

PVD Coating for Heat-Resistant Alloy

PR115S/PR120S



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



PVD Coating for Heat-Resistant Alloy

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 temperature (°C), the workpiece is likely to harden and insert damage is extremely rapid.

Crater wear

Worsening chip control, etc.

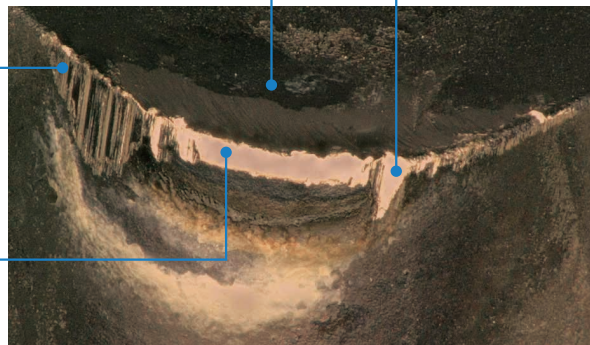
Diminishing wear damage from notching

Surface roughness
Deteriorating dimensional accuracy, etc.

Abrasive wear

Cutting force
Increased cutting heat

< Insert damaged image >



Diminishing damage from notching
Burr occurs

SOLUTION

With excellent heat resistance, wear resistance and stability, achieving 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)**



HRSA(Heat Resistant Super Alloy)
Exceptional Endurance. Maximum Tool Life.

Video



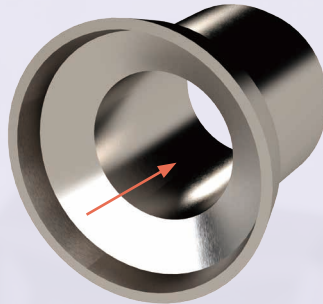
MEGACOAT TOUGH | HRSA |

Case Studies

SOLUTION ①

Airplane parts Ni-based heat-resistant alloy

Cutting conditions : Vc = 30 m/min, ap = 1.0 mm, f = 0.08 mm/rev, Wet
CCGT09T304MFP-GQ PR115S



Tool life

PR115S 20 pcs/edge

Tool life

1.3x

Competitor A

15 pcs/edge

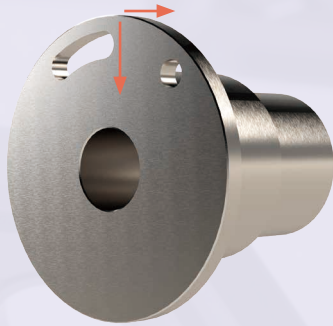
PR115S provides 1.3 times longer tool life in airplane parts machining, which requires high heat resistance

(User evaluation)

SOLUTION ②

Agricultural machine engine parts SUH600

Cutting conditions : Vc = 45 m/min, ap = 0.4 mm, f = 0.15 mm/rev, Wet
WNMG080408MQ PR120S



Tool life

PR120S 140 pcs/edge

Tool life

1.5x

Competitor B

90 pcs/edge

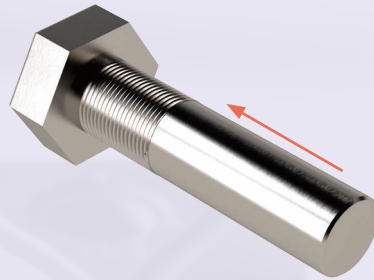
PR120S provides longer tool life in all six edges and ensures stable machining

(User evaluation)

SOLUTION ③

Bolt SUS304

Cutting conditions : Vc = 135 m/min, ap = 1.5 mm, f = 0.25 mm/rev, Wet
TNMG160408MQ 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

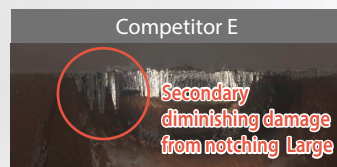
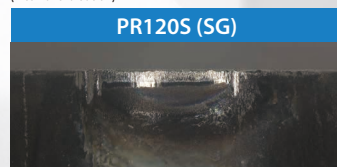
Cutting edge condition after 7.4 min machining
(Internal evaluation)



Cutting conditions :
Vc = 60 m/min, ap = 0.5 mm, f = 0.1 mm/rev,
Wet INCONEL718 CNMG120408 Type

PR120S

Cutting edge condition after 15 min machining
(Internal evaluation)



Cutting conditions :
Vc = 40 m/min, ap = 0.5 mm, f = 0.1 mm/rev,
Wet INCONEL718 CNMG120408 Type

Supports small parts machining of stainless steel

SUS316L cutting performance

PR120S

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



Cutting conditions : Vc = 150 m/min, ap = 1.0 mm, f = 0.08 mm/rev,
Wet, SUS316L, DCGT11T304 Type

2

Unique carbide substrate with excellent heat resistance and New coating “MEGACOAT TOUGH”

PR115S

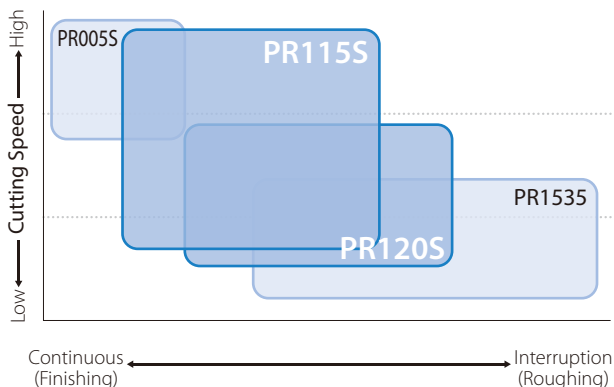
Covers a wide range of difficult-to-cut material machining applications
1st recommendation for continuous finishing of heat-resistant alloys

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

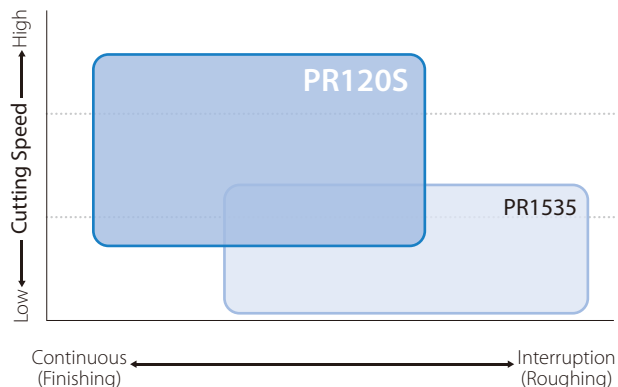
S

Heat-Resistant Alloys Application map



M

Stainless Steel Application map



Carbide Substrate and Coating

< Section image >



MEGACOAT TOUGH | HRSA |

“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 **surpress crater wear**

3. Special adhesive layer

Check
Improved adhesion of the coating with **notching control**

4. Unique carbide substrate

Specializes in heat-resistant alloys

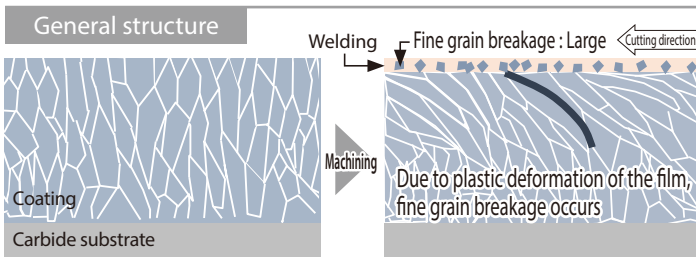




1. Wear resistant layer

Thick-film PVD suppresses abrasive wear
Reduces notch damage with ultra-fine grain structure

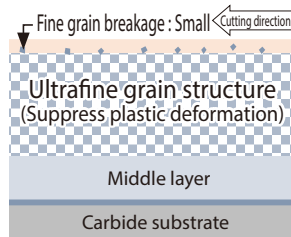
Damage to the coating during machining of heat-resistant alloys (Image)



PR115S/PR120S

Due to ultrafine structure of the membrane, controls fine grain breakage

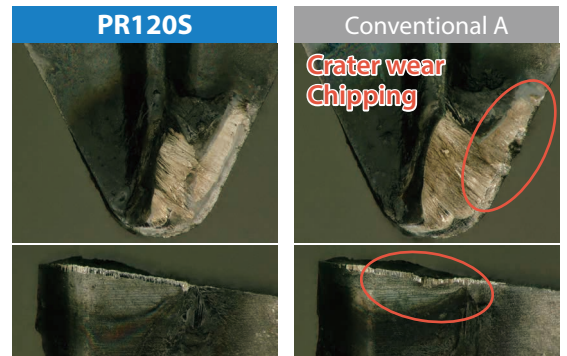
Due to grain breakage and dropping of welding, controls wear and tear



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 = 150 m/min, ap = 1.0 mm, f = 0.08 mm/rev, Wet SUS316L DCGT11T304 Type

3. Special adhesive layer

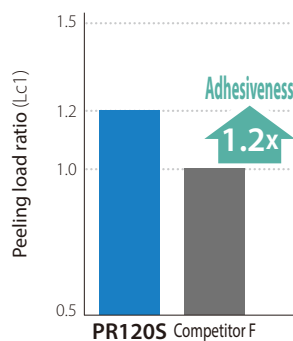
Check

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

Scratch test results

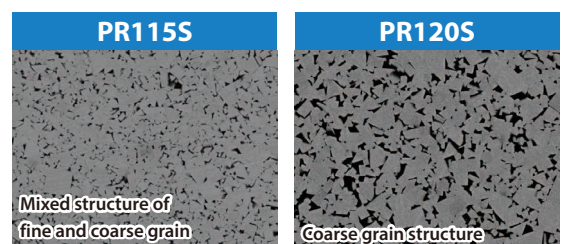


Peeling load (Lc1)
(Internal evaluation)



4. Unique carbide substrate

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



Excellent heat resistance

Excellent heat resistance and stability

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



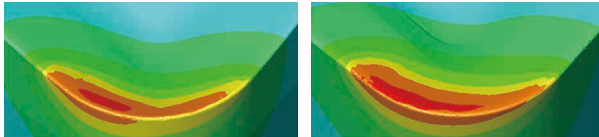
Special rake face design decreases cutting edge temperature

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)



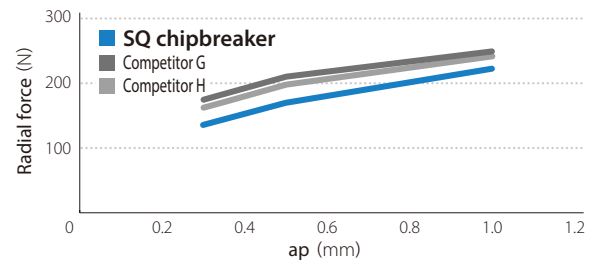
SQ chipbreaker

Conventional B

Cutting conditions: $V_c = 40$ m/min, $a_p = 1.0$ mm, $f = 0.15$ mm/rev,
Dry CNMG120408 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: $V_c = 40$ m/min, $f = 0.15$ mm/rev, Wet, CNMG120408 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



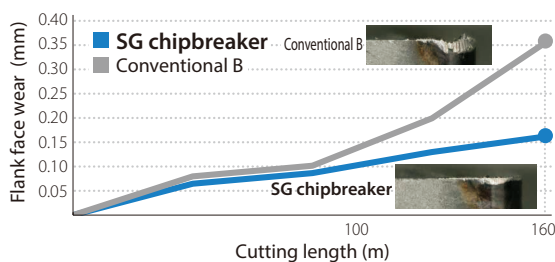
Standard chipbreaker

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: $V_c = 80$ m/min, $a_p = 1.0$ mm, $f = 0.20$ mm/rev, Wet, CNMG120408 Type
Workpiece: INCONEL718

SX chipbreaker for high efficiency roughing

Improved efficiency for roughing in heat-resistant alloys

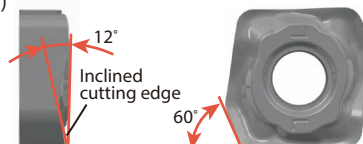
SX chipbreaker benefits

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











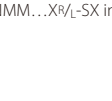


Rake design decreases temperature at the cutting edge













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

Stock Items (Negative) M Class





Shape Handed Insert shows Right-hand	Description	Dimensions (mm)				PR1155	PR1205	PR1535
		I.C.	Thickness	Hole Diameter	Corner R (RE)			
	CNMG 120404SQ	12.70	4.76	5.16	0.4	●	●	
	120408SQ				0.8	●	●	
	120412SQ				1.2	●	●	
	CNMG 160612SQ	15.875	6.35	6.35	1.2	●	●	
	160616SQ				1.6	●	●	
	CNMG 190612SQ	19.05	6.35	7.94	1.2	●	●	
190616SQ	1.6				●	●		
	CNMG 120404MQ	12.70	4.76	5.16	0.4	●	●	●
	120408MQ				0.8	●	●	●
	CNMG 120404MS	12.70	4.76	5.16	0.4	●	●	●
	120408MS				0.8	●	●	●
	120412MS				1.2	●	●	●
	120416MS				1.6	●	●	●
	CNMG 120404MU	12.70	4.76	5.16	0.4	●	●	●
	120408MU				0.8	●	●	●
	120412MU				1.2	●	●	●
	CNMG 160608MU	15.875	6.35	6.35	0.8	●	●	●
	160612MU				1.2	●	●	●
	160616MU				1.6	●	●	●
	CNMG 190612MU	19.05	6.35	7.94	1.2	●	●	●
	190616MU				1.6	●	●	●
	CNMG 120404TK	12.70	4.76	5.16	0.4	●	●	●
	120408TK				0.8	●	●	●
	CNMG 120408SG	12.70	4.76	5.16	0.8	●	●	●
	120412SG				1.2	●	●	●
	CNMG 160612SG	15.875	6.35	6.35	1.2	●	●	●
	160616SG				1.6	●	●	●
	CNMG 190612SG	19.05	6.35	7.94	1.2	●	●	●
	190616SG				1.6	●	●	●
	CNMM 1204X ^{R/L} -SX	12.70	4.42	5.16	-	●	●	
	CNMM 1606X ^{R/L} -SX	15.875	5.96	6.35	-	●	●	
	CNMM 1906X ^{R/L} -SX	19.05	5.93	7.94	-	●	●	
	DNMG 150404SQ	12.70	4.76	5.16	0.4	●	●	
	150408SQ				0.8	●	●	
	150412SQ				1.2	●	●	
	DNMG 150604SQ	12.70	6.35	5.16	0.4	●	●	
	150608SQ				0.8	●	●	
	150612SQ				1.2	●	●	
	DNMG 150404MQ	12.70	4.76	5.16	0.4	●	●	●
	150408MQ				0.8	●	●	●
	DNMG 150604MQ	12.70	6.35	5.16	0.4	●	●	●
	150608MQ				0.8	●	●	●





CNMM...X^{R/L}-SX inserts are single-sided with 2 cutting edges

Shape	Description	Dimensions (mm)				PR1155	PR1205	PR1535
		I.C.	Thickness	Hole Diameter	Corner R (RE)			
	DNMG 150404MS	12.70	4.76	5.16	0.4	●	●	●
	150408MS				0.8	●	●	●
	150412MS				1.2	●	●	●
	DNMG 150604MS	12.70	6.35	5.16	0.4	●	●	●
	150608MS				0.8	●	●	●
	150612MS				1.2	●	●	●
	DNMG 150404MU	12.70	4.76	5.16	0.4	●	●	●
	150408MU				0.8	●	●	●
	DNMG 150604MU	12.70	6.35	5.16	0.4	●	●	●
	150608MU				0.8	●	●	●
	DNMG 150408SG	12.70	4.76	5.16	0.8	●	●	●
	150412SG				1.2	●	●	●
	DNMG 150608SG	12.70	6.35	5.16	0.8	●	●	●
	150612SG				1.2	●	●	●
	SNMG 120404MQ	12.70	4.76	5.16	0.4	●	●	●
	120408MQ				0.8	●	●	●
	SNMG 120404MS	12.70	4.76	5.16	0.4	●	●	●
	120408MS				0.8	●	●	●
	120412MS				1.2	●	●	●
	120416MS				1.6	●	●	●
	SNMG 190612MU	19.05	6.35	7.94	1.2	●	●	●
	190616MU				1.6	●	●	●
	SNMG 120408SG	12.70	4.76	5.16	0.8	●	●	●
	120412SG				1.2	●	●	●
	SNMG 150612SG	15.875	6.35	6.35	1.2	●	●	
	150616SG				1.6	●	●	
	SNMG 190612SG	19.05	6.35	7.94	1.2	●	●	●
	190616SG				1.6	●	●	●
	TNMG 160404MQ	9.525	4.76	3.81	0.4	●	●	●
	160408MQ				0.8	●	●	●
	TNMG 160404MS	9.525	4.76	3.81	0.4	●	●	●
	160408MS				0.8	●	●	●
	160412MS				1.2	●	●	●
	TNMG 160404MU	9.525	4.76	3.81	0.4	●	●	●
	160408MU				0.8	●	●	●
	TNMG 160408SG	9.525	4.76	3.81	0.8	●	●	●
	160412SG				1.2	●	●	●
	TNMG 220408SG	12.70	4.76	5.16	0.8	●	●	●
	220412SG				1.2	●	●	●

●: Standard Stock



Stock Items (Negative) M Class



Shape	Description	Dimensions (mm)				PR1155	PR1205	PR1535
		I.C.	Thickness	Hole Diameter	Corner R (RE)			
 Finishing-Medium	VNMG 160404MQ 160408MQ	9.525	4.76	3.81	0.4	●	●	●
	0.8				●	●	●	
 Medium-Roughing	VNMG 160404MS 160408MS 160412MS	9.525	4.76	3.81	0.4	●	●	●
	0.8				●	●	●	
	1.2				●	●	●	
 Medium-Roughing	VNMG 160404MU 160408MU	9.525	4.76	3.81	0.4	●	●	●
	0.8				●	●	●	
 Roughing	VNMG 160404SG 160408SG	9.525	4.76	3.81	0.4	●	●	●
	0.8				●	●	●	

Shape	Description	Dimensions (mm)				PR1155	PR1205	PR1535
		I.C.	Thickness	Hole Diameter	Corner R (RE)			
 Finishing-Medium	WNMG 080404MQ 080408MQ	12.70	4.76	5.16	0.4	●	●	●
	0.8				●	●	●	
 Medium-Roughing	WNMG 080404MS 080408MS 080412MS	12.70	4.76	5.16	0.4	●	●	●
	0.8				●	●	●	
	1.2				●	●	●	
 Medium-Roughing	WNMG 080404MU 080408MU	12.70	4.76	5.16	0.4	●	●	●
	0.8				●	●	●	
 Roughing	WNMG 080408SG 080412SG	12.70	4.76	5.16	0.8	●	●	●
	1.2				●	●	●	

● : Standard Stock

Stock Items (Negative) G Class

Shape	Description	Dimensions (mm)				PR1155	PR1205	PR1535
		I.C.	Thickness	Hole Diameter	Corner R (RE)			
 Finishing-Medium / Sharp Edge / Polished	CNGG 120402MFP-SK 120404MFP-SK	12.70	4.76	5.16	<0.2	●	●	●
	<0.4				●	●	●	
 Finishing-Medium / Sharp Edge / Polished	DNGG 150402MFP-SK 150404MFP-SK	12.70	4.76	5.16	<0.2	●	●	●
	<0.4				●	●	●	

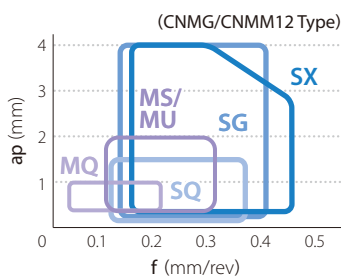
Shape	Description	Dimensions (mm)				PR1155	PR1205	PR1535
		I.C.	Thickness	Hole Diameter	Corner R (RE)			
 Finishing-Medium / Sharp Edge / Polished	TNGG 160401MFP-SK 160402MFP-SK 160404MFP-SK	9.525	4.76	3.81	<0.1	●	●	●
	<0.2				●	●	●	
	<0.4				●	●	●	
 Finishing-Medium / Sharp Edge / Polished	VNGG 160402MFP-SK 160404MFP-SK	9.525	4.76	3.81	<0.2	●	●	●
	<0.4				●	●	●	

Insert with corner R (RE) dimension expressed with less than sign (e.g. <0.1, <0.2 etc.) indicates models with minus tolerance for corner R (RE)

● : Standard Stock

Applicable Chipbreaker Range (ap Indicates radial depth of cut per side)

Heat-Resistant Alloys



Cutting Range

Finishing
ap : 0.2 - 1.0 mm

Medium-Roughing
ap : 0.5 - 4.0 mm

Medium-Roughing
ap : 0.5 - 4.0 mm

Recommended Chipbreaker

SQ
Chipbreaker

Issue : Finished surfaces, chip control

SG
Chipbreaker

Issue : Finished surfaces, chip control

SX
Chipbreaker

Advantage
Notching control

Advantage
General Purpose/
1st Recommendation

Advantage
Minimize Burrs
⇒ Greater Depths of Cut

MQ
Chipbreaker

Cutting Range
ap : 0.5 - 2.0 mm

MS
Chipbreaker

MU
Chipbreaker

Advantage

Low Cutting Force/
Chip Control

Advantage

Cutting Edge
Damage Control

Advantage

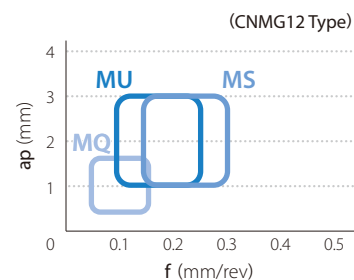
Low Cutting Force/
Chip Control

Recommended Cutting Conditions

Workpiece	Cutting Range	Application	Recommended Chipbreaker	Recommended Grade	Min. – Recommendation – Max.			
					Vc (m/min)	ap (mm)	f (mm/rev)	
Heat-Resistant Alloys	Finishing	Continuous	MQ	PR115S	25 – 45 – 70	0.2 – 0.5 – 1.0	0.05 – 0.1 – 0.2	
		Light Interruption		PR120S	25 – 40 – 60			
	Finishing-Medium	Continuous	SQ	PR115S	25 – 45 – 70	0.3 – 0.5 – 1.5	0.1 – 0.17 – 0.35	
		Light Interruption		PR120S	25 – 40 – 60			
		Continuous	SK	PR115S	25 – 45 – 70	0.5 – 1.0 – 1.5	0.03 – 0.05 – 0.1	
		Light Interruption		PR120S	25 – 40 – 60			
	Medium-Roughing	Continuous	MU	PR115S	25 – 45 – 70	0.5 – 1.0 – 2.0	0.1 – 0.15 – 0.3	
		Light Interruption		PR120S	25 – 40 – 60			
		Heavy Interruption		PR153S	25 – 30 – 45			
		Continuous	MS	PR115S	25 – 45 – 70	0.5 – 1.0 – 2.0	0.1 – 0.15 – 0.3	
		Light Interruption		PR120S	25 – 40 – 60			
		Heavy Interruption		PR153S	25 – 30 – 45			
		Continuous	TK	PR115S	25 – 45 – 70	1.0 – 2.0 – 3.0	0.12 – 0.2 – 0.3	
		Light Interruption		PR120S	25 – 40 – 60			
		Heavy Interruption		PR153S	25 – 30 – 45			
	Roughing	Continuous	SG	PR115S	25 – 45 – 70	0.5 – 2.0 – 4.0	0.1 – 0.3 – 0.4	
		Light Interruption		PR120S	25 – 40 – 60			
		Heavy Interruption		PR153S	25 – 30 – 45			
		Continuous	SX	PR115S	25 – 45 – 70	0.5 – 2.0 – 4.0	0.15 – 0.3 – 0.45	
		Light Interruption		PR120S	25 – 40 – 60			
		Heavy Interruption		PR153S	25 – 30 – 45			
	Stainless Steel (Austenitic related)	Finishing	Continuous	MQ	PR120S	100 – 140 – 180	0.5 – 1.0 – 1.5	0.05 – 0.1 – 0.15
			Interruption		PR153S			
		Finishing-Medium	Continuous	SK	PR120S	80 – 120 – 150	0.5 – 1.5 – 2.0	0.03 – 0.05 – 0.1
Interruption			PR153S					
Medium-Roughing		Continuous	MU	PR120S	80 – 120 – 150	1.0 – 2.0 – 3.0	0.1 – 0.15 – 0.25	
		Interruption		PR153S			0.15 – 0.25 – 0.3	
		Continuous	MS	PR120S	80 – 120 – 150	1.0 – 2.0 – 3.0	0.15 – 0.2 – 0.3	
		Interruption		PR153S			0.2 – 0.3 – 0.4	
		Continuous	TK	PR120S	80 – 120 – 150	1.0 – 2.0 – 4.0	0.1 – 0.2 – 0.3	
		Interruption		PR153S			0.2 – 0.3 – 0.4	
Stainless Steel (Precipitation Hardening)		Finishing	Continuous	MQ	PR120S	80 – 100 – 120	0.5 – 1.0 – 1.5	0.05 – 0.1 – 0.15
			Interruption		PR153S			
	Medium-Roughing	Continuous	MU	PR120S	80 – 100 – 120	1.0 – 2.0 – 3.0	0.1 – 0.15 – 0.25	
		Interruption		PR153S			0.15 – 0.25 – 0.3	
		Continuous	MS	PR120S	80 – 100 – 120	1.0 – 2.0 – 3.0	0.15 – 0.2 – 0.3	
		Interruption		PR153S			0.2 – 0.3 – 0.4	
		Continuous	TK	PR120S	80 – 100 – 120	1.0 – 2.0 – 4.0	0.1 – 0.2 – 0.3	
		Interruption		PR153S			0.2 – 0.3 – 0.4	

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

Stainless Steel



Cutting Range

Finishing
ap : 0.5 - 1.5 mm

Finishing-Medium
ap : 1.0 - 3.0 mm

Recommended Chipbreaker

MQ

Chipbreaker



Advantage
Low Cutting Force/
Chip Control

MS

Chipbreaker



Advantage
Cutting Edge
Damage Control

Issue : Finished surfaces, chip control










MU









Chipbreaker



Advantage
Low Cutting Force/
Chip Control

Stock Items (Positive)

Shape	Description	Dimensions (mm)					PRI155	PRI205	PRI535	
		I.C.	Thickness	Hole Diameter	Corner R (RE)	Relief Angle				
	CCGT 0602005MFP-SKS	6.35	2.38	3	<0.05	7°	●	●	●	
	060201MFP-SKS				<0.1		●	●	●	
	060202MFP-SKS				<0.2		●	●	●	
		CCGT 09T3005MFP-SKS	9.525	3.97	4.7	<0.05	7°	●	●	●
		09T301MFP-SKS				<0.1		●	●	●
		09T302MFP-SKS				<0.2		●	●	●
09T304MFP-SKS		<0.4				●		●	●	
	CCGT 060201MFP-SK	6.35	2.38	3	<0.1	7°	●	●	●	
	060202MFP-SK				<0.2		●	●	●	
	060204MFP-SK				<0.4		●	●	●	
		CCGT 09T301MFP-SK	9.525	3.97	4.7	<0.1	7°	●	●	●
		09T302MFP-SK				<0.2		●	●	●
		09T304MFP-SK				<0.4		●	●	●
	CCGT 060201MFP-GQ	6.35	2.38	3	<0.1	7°	●	●	●	
	060202MFP-GQ				<0.2		●	●	●	
	060204MFP-GQ				<0.4		●	●	●	
		CCGT 09T301MFP-GQ	9.525	3.97	4.7	<0.1	7°	●	●	●
		09T302MFP-GQ				<0.2		●	●	●
		09T304MFP-GQ				<0.4		●	●	●
	CCMT 09T304MQ	9.525	3.97	4.7	0.4	7°	●	●	●	
	09T308MQ				0.8		●	●	●	
	DCGT 0702005MFP-SKS	6.35	2.38	3	<0.05	7°	●	●	●	
	070201MFP-SKS				<0.1		●	●	●	
	070202MFP-SKS				<0.2		●	●	●	
		DCGT 11T3005MFP-SKS	9.525	3.97	4.7	<0.05	7°	●	●	●
		11T301MFP-SKS				<0.1		●	●	●
		11T302MFP-SKS				<0.2		●	●	●
11T304MFP-SKS		<0.4				●		●	●	

Shape	Description	Dimensions (mm)					PRI155	PRI205	PRI535	
		I.C.	Thickness	Hole Diameter	Corner R (RE)	Relief Angle				
	DCGT 070201MFP-SK	6.35	2.38	3	<0.1	7°	●	●	●	
	070202MFP-SK				<0.2		●	●	●	
	070204MFP-SK				<0.4		●	●	●	
	DCGT 11T301MFP-SK	9.525	3.97	4.7	<0.1	7°	●	●	●	
	11T302MFP-SK				<0.2		●	●	●	
	11T304MFP-SK				<0.4		●	●	●	
	Finishing / Sharp Edge / Polished									
	DCGT 070201MFP-GQ	6.35	2.38	3	<0.1	7°	●	●	●	
	070202MFP-GQ				<0.2		●	●	●	
	070204MFP-GQ				<0.4		●	●	●	
		DCGT 11T301MFP-GQ	9.525	3.97	4.7	<0.1	7°	●	●	●
		11T302MFP-GQ				<0.2		●	●	●
		11T304MFP-GQ				<0.4		●	●	●
	DCMT 070202MQ	6.35	2.38	3	0.2	7°	●	●	●	
	070204MQ				0.4		●	●	●	
		DCMT 11T304MQ	9.525	3.97	4.7	0.4	7°	●	●	●
		11T308MQ				0.8		●	●	●
	VCGT 110301MFP-SKS	6.35	3.18	2.8	<0.1	7°	●	●	●	
	110302MFP-SKS				<0.2		●	●	●	
	110304MFP-SKS				<0.4		●	●	●	
	VPGT 110301MFP-SKS	6.35	3.18	3	<0.1	11°	●	●	●	
	110302MFP-SKS				<0.2		●	●	●	
	110304MFP-SKS				<0.4		●	●	●	

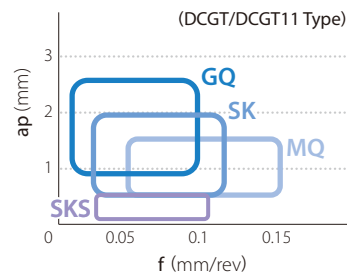
● : Standard Stock

Insert with corner R (RE) dimension expressed with less than sign (e.g. <0.1, <0.2 etc.) indicates models with minus tolerance for corner R (RE)



Applicable Chipbreaker Range (ap Indicates radial depth of cut per side)

Heat-Resistant Alloys



Cutting Range

Finishing
ap : 0.5 - 2.0 mm

Finishing-Medium
ap : 1.0 - 2.5 mm

Recommended Chipbreaker

SK
Chipbreaker



Advantage

General Purpose/
1st Recommendation

Cutting Range
ap : 0.1 - 0.5 mm

SKS
Chipbreaker



Advantage
Chip Control

Issue : Chip control during low cutting

GQ

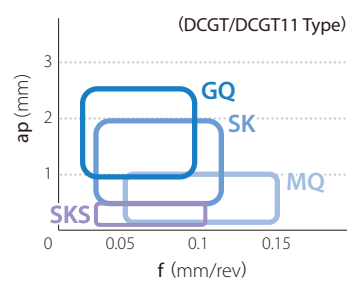
Chipbreaker



Advantage

Chipbreaker width according to ap range
⇒ Can be cut in a wide range of conditions

Stainless Steel



Cutting Range

Finishing
ap : 0.5 - 1.5 mm

Finishing-Medium
ap : 1.0 - 2.5 mm

Recommended Chipbreaker

SK
Chipbreaker



Advantage

General Purpose/
1st Recommendation

Cutting Range
ap : 0.1 - 0.5 mm

SKS
Chipbreaker



Advantage
Chip Control

Issue : Chip control during low cutting

GQ

Chipbreaker



Advantage

Chipbreaker width according to ap range
⇒ Can be cut in a wide range of conditions

Recommended Cutting Conditions

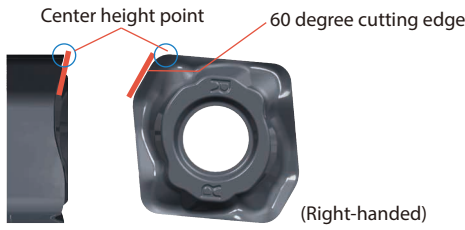
Workpiece	Cutting Range	Recommended Chipbreaker	Recommended Grade	Min. - Recommendation - Max.		
				Vc (m/min)	ap (mm)	f (mm/rev)
Heat-Resistant Alloys	Finishing	MQ	PR115S	25 - 45 - 70	0.5 - 1.0 - 1.5	0.05 - 0.1 - 0.15
			PR120S	25 - 40 - 60		0.08 - 0.15 - 0.2
			PR153S	25 - 30 - 45		
		SKS	PR115S	25 - 45 - 70	0.1 - 0.3 - 0.5	0.03 - 0.05 - 0.1
			PR120S	25 - 40 - 60		
			PR153S	25 - 30 - 45		0.05 - 0.1 - 0.15
		SK	PR115S	25 - 45 - 70	0.5 - 1.0 - 2.0	0.03 - 0.08 - 0.12
			PR120S	25 - 40 - 60		
			PR153S	25 - 30 - 45		0.05 - 0.1 - 0.15
	Finishing-Medium	GQ	PR115S	25 - 45 - 70	1.0 - 1.5 - 2.5	0.02 - 0.05 - 0.08
			PR120S	25 - 40 - 60		
			PR153S	25 - 30 - 45		0.04 - 0.07 - 0.1
Stainless Steel (Austenitic related)	Finishing	MQ	PR120S	80 - 100 - 120	0.3 - 0.5 - 1.0	0.05 - 0.1 - 0.15
			PR153S	60 - 80 - 100		0.08 - 0.15 - 0.2
		SKS	PR120S	80 - 100 - 120	0.1 - 0.3 - 0.5	0.03 - 0.05 - 0.1
			PR153S	60 - 80 - 100		0.05 - 0.1 - 0.15
		SK	PR120S	80 - 100 - 120	0.5 - 1.0 - 2.0	0.03 - 0.08 - 0.12
			PR153S	60 - 80 - 100		0.05 - 0.1 - 0.15
	Finishing-Medium	GQ	PR120S	80 - 100 - 120	1.0 - 1.5 - 2.5	0.02 - 0.05 - 0.08
			PR153S	60 - 80 - 100		0.04 - 0.07 - 0.1
Stainless Steel (Precipitation Hardening)	Finishing	MQ	PR120S	40 - 60 - 80	0.3 - 0.5 - 1.0	0.05 - 0.1 - 0.15
			PR153S	30 - 50 - 70		0.08 - 0.15 - 0.2
		SKS	PR120S	40 - 60 - 80	0.1 - 0.3 - 0.5	0.03 - 0.05 - 0.1
			PR153S	30 - 50 - 70		0.05 - 0.1 - 0.15
		SK	PR120S	40 - 60 - 80	0.5 - 1.0 - 2.0	0.03 - 0.08 - 0.12
			PR153S	30 - 50 - 70		0.05 - 0.1 - 0.15
	Finishing-Medium	GQ	PR120S	40 - 60 - 80	1.0 - 1.5 - 2.5	0.02 - 0.05 - 0.08
			PR153S	30 - 50 - 70		0.04 - 0.07 - 0.1

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

SX Chipbreaker Usage Precautions

1. Cutting Edge Height

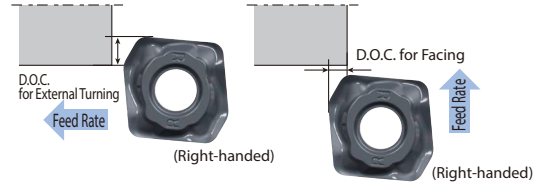
The center of the cutting edge height of the nose is slanted by 60 degrees based on circled portions in image below.



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 (mm)	Max. D.O.C. Facing (mm)
CNMM1204X ^{R/L} -SX	0.5 - 2.0 - 4.0	2.0
CNMM1606X ^{R/L} -SX	0.5 - 2.5 - 4.5	2.0
CNMM1906X ^{R/L} -SX	0.5 - 3.0 - 5.0	2.5



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.

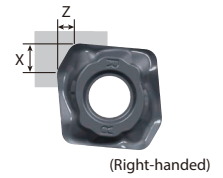
Insert Description	Applicable Toolholder (Kyocera)	Standard Shim	Shim for SX Chipbreaker
CNMM1204X ^{R/L} -SX	DCLN ^{R/L} 2020K-12	DC-44	DC-44-C
	DCLN ^{R/L} 2525M-12		
	PCLN ^{R/L} 2020H-12	LC-42N	LC-42N-C
	PCLN ^{R/L} 2020K-12		
	PCLN ^{R/L} 2525M-12		
PCLN ^{R/L} 3225P-12			
CNMM1606X ^{R/L} -SX	PCLN ^{R/L} 2525M-16	LC-53N	LC-53N-C
	PCLN ^{R/L} 3232P-16		
CNMM1906X ^{R/L} -SX	PCLN ^{R/L} 3232P-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 (mm)	
	X	Z
CNMM1204X ^{R/L} -SX	4.1	2.9
CNMM1606X ^{R/L} -SX	4.8	3.3
CNMM1906X ^{R/L} -SX	5.4	3.6



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 (mm)
CNMM1204X ^{R/L} -SX	0.75
CNMM1606X ^{R/L} -SX	0.85
CNMM1906X ^{R/L} -SX	1.05

The SX Chipbreaker is Uniquely 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)