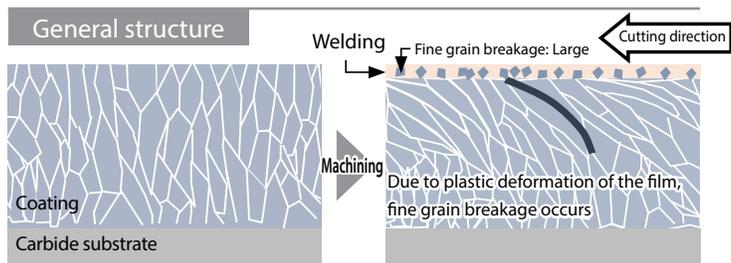
"MEGACOAT TOUGH" has a special adhesive layer

- 1. Wear resistant layer** **AlTiCrN layer**
Thick-film PVD suppresses abrasive wear
- 2. Middle layer** **TiAlN layer**
Excellent oxidation resistance to suppress crater wear
- 3. Special adhesive layer** **Improved coating adhesion for notching control**
- 4. Unique carbide substrate** **Specializes in heat-resistant alloys**



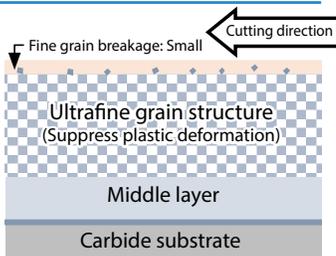
1. Wear resistant layer

Thick-film PVD suppresses abrasive wear
 Reduces notch damage with ultra-fine grain structure
 Damage to the coating during machining of heat-resistant alloys (Image)



PR115S/PR120S

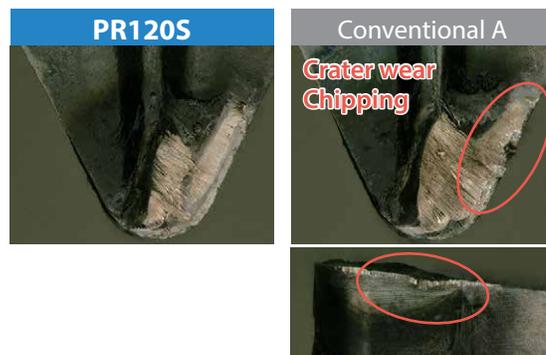
Due to ultrafine structure of the membrane, controls fine grain breakage
 Due to grain breakage and dropping of welding, controls wear and tear



2. Middle layer

TiAlN layer provides superior oxidation resistance
 Controls crater wear

Crater wear comparison (Internal evaluation) After machining for 50 min

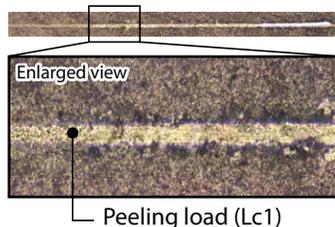


Cutting conditions : Vc = 490 sfm, D.O.C. = 0.039", f = 0.003 ipt, Wet 316L DCGT3251 Type

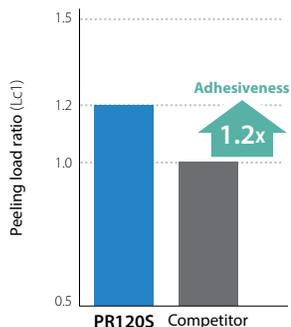
3. Special adhesive layer

Adhesion layer at carbide substrate/
 main layer interface, high affinity
 and improved adhesion

Scratch test results

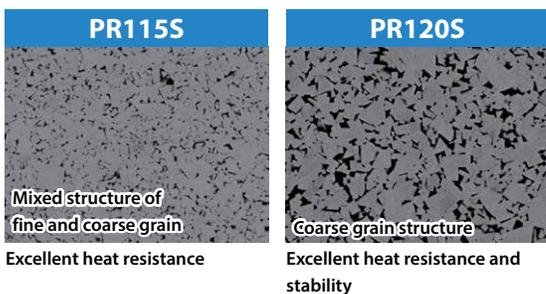


Peeling load (Lc1)
 (Internal evaluation)



4. Unique carbide substrate

Carbide substrate for heat-resistant alloy machining
 Excellent thermal properties with high thermal conductivity



3 New chipbreaker designs (SQ/SG/SX) improve machining stability

Finishing to medium machining SQ chipbreaker

Extended tool life and improved efficiency for mid-range to finishing applications in heat-resistant alloys

SQ chipbreaker benefits

Reduced temperature at the cutting edge → Extended tool life
Reduces burring → Extended tool life and efficiency improvements



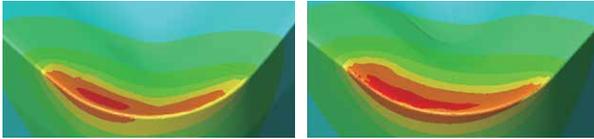
Special rake face design decreases cutting edge temperature

Optimal design achieved with simulation technology

Slant cutting edge

Inclined in (-) direction
Effective for burr suppression and reducing notching

Edge temperature comparison (Simulation) (Internal evaluation)



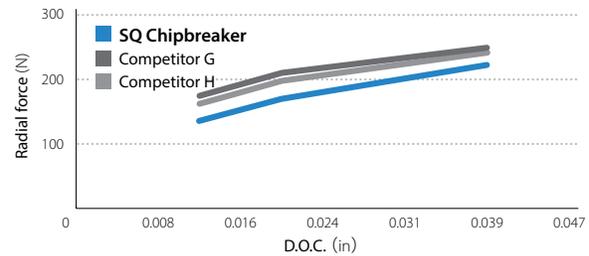
SQ chipbreaker

Conventional B

Cutting conditions : $V_c = 130$ sfm, D.O.C. 0.039, 0.006 ipt,
Dry CNMG432 Type
Workpiece : Ni-based heat-resistant alloy

The newly developed chipbreaker lowers the temperature of the cutting edge. This improves tool life and machining efficiency in semi-finishing applications.

Cutting force comparison (Internal evaluation)



Cutting conditions :
 $V_c = 130$ sfm, $f = 0.006$ ipt, Wet, CNMG432 Type
Workpiece : Ni-based heat-resistant alloy

SG chipbreaker for roughing

Supports roughing of heat-resistant alloys

SG chipbreaker benefits

Well-balanced rake face shape → Extended tool life
Shallow bottom chipbreaker design → Smooth chip control



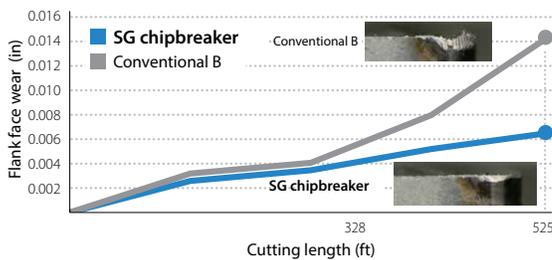
Standard chipbreaker

Stable chip control during heavy machining applications

Well-balanced rake face shape

High-strength and low cutting force design

Wear resistance comparison (Internal evaluation)



Cutting conditions :
 $V_c = 260$ sfm, D.O.C. = .039", $f = 0.008$ " Wet, CNMG432 Type
Workpiece : INCONEL® 718

SX chipbreaker for high efficiency roughing

Improved efficiency for roughing in heat-resistant alloys

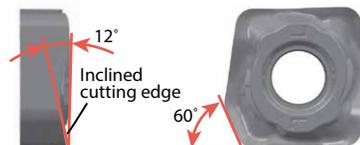
SX chipbreaker benefits

Decreased edge temperature
→ Extended tool life
Suppresses burr formation
→ Greater depths of cut
Decreased radial forces
→ Resists edge build-up and improves efficiency

Please refer to the back cover for precautions when using the SX chipbreaker.

Unique cutting edge design (Handed insert)

- 60° lead angle (when Installed in the toolholder)
- 12° rake angle



Rake design decreases temperature at the cutting edge

Optimal design achieved with CNC simulation technology

- Can be installed in standard Kyocera toolholders (DCLN/PCLN) by changing to corresponding SX shim
- Single-sided handed insert

Negative Inserts (M Class)

| Shape Handed Insert shows Right-hand | Part Number | Dimensions (in) | | | | | | |
|---|-------------|-----------------|-----------|-----------|---------------|--------|--------|--------|
| | | I.C. | Thickness | Hole Dia. | Corner R (RE) | PRI155 | PRI205 | PRI535 |
|  | CNMG 431SQ | 1/2 | 3/16 | 0.150 | 1/64 | ● | ● | |
| | 432SQ | | | | 1/32 | ● | ● | |
| | 433SQ | | | | 3/64 | ● | ● | |
| | CNMG 543SQ | 5/8 | 1/4 | 0.250 | 3/64 | ● | ● | |
| | 544SQ | | | | 1/16 | ● | ● | |
| | CNMG 643SQ | 3/4 | 1/4 | 0.313 | 3/64 | ● | ● | |
| 644SQ | 1/16 | | | | ● | ● | | |
| Finishing-Medium | | | | | | | | |
|  | CNMG 431MQ | 1/2 | 3/16 | 0.203 | 1/64 | ● | ● | ● |
| | 432MQ | | | | 1/32 | ● | ● | ● |
| Finishing-Medium | | | | | | | | |
|  | CNMG 431MS | 1/2 | 3/16 | 0.203 | 1/64 | ● | ● | ● |
| | 432MS | | | | 1/32 | ● | ● | ● |
| | 433MS | | | | 3/64 | ● | ● | ● |
| | 434MS | | | | 1/16 | ● | ● | ● |
| Medium-Roughing | | | | | | | | |
|  | CNMG 431MU | 1/2 | 3/16 | 0.203 | 1/64 | ● | ● | ● |
| | 432MU | | | | 1/32 | ● | ● | ● |
| | 433MU | | | | 3/64 | ● | ● | ● |
| | CNMG 542MU | 5/8 | 1/4 | 0.250 | 1/32 | ● | ● | ● |
| | 543MU | | | | 3/64 | ● | ● | ● |
| | 544MU | | | | 1/16 | ● | ● | ● |
| CNMG 643MU | 3/4 | 1/4 | 0.313 | 3/64 | ● | ● | ● | |
| 644MU | | | | 1/16 | ● | ● | ● | |
| Medium-Roughing | | | | | | | | |
|  | CNMG 431TK | 1/2 | 3/16 | 0.203 | 1/64 | ● | ● | ● |
| | 432TK | | | | 1/32 | ● | ● | ● |
| Medium-Roughing | | | | | | | | |
|  | CNMG 432SG | 1/2 | 3/16 | 0.203 | 1/32 | ● | ● | ● |
| | 433SG | | | | 3/64 | ● | ● | ● |
| | CNMG 543SG | 5/8 | 1/4 | 0.250 | 3/64 | ● | ● | ● |
| | 544SG | | | | 1/16 | ● | ● | ● |
| | CNMG 643SG | 3/4 | 1/4 | 0.313 | 3/64 | ● | ● | ● |
| | 644SG | | | | 1/16 | ● | ● | ● |
| Roughing | | | | | | | | |
|  | CNMM 43XRSX | 1/2 | 3/16 | 0.203 | - | ● | ● | |
| | CNMM 54XRSX | 5/8 | 1/4 | 0.250 | - | ● | ● | |
| | CNMM 64XRSX | 3/4 | 1/4 | 0.313 | - | ● | ● | |
| Roughing/ Single-sided | | | | | | | | |
|  | DNMG 431SQ | 1/2 | 3/16 | 0.203 | 1/64 | ● | ● | |
| | 432SQ | | | | 1/32 | ● | ● | |
| | 433SQ | | | | 3/64 | ● | ● | |
| | DNMG 441SQ | 1/2 | 1/4 | 0.203 | 1/64 | ● | ● | |
| | 442SQ | | | | 1/32 | ● | ● | |
| | 443SQ | | | | 3/64 | ● | ● | |
| Finishing-Medium | | | | | | | | |
|  | DNMG 431MQ | 1/2 | 3/16 | 0.203 | 1/64 | ● | ● | ● |
| | 432MQ | | | | 1/32 | ● | ● | ● |
| | DNMG 441MQ | 1/2 | 1/4 | 0.203 | 1/64 | ● | ● | ● |
| | 442MQ | | | | 1/32 | ● | ● | ● |
| Finishing-Medium | | | | | | | | |

| Shape | Part Number | Dimensions (in) | | | | | | |
|--|-------------|-----------------|-----------|-----------|---------------|--------|--------|--------|
| | | I.C. | Thickness | Hole Dia. | Corner R (RE) | PRI155 | PRI205 | PRI535 |
|  | DNMG 431MS | 1/2 | 3/16 | 0.150 | 1/64 | ● | ● | ● |
| | 432MS | | | | 1/32 | ● | ● | ● |
| | 433MS | | | | 3/64 | ● | ● | ● |
| | DNMG 441MS | 1/2 | 1/4 | 0.203 | 1/64 | ● | ● | ● |
| | 442MS | | | | 1/32 | ● | ● | ● |
| | 443MS | | | | 3/64 | ● | ● | ● |
| Medium-Roughing | | | | | | | | |
|  | DNMG 431MU | 1/2 | 3/16 | 0.203 | 1/64 | ● | ● | ● |
| | 432MU | | | | 1/32 | ● | ● | ● |
| Medium-Roughing | | | | | | | | |
|  | DNMG 432SG | 1/2 | 3/16 | 0.203 | 1/32 | ● | ● | ● |
| | 433SG | | | | 3/64 | ● | ● | ● |
| | DNMG 442SG | 1/2 | 1/4 | 0.203 | 1/32 | ● | ● | ● |
| | 443SG | | | | 3/64 | ● | ● | ● |
| Roughing | | | | | | | | |
|  | SNMG 431MQ | 1/2 | 3/16 | 0.203 | 1/64 | ● | ● | ● |
| | 432MQ | | | | 1/32 | ● | ● | ● |
| Finishing-Medium | | | | | | | | |
|  | SNMG 431MS | 1/2 | 3/16 | 0.203 | 1/64 | ● | ● | ● |
| | 432MS | | | | 1/32 | ● | ● | ● |
| | 433MS | | | | 3/64 | ● | ● | ● |
| | 434MS | | | | 1/16 | ● | ● | ● |
| Medium-Roughing | | | | | | | | |
|  | SNMG 643MU | 3/4 | 1/4 | 0.313 | 3/64 | ● | ● | ● |
| | 644MU | | | | 1/16 | ● | ● | ● |
| Medium-Roughing | | | | | | | | |
|  | SNMG 432SG | 1/2 | 3/16 | 0.203 | 1/32 | ● | ● | ● |
| | 433SG | | | | 3/64 | ● | ● | ● |
| | SNMG 543SG | 5/8 | 1/4 | 0.250 | 3/64 | ● | ● | |
| | 544SG | | | | 1/16 | ● | ● | |
| | SNMG 643SG | 3/4 | 1/4 | 0.313 | 3/64 | ● | ● | ● |
| | 644SG | | | | 1/16 | ● | ● | ● |
| Roughing | | | | | | | | |
|  | TNMG 331MQ | 3/8 | 3/16 | 0.150 | 1/64 | ● | ● | ● |
| | 332MQ | | | | 1/32 | ● | ● | ● |
| Finishing-Medium | | | | | | | | |
|  | TNMG 331MS | 3/8 | 3/16 | 0.150 | 1/64 | ● | ● | ● |
| | 332MS | | | | 1/32 | ● | ● | ● |
| | 333MS | | | | 3/64 | ● | ● | ● |
| Medium-Roughing | | | | | | | | |
|  | TNMG 331MU | 3/8 | 3/16 | 0.150 | 1/64 | ● | ● | ● |
| | 332MU | | | | 1/32 | ● | ● | ● |
| Medium-Roughing | | | | | | | | |
|  | TNMG 332SG | 3/8 | 3/16 | 0.150 | 1/32 | ● | ● | ● |
| | 333SG | | | | 3/64 | ● | ● | ● |
| | TNMG 432SG | 1/2 | 3/16 | 0.203 | 1/32 | ● | ● | ● |
| | 433SG | | | | 3/64 | ● | ● | ● |
| Roughing | | | | | | | | |

CNMM...XRL-SX inserts are single-sided with 2 cutting edges
 ●: Standard Stock

Negative Inserts (M Class)

| Shape | Part Number | Dimensions (in) | | | | PRI155 | PRI205 | PRI535 |
|---|------------------------------|-----------------|-----------|-----------|---------------|--------|--------|--------|
| | | I.C. | Thickness | Hole Dia. | Corner R (RE) | | | |
|  Finishing-Medium | VNMG 331MQ 332MQ | 3/8 | 3/16 | 0.150 | 1/64 | ● | ● | ● |
| | | | | | 1/32 | ● | ● | ● |
|  Medium-Roughing | VNMG 331MS 332MS 333MS | 3/8 | 3/16 | 0.150 | 1/64 | ● | ● | ● |
| | | | | | 1/32 | ● | ● | ● |
| | | | | | 3/64 | ● | ● | ● |
|  Medium-Roughing | VNMG 331MU 332MU | 3/8 | 3/16 | 0.150 | 1/64 | ● | ● | ● |
| | | | | | 1/32 | ● | ● | ● |
|  Roughing | VNMG 331SG 332SG | 3/8 | 3/16 | 0.150 | 1/64 | ● | ● | ● |
| | | | | | 1/32 | ● | ● | ● |

| Shape | Part Number | Dimensions (in) | | | | PRI155 | PRI205 | PRI535 |
|---|------------------------------|-----------------|-----------|-----------|---------------|--------|--------|--------|
| | | I.C. | Thickness | Hole Dia. | Corner R (RE) | | | |
|  Finishing-Medium | WNMG 431MQ 432MQ | 3/16 | 3/16 | 0.203 | 1/64 | ● | ● | ● |
| | | | | | 1/32 | ● | ● | ● |
|  Medium-Roughing | VNMG 431MS 432MS 433MS | 3/16 | 3/16 | 0.203 | 1/64 | ● | ● | ● |
| | | | | | 1/32 | ● | ● | ● |
| | | | | | 3/64 | ● | ● | ● |
|  Medium-Roughing | VNMG 431MU 432MU | 3/16 | 3/16 | 0.203 | 1/64 | ● | ● | ● |
| | | | | | 1/32 | ● | ● | ● |
|  Roughing | VNMG 432SG 433SG | 3/16 | 3/16 | 0.203 | 1/32 | ● | ● | ● |
| | | | | | 3/64 | ● | ● | ● |

● : Standard Stock

Negative Inserts (G Class)

| Shape | Part Number | Dimensions (in) | | | | PRI155 | PRI205 | PRI535 |
|---|------------------------------|-----------------|-----------|-----------|---------------|--------|--------|--------|
| | | I.C. | Thickness | Hole Dia. | Corner R (RE) | | | |
|  Finishing-Medium / Sharp Edge / Polished | CNGG 4305MFP-SK 431MFP-SK | 1/2 | 3/16 | 0.203 | <0.008 | ● | ● | ● |
| | | | | | <1/64 | ● | ● | ● |
|  Finishing-Medium / Sharp Edge / Polished | DNGG 4305MFP-SK 431MFP-SK | 1/2 | 3/16 | 0.203 | <0.008 | ● | ● | ● |
| | | | | | <1/64 | ● | ● | ● |

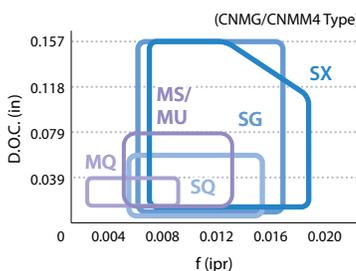
Insert with corner R (RE) dimension expressed with less than sign (i.e. <0.008, <1/64 etc.) indicates models with minus tolerance for corner R (RE)

| Shape | Part Number | Dimensions (in) | | | | PRI155 | PRI205 | PRI535 |
|---|--|-----------------|-----------|-----------|---------------|--------|--------|--------|
| | | I.C. | Thickness | Hole Dia. | Corner R (RE) | | | |
|  Finishing-Medium / Sharp Edge / Polished | TNGG 3302MFP-SK 3305MFP-SK 331MFP-SK | 3/8 | 3/16 | 0.150 | <0.004 | ● | ● | ● |
| | | | | | <0.008 | ● | ● | ● |
| | | | | | <1/64 | ● | ● | ● |
|  Finishing-Medium / Sharp Edge / Polished | VNGG 3305MFP-SK 331MFP-SK | 3/8 | 3/16 | 0.150 | <0.008 | ● | ● | ● |
| | | | | | <1/64 | ● | ● | ● |

● : Standard Stock

Applicable Chipbreaker Range (D.O.C. Indicates radial depth of cut per side)

Heat-Resistant Alloys



Cutting Range

Finishing
D.O.C.: 0.008" - 0.039"

Medium-Roughing
D.O.C.: 0.020" - 0.158"

Medium-Roughing
D.O.C.: 0.020" - 0.158"

Recommended Chipbreaker

SQ
Chipbreaker



Advantage

Notching control

Issue: Finished surfaces, chip control

SG
Chipbreaker



Advantage

General Purpose/
1st Recommendation

Issue: Finished surfaces, chip control

MQ
Chipbreaker



Advantage

Low Cutting Force/
Chip Control

MS
Chipbreaker



Advantage

Cutting Edge Damage
Control

MU
Chipbreaker



Advantage

Low Cutting Force/
Chip Control

SX
Chipbreaker



Advantage

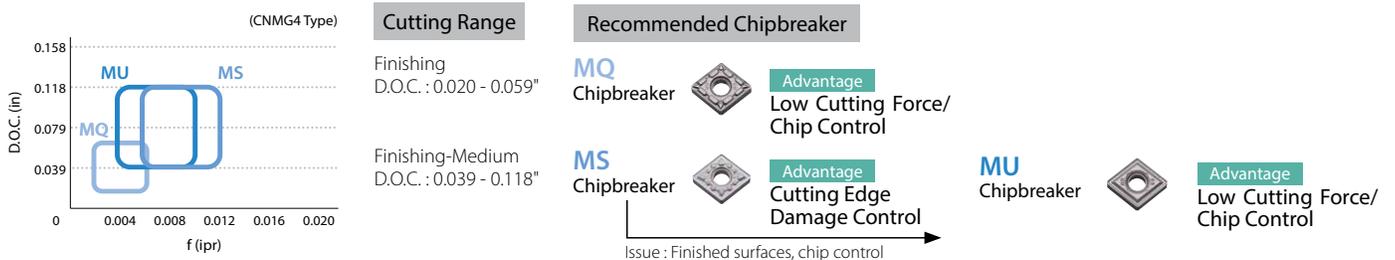
Minimize Burrs
⇒ Greater Depths of Cut

Recommended Cutting Conditions

| Workpiece | Cutting Range | Application | Recommended Chipbreaker | Recommended Grade | Min. – Recommendation – Max. | | | |
|------------------------------|--|--------------------|-------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|
| | | | | | Vc (sfm) | D.O.C. (in) | ipt (mm/rev) | |
| Heat-Resistant Alloys | Finishing | Continuous | MQ | PR115S | 80 – 150 – 230 | 0.008 – 0.020 – 0.039 | 0.002 – 0.004 – 0.008 | |
| | | Light Interruption | | PR120S | 80 – 130 – 200 | | | |
| | Finishing-Medium | Continuous | SQ | PR115S | 80 – 150 – 230 | 0.012 – 0.020 – 0.059 | 0.004 – 0.007 – 0.014 | |
| | | Light Interruption | | PR120S | 80 – 130 – 200 | | | |
| | | Continuous | SK | PR115S | 80 – 150 – 230 | 0.020 – 0.039 – 0.059 | 0.001 – 0.002 – 0.004 | |
| | | Light Interruption | | PR120S | 80 – 130 – 200 | | | |
| | Medium-Roughing | Continuous | MU | PR115S | 80 – 150 – 230 | 0.020 – 0.039 – 0.079 | 0.004 – 0.006 – 0.012 | |
| | | Light Interruption | | PR120S | 80 – 130 – 200 | | | |
| | | Heavy Interruption | | PR153S | 80 – 100 – 150 | | | |
| | | Continuous | MS | PR115S | 80 – 150 – 230 | 0.020 – 0.039 – 0.079 | 0.004 – 0.006 – 0.012 | |
| | | Light Interruption | | PR120S | 80 – 130 – 200 | | | |
| | | Heavy Interruption | | PR153S | 80 – 100 – 150 | | | |
| | | Continuous | TK | PR115S | 80 – 150 – 230 | 0.039 – 0.079 – 0.118 | 0.005 – 0.008 – 0.012 | |
| | Light Interruption | PR120S | | 80 – 130 – 200 | | | | |
| | Heavy Interruption | PR153S | | 80 – 100 – 150 | | | | |
| | Roughing | Continuous | SG | PR115S | 80 – 150 – 230 | 0.020 – 0.079 – 0.158 | 0.004 – 0.012 – 0.016 | |
| | | Light Interruption | | PR120S | 80 – 130 – 200 | | | |
| | | Heavy Interruption | | PR153S | 80 – 100 – 150 | | | |
| | | Continuous | SX | PR115S | 80 – 150 – 230 | 0.020 – 0.079 – 0.158 | 0.006 – 0.012 – 0.018 | |
| | | Light Interruption | | PR120S | 80 – 130 – 200 | | | |
| | | Heavy Interruption | | PR153S | 80 – 100 – 150 | | | |
| Stainless Steel (Austenitic) | Finishing | Continuous | MQ | PR120S | 330 – 460 – 590 | 0.020 – 0.039 – 0.059 | 0.002 – 0.004 – 0.006 | |
| | | Interruption | | PR153S | | | | |
| | Finishing-Medium | Continuous | SK | PR120S | 260 – 390 – 490 | 0.020 – 0.059 – 0.079 | 0.001 – 0.002 – 0.004 | |
| | | Interruption | | PR153S | | | | |
| | Medium-Roughing | Continuous | MU | PR120S | 260 – 390 – 490 | 0.039 – 0.079 – 0.118 | 0.004 – 0.006 – 0.010 | |
| | | Interruption | | PR153S | | | | |
| | | Continuous | MS | PR120S | 260 – 390 – 490 | 0.039 – 0.079 – 0.118 | 0.006 – 0.008 – 0.012 | |
| | | Interruption | | PR153S | | | | |
| | | Continuous | TK | PR120S | 260 – 390 – 490 | 0.039 – 0.079 – 0.158 | 0.004 – 0.008 – 0.012 | |
| | | Interruption | | PR153S | | | | |
| | Stainless Steel (Precipitation Hardened) | Finishing | Continuous | MQ | PR120S | 260 – 330 – 390 | 0.020 – 0.039 – 0.059 | 0.002 – 0.004 – 0.006 |
| | | | Interruption | | PR153S | | | |
| Medium-Roughing | | Continuous | MU | PR120S | 260 – 330 – 390 | 0.039 – 0.079 – 0.118 | 0.004 – 0.006 – 0.010 | |
| | | Interruption | | PR153S | | | | |
| | | Continuous | MS | PR120S | 260 – 330 – 390 | 0.039 – 0.079 – 0.118 | 0.006 – 0.008 – 0.012 | |
| | | Interruption | | PR153S | | | | |
| Continuous | TK | PR120S | 260 – 330 – 390 | 0.039 – 0.079 – 0.158 | 0.004 – 0.008 – 0.012 | | | |
| Interruption | | PR153S | | | | | | |

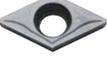
The **bold-faced number** indicates a center value of recommended cutting condition

Stainless Steel

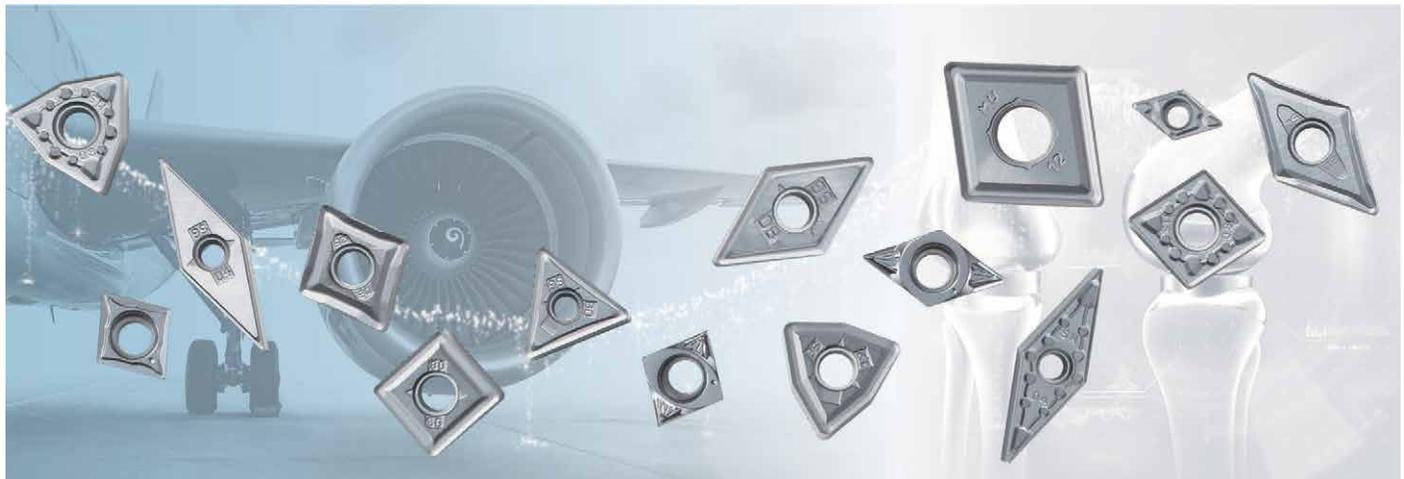


Positive Inserts

| Shape | Part Number | Dimensions (in) | | | | Relief Angle | PR1155 | PR1205 | PR1535 | |
|---|--|------------------|-----------|-----------|---------------|--------------|--------|--------|--------|---|
| | | I.C. | Thickness | Hole Dia. | Corner R (RE) | | | | | |
|  Finishing Sharp Edge / Polished | CCGT 215013MFP-SKS | 1/4 | 3/32 | 0.118 | <0.002 | 7° | ● | ● | ● | |
| | 21502MFP-SKS | | | | <0.004 | | ● | ● | ● | |
| | 21505MFP-SKS | | | | <0.008 | | ● | ● | ● | |
| | CCGT 325013MFP-SKS | 3/8 | 5/32 | 0.185 | <0.002 | 7° | ● | ● | ● | |
| | 32502MFP-SKS | | | | <0.004 | | ● | ● | ● | |
| | 32505MFP-SKS | | | | <0.008 | | ● | ● | ● | |
| | 3251MFP-SKS | | | | <1/64 | | ● | ● | ● | |
| |  Finishing Sharp Edge / Polished | CCGT 21502MFP-SK | 1/4 | 3/32 | 0.118 | <0.004 | 7° | ● | ● | ● |
| | | 21505MFP-SK | | | | <0.008 | | ● | ● | ● |
| 2151MFP-SK | | <1/64 | | | | ● | | ● | ● | |
| CCGT 32502MFP-SK | | 3/8 | 5/32 | 0.185 | <0.004 | 7° | ● | ● | ● | |
| 32505MFP-SK | | | | | <0.008 | | ● | ● | ● | |
| 3251MFP-SK | | | | | <1/64 | | ● | ● | ● | |
|  Finishing-Medium Sharp Edge / Polished | CCGT 21502MFP-GQ | 1/4 | 3/32 | 0.118 | <0.004 | 7° | ● | ● | ● | |
| | 21505MFP-GQ | | | | <0.008 | | ● | ● | ● | |
| | 2151MFP-GQ | | | | <1/64 | | ● | ● | ● | |
| | CCGT 32502MFP-GQ | 3/8 | 5/32 | 0.185 | <0.004 | 7° | ● | ● | ● | |
| | 32505MFP-GQ | | | | <0.008 | | ● | ● | ● | |
| | 3251MFP-GQ | | | | <1/64 | | ● | ● | ● | |
|  Finishing-Medium | CCMT 3251MQ | 3/8 | 5/32 | 0.185 | 1/64 | 7° | ● | ● | ● | |
| | 3252MQ | | | | 1/32 | | ● | ● | ● | |
| | DCGT 215013MFP-SKS | 1/4 | 3/32 | 0.118 | <0.002 | 7° | ● | ● | ● | |
| 21502MFP-SKS | <0.004 | | | | ● | | ● | ● | | |
| 21505MFP-SKS | <0.008 | | | | ● | | ● | ● | | |
|  Finishing Sharp Edge / Polished | DCGT 325013MFP-SKS | 3/8 | 5/32 | 0.185 | <0.002 | 7° | ● | ● | ● | |
| | 32502MFP-SKS | | | | <0.004 | | ● | ● | ● | |
| | 32505MFP-SKS | | | | <0.008 | | ● | ● | ● | |
| | 3251MFP-SKS | | | | <1/64 | | ● | ● | ● | |

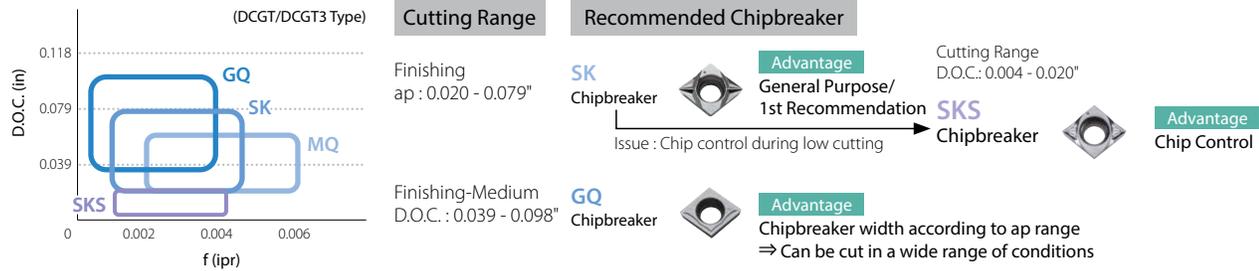
| Shape | Part Number | Dimensions (in) | | | | Relief Angle | PR1155 | PR1205 | PR1535 |
|---|------------------|-----------------|-----------|-----------|---------------|--------------|--------|--------|--------|
| | | I.C. | Thickness | Hole Dia. | Corner R (RE) | | | | |
|  Finishing Sharp Edge / Polished | DCGT 21502MFP-SK | 1/4 | 3/32 | 0.118 | <0.004 | 7° | ● | ● | ● |
| | 21505MFP-SK | | | | <0.008 | | ● | ● | ● |
| | 2151MFP-SK | | | | <1/64 | | ● | ● | ● |
| | DCGT 32502MFP-SK | 3/8 | 5/32 | 0.185 | <0.004 | 7° | ● | ● | ● |
| | 32505MFP-SK | | | | <0.008 | | ● | ● | ● |
| | 3251MFP-SK | | | | <1/64 | | ● | ● | ● |
|  Finishing-Medium Sharp Edge / Polished | DCGT 21502MFP-GQ | 1/4 | 3/32 | 0.118 | <0.004 | 7° | ● | ● | ● |
| | 21505MFP-GQ | | | | <0.008 | | ● | ● | ● |
| | 2151MFP-GQ | | | | <1/64 | | ● | ● | ● |
| | DCGT 32502MFP-GQ | 3/8 | 5/32 | 0.185 | <0.004 | 7° | ● | ● | ● |
| | 32505MFP-GQ | | | | <0.008 | | ● | ● | ● |
| | 3251MFP-GQ | | | | <1/64 | | ● | ● | ● |
|  Finishing-Medium | DCMT 21505MQ | 1/4 | 3/32 | 0.118 | 0.008 | 7° | ● | ● | ● |
| | 2151MQ | | | | 1/64 | | ● | ● | ● |
| | DCMT 3251MQ | 3/8 | 5/32 | 0.185 | 1/64 | 7° | ● | ● | ● |
| | 3252MQ | | | | 1/32 | | ● | ● | ● |
|  Finishing Sharp Edge / Polished | VCGT 2202MFP-SKS | 1/4 | 1/8 | 0.110 | <0.004 | 7° | ● | ● | ● |
| | 2205MFP-SKS | | | | <0.008 | | ● | ● | ● |
| | 221MFP-SKS | | | | <1/64 | | ● | ● | ● |
|  Finishing Sharp Edge / Polished | VPGT 2202MFP-SKS | 1/4 | 1/8 | 0.118 | <0.004 | 11° | ● | ● | ● |
| | 2205MFP-SKS | | | | <0.008 | | ● | ● | ● |
| | 221MFP-SKS | | | | <1/64 | | ● | ● | ● |

● : Standard Stock
 Insert with corner R (RE) dimension expressed with less than sign (i.e. <0.008, <1/64 etc.) indicates models with minus tolerance for corner R (RE)

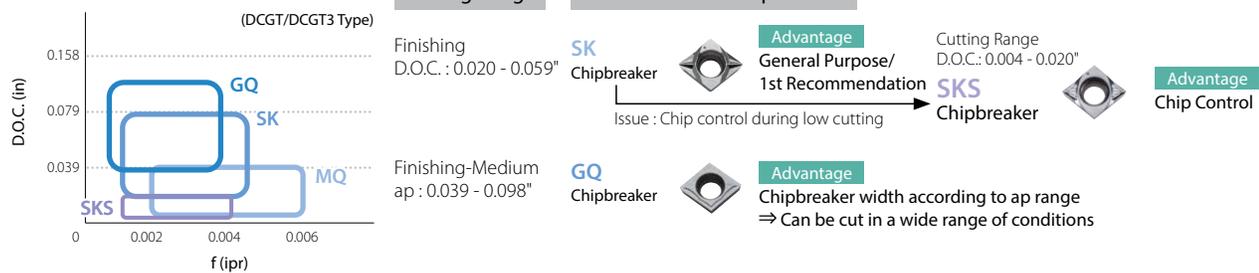


Applicable Chipbreaker Range (D.O.C. indicates radial depth of cut per side)

Heat-Resistant Alloys



Stainless Steel



Recommended Cutting Conditions

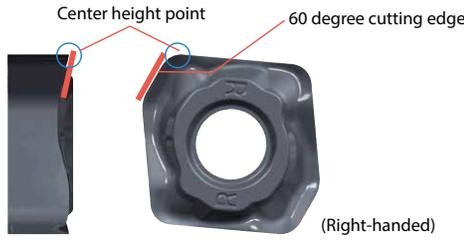
| Workpiece | Cutting Range | Recommended Chipbreaker | Recommended Grade | Min. – Recommendation – Max. | | |
|--|------------------|-------------------------|-------------------|------------------------------|------------------------------|------------------------------|
| | | | | sfm | D.O.C. (in) | ipt |
| Heat-Resistant Alloys | Finishing | MQ | PR115S | 80 – 150 – 230 | 0.020 – 0.039 – 0.059 | 0.002 – 0.004 – 0.006 |
| | | | PR120S | 80 – 130 – 200 | | 0.003 – 0.006 – 0.008 |
| | | | PR153S | 80 – 100 – 150 | | |
| | | SKS | PR115S | 80 – 150 – 230 | 0.004 – 0.012 – 0.020 | 0.001 – 0.002 – 0.004 |
| | | | PR120S | 80 – 130 – 200 | | |
| | | | PR153S | 80 – 100 – 150 | | 0.002 – 0.004 – 0.006 |
| | Finishing-Medium | SK | PR115S | 80 – 150 – 230 | 0.020 – 0.039 – 0.079 | 0.001 – 0.003 – 0.005 |
| | | | PR120S | 80 – 130 – 200 | | |
| | | | PR153S | 80 – 100 – 150 | | |
| | | GQ | PR115S | 80 – 150 – 230 | 0.039 – 0.059 – 0.098 | 0.001 – 0.002 – 0.003 |
| | | | PR120S | 80 – 130 – 200 | | |
| | | | PR153S | 80 – 100 – 150 | | |
| Stainless Steel (Austenitic) | Finishing | MQ | PR120S | 260 – 330 – 390 | 0.012 – 0.020 – 0.039 | 0.002 – 0.004 – 0.006 |
| | | | PR153S | 200 – 260 – 330 | | 0.003 – 0.006 – 0.008 |
| | | | PR120S | 260 – 330 – 390 | | |
| | | SKS | PR120S | 260 – 330 – 390 | 0.012 – 0.020 – 0.039 | 0.002 – 0.004 – 0.006 |
| | | | PR153S | 200 – 260 – 330 | | |
| | | | PR120S | 260 – 330 – 390 | | |
| | Finishing-Medium | SK | PR120S | 260 – 330 – 390 | 0.020 – 0.039 – 0.079 | 0.001 – 0.003 – 0.005 |
| | | | PR153S | 200 – 260 – 330 | | |
| | | | PR153S | 200 – 260 – 330 | | |
| | | GQ | PR120S | 260 – 330 – 390 | 0.039 – 0.059 – 0.098 | 0.001 – 0.002 – 0.003 |
| | | | PR153S | 200 – 260 – 330 | | |
| | | | PR153S | 200 – 260 – 330 | | |
| Stainless Steel (Precipitation Hardened) | Finishing | MQ | PR120S | 130 – 200 – 260 | 0.012 – 0.020 – 0.039 | 0.002 – 0.004 – 0.006 |
| | | | PR153S | 100 – 160 – 230 | | 0.003 – 0.006 – 0.008 |
| | | | PR120S | 130 – 200 – 260 | | |
| | | SKS | PR120S | 130 – 200 – 260 | 0.012 – 0.020 – 0.039 | 0.002 – 0.004 – 0.006 |
| | | | PR153S | 100 – 160 – 230 | | |
| | | | PR120S | 130 – 200 – 260 | | |
| | Finishing-Medium | SK | PR120S | 130 – 200 – 260 | 0.020 – 0.039 – 0.079 | 0.001 – 0.003 – 0.005 |
| | | | PR153S | 100 – 160 – 230 | | |
| | | | PR153S | 100 – 160 – 230 | | |
| | | GQ | PR120S | 130 – 200 – 260 | 0.039 – 0.059 – 0.098 | 0.001 – 0.002 – 0.003 |
| | | | PR120S | 130 – 200 – 260 | | |
| | | | PR153S | 100 – 160 – 230 | | |

The **bold-faced number** indicates a center value of recommended cutting condition

SX Chipbreaker Usage Precautions

1. Cutting Edge Height

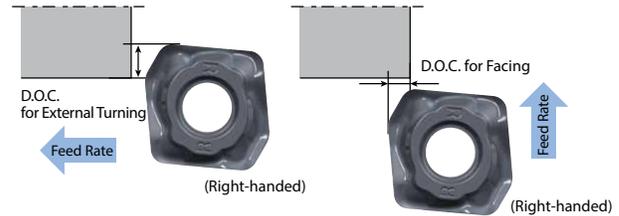
The center of the cutting edge height of the nose is slanted by 60 degrees based on circled portions in image below.



2. Recommended D.O.C.

Recommended depth of cut is no greater than the 60° lead angle; however, larger depths of cut are possible.

| Description | Recommended D.O.C. External Turning (in) | Max. D.O.C. Facing (in) |
|----------------------------|--|-------------------------|
| CNMM43X ^{R/L} -SX | 0.020 - 0.079 - 0.158 | 0.079 |
| CNMM54X ^{R/L} -SX | 0.020 - 0.098 - 0.177 | 0.079 |
| CNMM64X ^{R/L} -SX | 0.020 - 0.118 - 0.197 | 0.098 |



3. Applicable Toolholder

The SX chipbreaker insert requires a different shim than standard inserts. No additional toolholder modifications are necessary when using the applicable Kyocera holders.

| Insert Description | Applicable Toolholder (Kyocera) | Standard Shim | Shim for SX Chipbreaker |
|----------------------------|--|---------------|-------------------------|
| CNMM43X ^{R/L} -SX | DCLNR/L12-4B DCLNR/L16-4D DCLN R/L2020K-12 DCLN R/L2525M-12 | DC-44 | DC-44-C |
| | PCLNR/L12-4B PCLNR/L16-4D PCLN R/L2020H-12 PCLN R/L2020K-12 PCLN R/L2525M-12 PCLN R/L3225P-12 | LC-42N | LC-42N-C |
| CNMM54X ^{R/L} -SX | PCLN R/L2525M-16 PCLN R/L3232P-16 | LC-53N | LC-53N-C |
| CNMM64X ^{R/L} -SX | PCLNR/L3232P-19 | LC-63 | LC-63-C |

Boring is not recommended

4. Unmachined Portion Varies with Insert Size

Unmachined portion is reflected below.

| Description | Amount Uncut (in) | |
|----------------------------|-------------------|-------|
| | X | Z |
| CNMM43X ^{R/L} -SX | 0.161 | 0.114 |
| CNMM54X ^{R/L} -SX | 0.189 | 0.130 |
| CNMM64X ^{R/L} -SX | 0.213 | 0.142 |



5. Facing

Facing is possible, but turning is recommended. Cutting edge may drop below center in facing operations. Boss remains at the center of the workpiece.

| Description | Run-out Amount when Facing (in) |
|----------------------------|---------------------------------|
| CNMM43X ^{R/L} -SX | 0.030 |
| CNMM54X ^{R/L} -SX | 0.033 |
| CNMM64X ^{R/L} -SX | 0.041 |

The SX Chipbreaker is Uniquely Designed for High Efficiency Roughing. It Differs from Standard Inserts by the Following.

- Handed single-sided 2-edge insert
- Requires a dedicated shim
- Unmachined portion remains at corner (4. Unmachined portion varies with insert size)
- Position of insert is below the center when facing (5. Facing)



KYOCERA Precision Tools

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Technical Support | 800.823.7284 - Option 2



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