KYOCERA

PR005S / PR015S

for Heat-Resistant Alloy

Stable and Consistent Performance While Machining Heat-Resistant Alloy

Improved Thermal Properties Help to Reduce Sudden Fracture and Decrease Edge Wear

Improved Wear Resistance with MEGACOAT HARD Coating

Low Cutting Force and Stable Machining with Newly Developed Chipbreakers (SQ/SX/SG)

NEW SG Chipbreaker
for Roughing Applications

PR005S / PR015S

for Machining Heat-Resistant Alloy

View Online

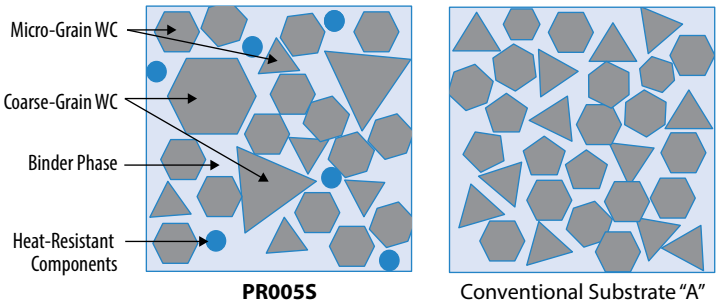
Improved Thermal Properties Help to Reduce Sudden Fracture and Edge Wear

1 Newly Developed Substrate Helps to Reduce Sudden Fracture and Notch Wear

Improved thermal conductivity by optimum distribution of WC coarse grains

Resists heat concentration at the cutting edge to promote stable machining

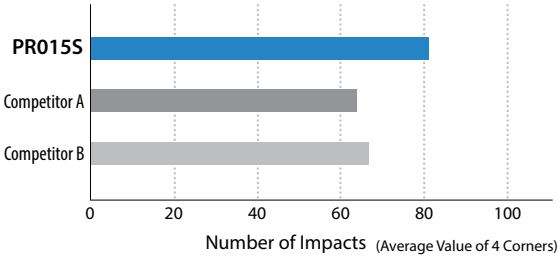
(Pattern Diagram)



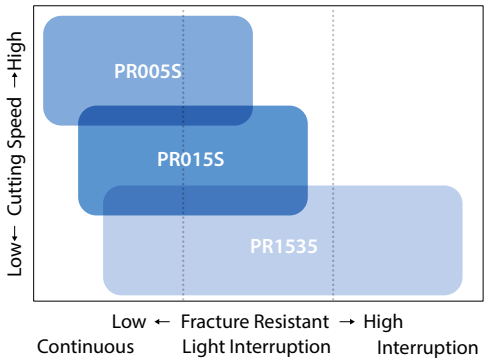
PR005S : Hard, Wear-resistant Grade for High-speed Machining

PR015S : General Purpose Grade with Excellent Wear Resistance and Stability

Fracture Resistance Comparison (Internal Evaluation)

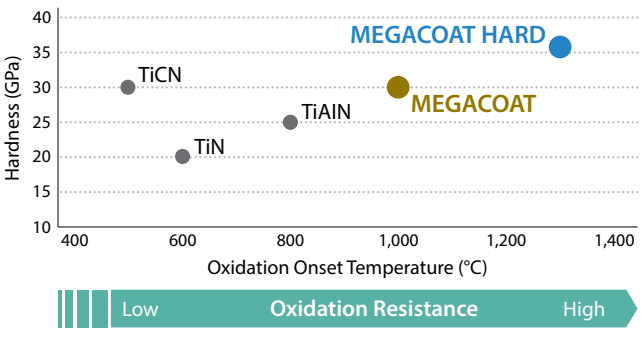


Cutting Conditions: Vc = 80 sfm, D.O.C. = 0.039", f = 0.004 ipr, Wet
CNMG432 Type Workpiece: Nickel-based Superalloy Cylindrical Workpiece with 1 Flat Face



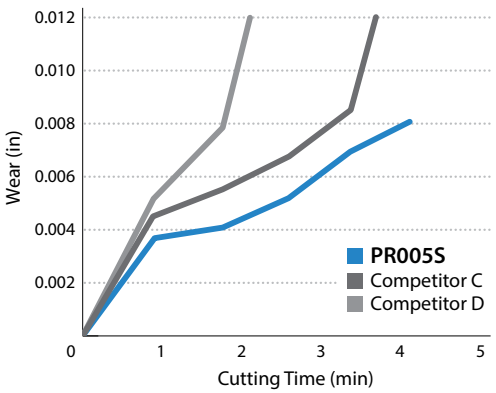
2 Improved Wear Resistance with MEGACOAT HARD Coating

Coating Film Property (Internal Evaluation)



Excellent wear resistance with high-hardness resists boundary damage with improved thermal properties

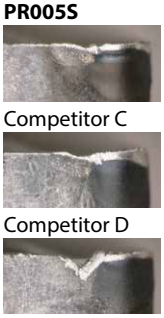
Wear Resistance Comparison (Internal Evaluation)



Cutting Conditions: Vc = 200 sfm, D.O.C. = 0.039", f = 0.008 ipr, Wet, CNMG432 Type
Workpiece: Nickel-based Superalloy

Machining Time: 3.5 min

Competitor D could only reach 2.6 minutes.



3 New Chipbreaker Designs Improve Machining Stability

SQ Chipbreaker for Finishing to Medium Machining

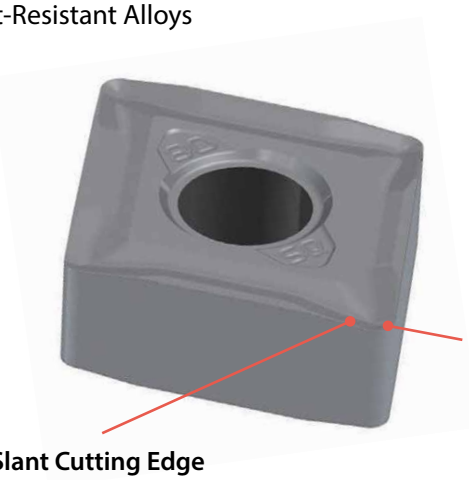
Double-sided 4-Corner Design

Extended Tool Life and Improved Efficiency for
Medium-Finishing Applications in Heat-Resistant Alloys

SQ Chipbreaker Benefits

Reduced Temperature at the Cutting Edge
for Extended Tool Life

Reduces Burring
for Extended Tool Life and Efficiency Improvements



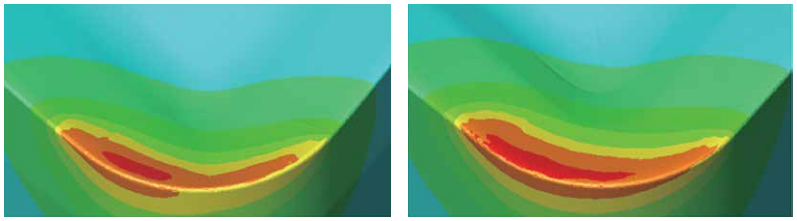
Special Axial Face Design Decreases Cutting Edge Temperature

Optimal Design Achieved with
Simulation Technology

Slant Cutting Edge

Inclined in (-) Direction
Effective for Burr Suppression and Reducing Notching

Simulation of Edge-Temperature Comparison (Internal Evaluation)



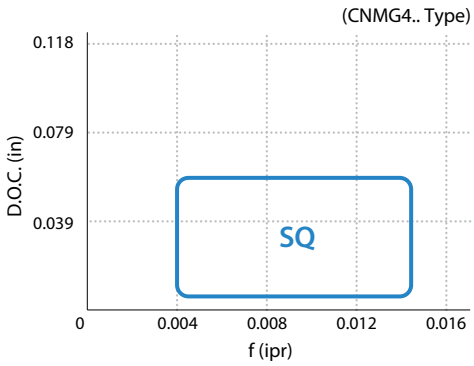
SQ Chipbreaker | Conventional B

Cutting Conditions: Vc = 130 sfm, D.O.C. = 0.039", f = 0.006 ipr, CNMG432 Type, Dry
Workpiece: Nickel-based Superalloy

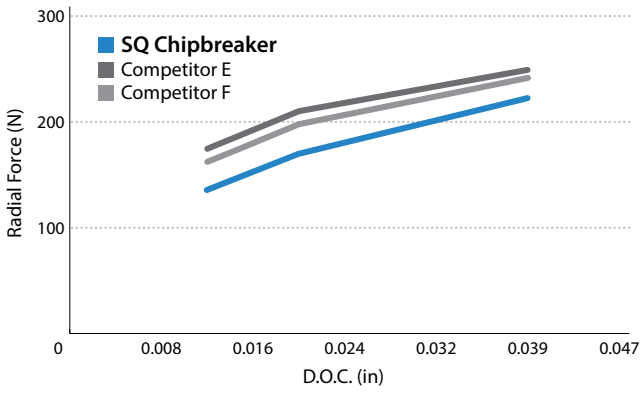
The newly developed SQ chipbreaker reduces temperature at the cutting edge, thereby improving tool life and machining efficiency in semi-finishing applications.

Applicable Chipbreaker Range

(D.O.C. Indicates Radial Depth of Cut per Side)

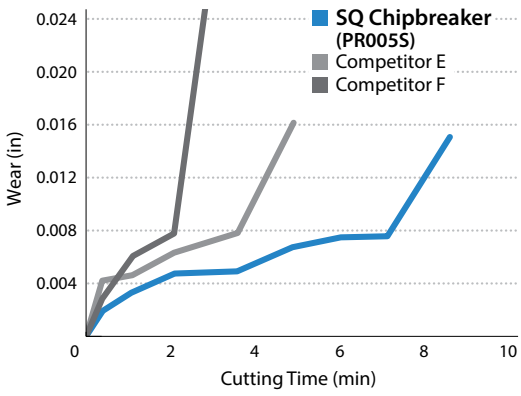


Cutting Force Comparison - Radial Force (Internal Evaluation)



Cutting Conditions: Vc = 130 sfm, f = 0.006 ipr, Wet, CNMG432 Type
Workpiece: Nickel-based Superalloy

Wear Resistance Comparison (Internal Evaluation)



Cutting Conditions: Vc = 130, D.O.C. = 0.039", f = 0.008 ipr, Wet, CNMG432 Type
Workpiece: Nickel-based Superalloy

Machining Time: 5 min
Competitor F could only reach 3.6 minutes.

SQ Chipbreaker (PR005S)

Competitor E

Competitor F

SX Chipbreaker for Roughing

Single-sided 2-Corner Design

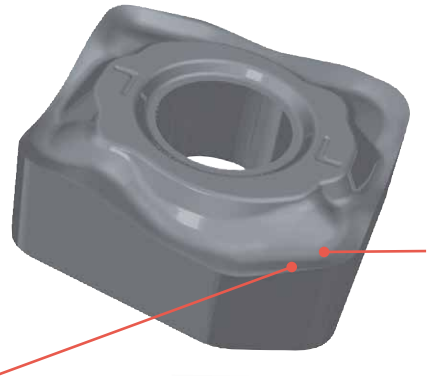
Improved Efficiency for Roughing Applications in Heat-resistant Alloys

SX Chipbreaker Benefits

Decreased Edge Temperature
for Longer Tool Life

Suppresses Burr Formation
for Greater Depths of Cut

Decreased Radial Forces
Resists Edge Build-up and Improves Efficiency



The SG chipbreaker is recommended if a double-sided 4-edge design for roughing is required

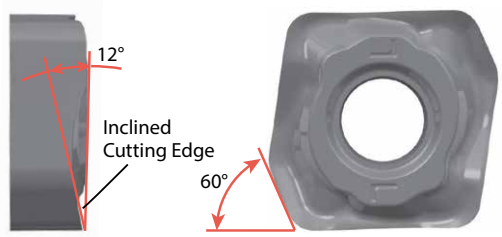
See **P6** for details

Rake Design Decreases Temperature at the Cutting Edge

Optimal Design Achieved with
CNC Simulation Technology

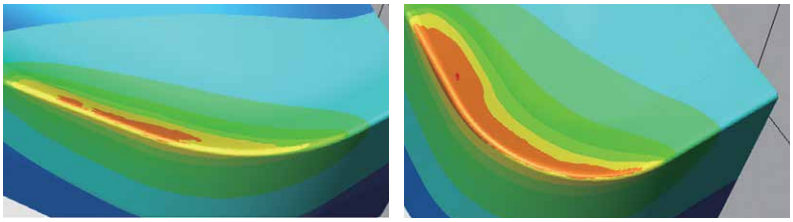
Unique Cutting Edge Design (Handed Insert)

60 Degree Lead Angle (when Installed in the Toolholder)
12 Degree Rake Angle



- Can be installed in standard Kyocera 80° (C type) toolholders by changing to corresponding SX shim
- Single-sided, handed insert

Simulation of Edge-Temperature Comparison (Internal Evaluation)



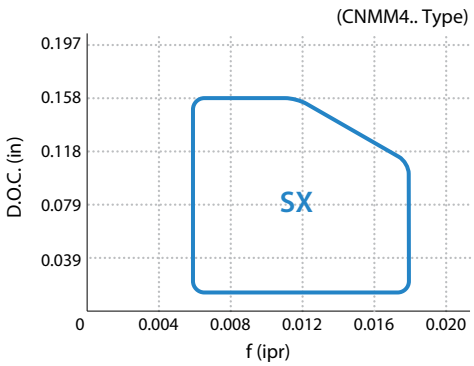
SX Chipbreaker Conventional C

Cutting Conditions: Vc = 130 sfm, D.O.C. = 0.079", f = 0.010 ipr, Dry
CNMM43XL-SX, CNMG433 Type Workpiece: Nickel-based Superalloy

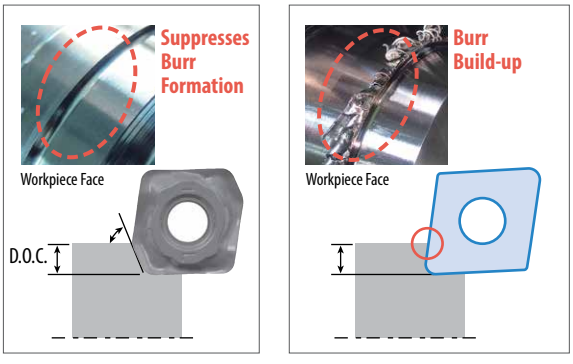
The SX Chipbreaker provides longer tool life and improved efficiency with its unique cutting edge and rake angle design

Applicable Chipbreaker Range

(D.O.C. Indicates Radial Depth of Cut per Side)



Burr Comparison (Internal Evaluation)



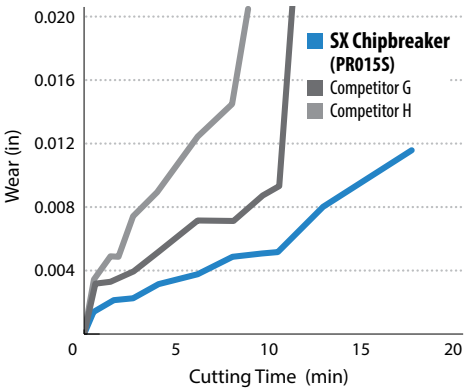
SX Chipbreaker Conventional D

Cutting Conditions: Vc = 130 sfm, D.O.C. = 0.079", f = 0.010 ipr, Wet
CNMM43XL-SX, CNMG433 Type After Machining 9.4 min. Workpiece: Nickel-based Superalloy

Even in larger depths of cut, the SX chipbreaker is able to suppress burr build-up

Increased D.O.C capability and reduced notch wear combine to provide greater machining efficiency

Wear Resistance Comparison (Internal Evaluation)

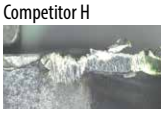


Machining Time: 5 min

SX Chipbreaker (PR015S)

Competitor G

Competitor H



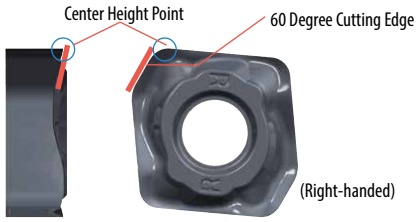
Cutting Conditions: Vc = 130 sfm, D.O.C. = 0.079", f = 0.010 ipr, Wet
CNMM43XL-SX, CNMG433 Type Workpiece: Nickel-based Superalloy

SX Chipbreaker and PR015S resist notching, thereby improving tool life

Caution when Using SX Chipbreaker

1. Cutting Edge Height

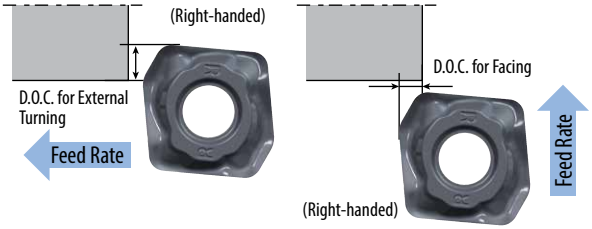
The center of the cutting edge height of the nose is slanted by 60 degrees based on circled portions in image below



2. Recommended D.O.C.

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

Insert Part Number	Recommended D.O.C. External Turning (in)	Max. D.O.C. Facing (in)
CNMM43X□-SX	0.020 - **0.079** - 0.158	0.079
CNMM54X□-SX	0.020 - **0.098** - 0.177	0.079
CNMM64X□-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

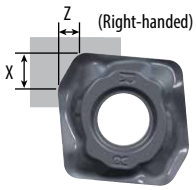
Insert Part Number	Applicable Toolholder (Kyocera)	Standard Shim	**Shim for SX Chipbreaker**
CNMM43X□-SX	DCLN□12-4B DCLN□16-4D DCLN□2020K-12 DCLN□2525M-12	DC-44	**DC-44-C**
	PCLN□12-4B PCLN□16-4D PCLN□2020H-12 PCLN□2020K-12 PCLN□2525M-12 PCLN□3225P-12	LC-42N	**LC-42N-C**
CNMM54X□-SX	PCLN□2525M-16 PCLN□3232P-16	LC-53N	**LC-53N-C**
CNMM64X□-SX	PCLN□3232P-19	LC-63	**LC-63-C**

Boring is Not Recommended

4. Unmachined Portion Varies with Insert Size

Unmachined portion is reflected below

Insert Part Number	Amount Uncut (in)	
	X	Z
CNMM43X□-SX	0.161	0.114
CNMM54X□-SX	0.189	0.130
CNMM64X□-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)

Insert Part Number	Run-out Amount when Facing (in)
CNMM43X□-SX	0.030
CNMM54X□-SX	0.033
CNMM64X□-SX	0.041

The SX chipbreaker is designed for high efficiency roughing. It differs from standard inserts by the following

- Handed, single-sided, 2-corner 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)

SG Chipbreaker for Roughing

NEW

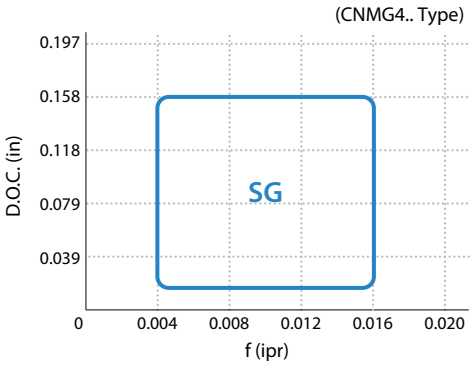
Double-sided 4-Corner Design

Improved Efficiency for Roughing Applications in Heat-resistant Alloys

SG Chipbreaker Benefits

Well-balanced axial face shape for extended tool life
Shallow bottom chipbreaker design for smooth chip control

Applicable Chipbreaker Range
(D.O.C. Indicates Radial Depth of Cut per Side)



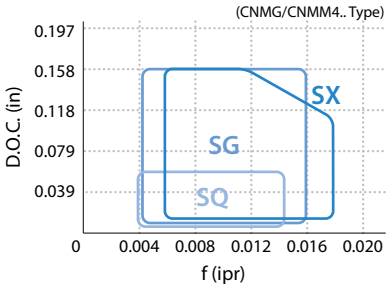
Standard Chipbreaker

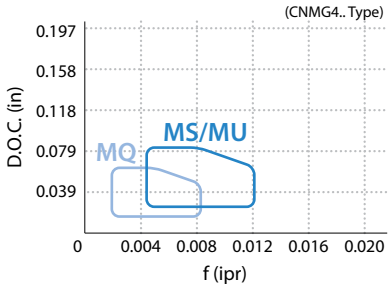
Stable chip control during heavy machining applications

Well-balanced Axial Face Shape

High-strength land and low cutting force design

Applicable Chipbreaker Range (D.O.C. Indicates Radial Depth of Cut per Side)





Recommended Cutting Conditions

Workpiece	Cutting Range	Application	Recommended Chipbreaker	Recommended Grade	Min. - Recommendation - Max.		
					Vc (sfm)	D.O.C. (in)	f (ipr)
Heat-Resistant Alloys	Finishing	Continuous	MQ	PR005S	100 – **180** – 300	0.008 – **0.012** – 0.039	0.002 – **0.003** – 0.006
		Interruption		PR015S	80 – **150** – 230	0.008 – **0.020** – 0.039	0.002 – **0.004** – 0.008
	Medium	Continuous	MU	PR005S	100 – **180** – 300	0.020 – **0.039** – 0.079	0.004 – **0.006** – 0.012
		Interruption		PR015S	80 – **150** – 230	0.020 – **0.039** – 0.079	0.004 – **0.006** – 0.012
		Continuous	MS	PR005S	100 – **180** – 300	0.020 – **0.039** – 0.079	0.004 – **0.006** – 0.012
		Interruption		PR015S	80 – **150** – 230	0.020 – **0.039** – 0.079	0.004 – **0.006** – 0.012
		Continuous	SQ	PR005S	100 – **180** – 300	0.012 – **0.020** – 0.059	0.004 – **0.007** – 0.014
		Interruption		PR015S	80 – **150** – 230	0.012 – **0.020** – 0.059	0.004 – **0.007** – 0.014
	Roughing	Continuous	SG	PR005S	100 – **180** – 300	0.020 – **0.079** – 0.158	0.004 – **0.012** – 0.016
		Interruption		PR015S	80 – **150** – 230	0.020 – **0.079** – 0.158	0.004 – **0.012** – 0.016
		Continuous	SX	PR005S	100 – **180** – 300	0.020 – **0.079** – 0.158	0.006 – **0.012** – 0.018
		Interruption		PR015S	80 – **150** – 230	0.020 – **0.079** – 0.158	0.006 – **0.012** – 0.018

Negative Inserts

● Continuous / 1st Choice
◒ Light Interruption / 1st Choice

Shape	Part Number	S	IC	Thickness	Hole	Corner-R (rε)	Heat-Resistant Alloy PR005S ●	Heat-Resistant Alloy PR015S ◒
 Finishing-Medium	CNMG 431SQ	1/2	3/16	0.203	1/64		●	●
	CNMG 432SQ				1/32		●	●
	CNMG 433SQ				3/64		●	●
	CNMG 543SQ	5/8	1/4	0.250	3/64		●	●
	CNMG 544SQ				1/16		●	●
	CNMG 643SQ	3/4	1/4	0.313	3/64		●	●
	CNMG 644SQ				1/16		●	●
 Finishing-Medium	CNMG 431MQ	1/2	3/16	0.203	1/64		●	●
	CNMG 432MQ				1/32		●	●
 Medium-Roughing	CNMG 431MS	1/2	3/16	0.203	1/64		●	●
	CNMG 432MS				1/32		●	●
	CNMG 433MS				3/64		●	●
	CNMG 434MS				1/16		●	●
 Medium-Roughing	CNMG 431MU	1/2	3/16	0.203	1/64		●	●
	CNMG 432MU				1/32		●	●
	CNMG 433MU				3/64		●	●
	CNMG 542MU	5/8	1/4	0.250	1/32		●	●
	CNMG 543MU				3/64		●	●
	CNMG 544MU				1/16		●	●
	CNMG 643MU	3/4	1/4	0.313	3/64		●	●
	CNMG 644MU				1/16		●	●
NEW  Roughing	CNMG 432SG	1/2	3/16	0.203	1/32		●	●
	CNMG 433SG				3/64		●	●
	CNMG 543SG	5/8	1/4	0.250	3/64		●	●
	CNMG 544SG				1/16		●	●
	CNMG 643SG	3/4	1/4	0.313	3/64		●	●
	CNMG 644SG				1/16		●	●
 Roughing	CNMM 43X*-SX*	1/2	0.174	0.203	–		●	●
	CNMM 54X*-SX*	5/8	0.235	0.250	–		●	●
	CNMM 64X*-SX*	3/4	0.233	0.313	–		●	●
 Finishing-Medium	DNMG 431SQ	1/2	3/16	0.203	1/64		●	●
	DNMG 432SQ				1/32		●	●
	DNMG 433SQ				3/64		●	●
	DNMG 441SQ	1/2	1/4	0.203	1/64		●	●
	DNMG 442SQ				1/32		●	●
	DNMG 443SQ				3/64		●	●
 Finishing-Medium	DNMG 431MQ	1/2	3/16	0.203	1/64		●	●
	DNMG 432MQ				1/32		●	●
	DNMG 441MQ	1/2	1/4	0.203	1/64		●	●
	DNMG 442MQ				1/32		●	●
 Medium-Roughing	DNMG 431MS	1/2	3/16	0.203	1/64		●	●
	DNMG 432MS				1/32		●	●
	DNMG 433MS				3/64		●	●
	DNMG 441MS	1/2	1/4	0.203	1/64		●	●
	DNMG 442MS				1/32		●	●
	DNMG 443MS				3/64		●	●
 Medium-Roughing	DNMG 431MU	1/2	3/16	0.203	1/64		●	●
	DNMG 432MU				1/32		●	●
	DNMG 441MU	1/2	1/4	0.203	1/64		●	●
	DNMG 442MU				1/32		●	●
NEW  Roughing	DNMG 432SG	1/2	3/16	0.203	1/32		●	●
	DNMG 433SG				3/64		●	●

● Continuous / 1st Choice
◒ Light Interruption / 1st Choice

Shape	Part Number	S	IC	Thickness	Hole	Corner-R (rε)	Heat-Resistant Alloy PR005S ●	Heat-Resistant Alloy PR015S ◒
 Finishing-Medium	SNMG 431MQ	1/2	3/16	0.203	1/64		●	●
	SNMG 432MQ				1/32		●	●
 Medium-Roughing	SNMG 431MS	1/2	3/16	0.203	1/64		●	●
	SNMG 432MS				1/32		●	●
	SNMG 433MS				3/64		●	●
	SNMG 434MS				1/16		●	●
 Medium-Roughing	SNMG 643MU	3/4	1/4	0.313	3/64		●	●
	SNMG 644MU				1/16		●	●
NEW  Roughing	SNMG 432SG	1/2	3/16	0.203	1/32		●	●
	SNMG 433SG				3/64		●	●
	SNMG 643SG	3/4	1/4	0.313	3/64		●	●
	SNMG 644SG				1/16		●	●
 Finishing-Medium	TNMG 331MQ	3/8	3/16	0.150	1/64		●	●
	TNMG 332MQ				1/32		●	●
 Medium-Roughing	TNMG 331MS	3/8	3/16	0.150	1/64		●	●
	TNMG 332MS				1/32		●	●
	TNMG 333MS				3/64		●	●
 Medium-Roughing	TNMG 331MU	3/8	3/16	0.150	1/64		●	●
	TNMG 332MU				1/32		●	●
NEW  Roughing	TNMG 332SG	3/8	3/16	0.150	1/32		●	●
	TNMG 333SG				3/64		●	●
	TNMG 432SG	1/2	3/16	0.203	1/32		●	●
	TNMG 433SG				3/64		●	●
 Finishing-Medium	VNMG 331MQ	3/8	3/16	0.150	1/64		●	●
	VNMG 332MQ				1/32		●	●
 Medium-Roughing	VNMG 331MS	3/8	3/16	0.150	1/64		●	●
	VNMG 332MS				1/32		●	●
	VNMG 333MS				3/64		●	●
 Medium-Roughing	VNMG 331MU	3/8	3/16	0.150	1/64		●	●
	VNMG 332MU				1/32		●	●
NEW  Roughing	VNMG 331SG	3/8	3/16	0.150	1/64		●	●
	VNMG 332SG				1/32		●	●
 Finishing-Medium	WNMG 431MQ	1/2	3/16	0.203	1/64		●	●
	WNMG 432MQ				1/32		●	●
 Medium-Roughing	WNMG 431MS	1/2	3/16	0.203	1/64		●	●
	WNMG 432MS				1/32		●	●
	WNMG 433MS				3/64		●	●
 Medium-Roughing	WNMG 431MU	1/2	3/16	0.203	1/64		●	●
	WNMG 432MU				1/32		●	●
NEW  Roughing	WNMG 432SG	1/2	3/16	0.203	1/32		●	●
	WNMG 433SG				3/64		●	●

CNMM…X-SX inserts are single-sided with 2 cutting edges.

***CNMM…X*-SX inserts require a different shim sold seperately. See page ➔ 5 for applicable shim for SX chipbreaker inserts.**

● : Standard Stock

Inserts sold in 10 piece boxes

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