

Excellent for highly accurate machining of heat-resistant and titanium alloys.



■ US905 a new CVD coated grade for efficient high-speed turning of heat-resistant alloys.



■ Economical W type insert and a notch resistant, large corner radius type available.

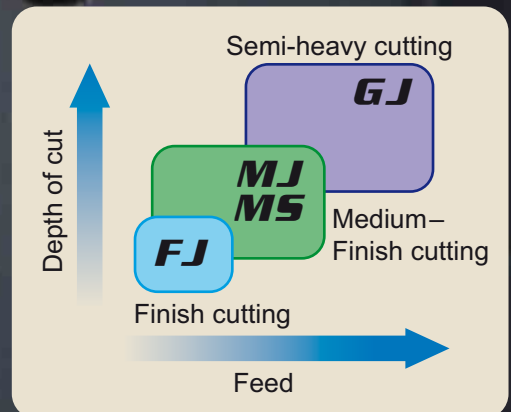
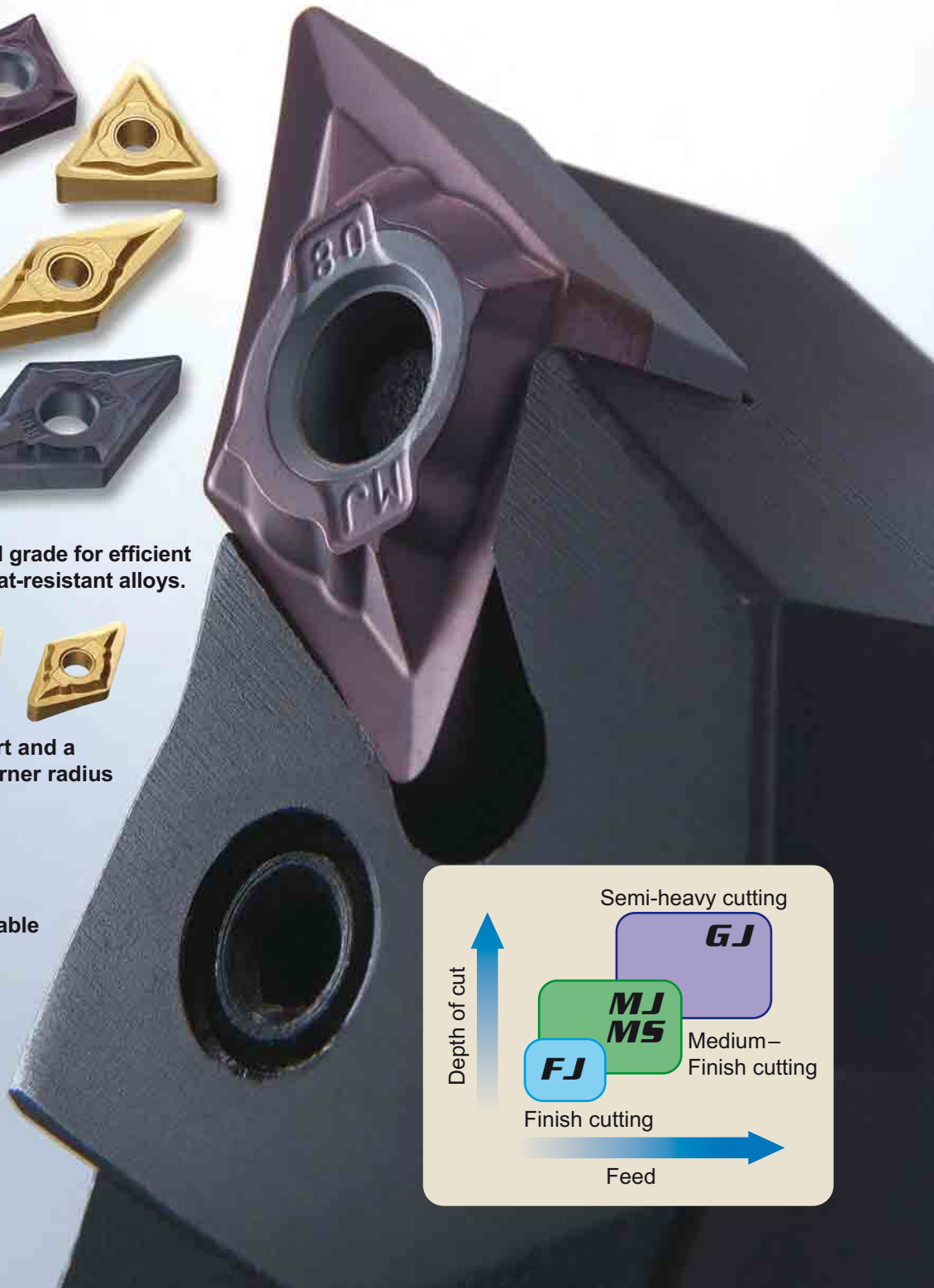


■ RCMX round insert available as standard.



US905

■ CVD coated US905 available for M class MS / GJ breaker.



Special Breakers for Difficult-to-cut Materials

FJ/MJ/GJ/MS breaker

RCMX type insert

Features of FJ/MJ/MS/GJ breaker

FJ breaker Finish cutting G Class

Optimum chip breaker for high accuracy finishing

Variable rake angle
9°-14°

- Reduced heat generation with the use of a sharp cutting edge.
- Superior chip control at very small depths of cut with a special dot type chip breaker.

Cutting edge of FJ breaker (Extremely sharp cutting edge) Cutting edge of a competitors breaker for difficult-to-cut materials.

MJ breaker Medium-Finish cutting M Class

First recommended chip breaker

Variable rake angle
9°-13°

- M-class type with a smooth micro honing for highest sharpness.
- A curved edge design suitable for copy turning.
- A wide variety of corner radii, 0.4-1.6 available as standard.

An industry first M-class type with micro honing.

Cutting edge of an M class MJ breaker. (Extremely sharp cutting edge) Edge of a competitors M class breaker.

MJ breaker Medium-Finish cutting G Class

Variable rake angle
12°-20°

- G-class type with a smooth micro honing for the highest sharpness.
- A curved edge design suitable for copy turning.
- When high accuracy and precise insert positioning are needed, we recommend the use of G-class inserts.

Cutting edge of a G class MJ breaker. (Extremely sharp cutting edge) Cutting edge of a competitors breaker for difficult-to-cut materials.

MS breaker Medium cutting M Class

25°
15°

- The sharp edges reduce cutting temperatures.
- Reduced contact area on the rake face.
- Suppresses heat generation.

GJ breaker Semi-heavy cutting M Class

Ideal for rough turning and machining of surface scale.

18°
Flat land

- Sharpness and high cutting edge strength with an optimum rake angle and flat land.
- Cutting edge geometry optimized for resistance to face wear when cutting titanium alloy.

RCMX Standard breaker Medium cutting M Class **NEW**

18°
0.1

- A smaller lead angle prevents notching.

For effective use of large corner radius and round inserts

By setting the depth of cut smaller than the corner radius value, notching during cutting of heat-resistant alloys can be greatly reduced.

Corner radius > 1.5 x Depth of cut

Depth of cut: 1mm

Corner radius over

1.5 is recommended.

<Cutting conditions>

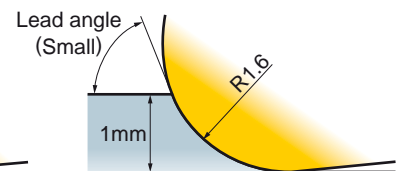
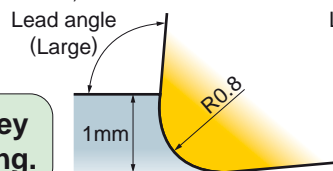
Workpiece : Inconel
 Insert : CNMG1204-MJ (US905)
 Holder : PCLNL2525M12
 Cutting speed: 70m/min
 Feed : 0.2mm/rev
 Depth of cut: 1.0mm
 Coolant : Wet (water soluble)



Cutting time : 1min.



Cutting time : 10 min.



A smaller lead angle is the key to reduced notching.

Grade Features

Application range for heat resistant alloy machining

Properties	Heat-resistant alloy	
		<ul style="list-style-type: none"> ● C D coated S 05 Une ualled wear resistance enables machining at high speeds when compared to conventional products. ● Miracle Coated grade 05R The combination of MIRACLE coating and a high-strength micro-grain cemented carbide substrate increases wear resistance for efficient continous cutting performance. ● Miracle Coated grade 10R A good balance of wear and fracture resistance. First recommendation for turning heat-resistant alloys. Also suitable for stainless steels. ● Miracle Coated grade 15 F High-strength micro-grain cemented carbide substrate. Ideal for interrupted cutting that re uires high fracture resistance.

Features of S 05

C D Coated S 05

Coating
A CVD coating layer with a close micro structure to prevent flank and face wear of edges that are sub ect to very high temperatures.

Substrate
The highest hardness cemented carbide substrate suitable for CVD coating. For reduced plastic deformation and improved dimensional accuracy of components.

Features of MIRACL coating

MIRACL coating features

Material	Oxidation temperature (°C)	Adhesion strength (N)
MIRACL Coating	~820	~80
Competitor s Ti coating grade	~600	~60

Increased heat resistance and Increased adhesion strength are shown as advantages of the MIRACL Coating.

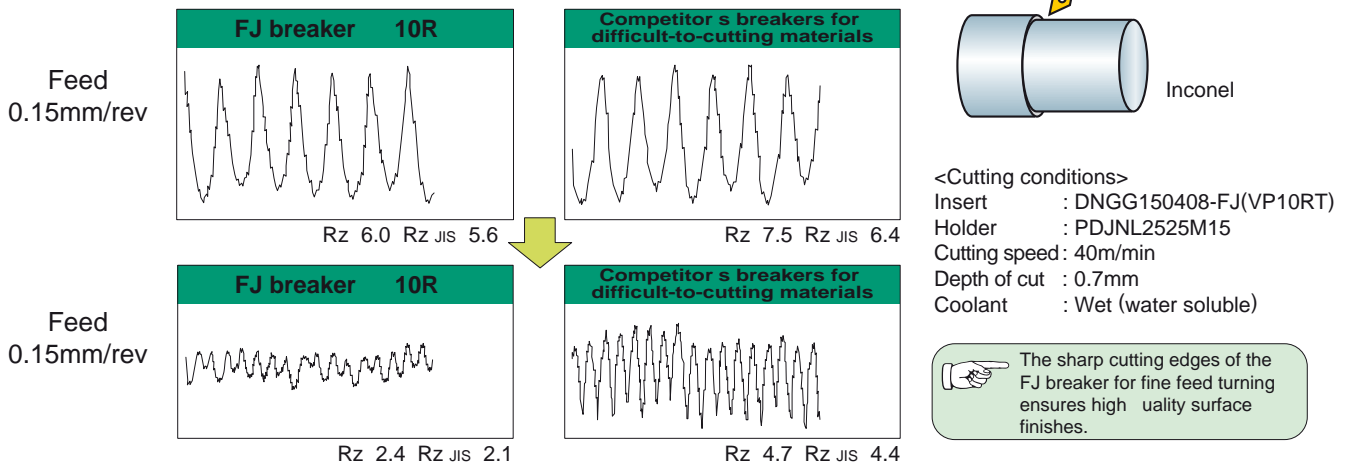
Titanium alloys

Properties	Titanium Alloys	
		<ul style="list-style-type: none"> ● Cemented carbide grade R 005 Unmatched resistance to heat and plastic deformation. Ideal for wear resistant high-speed machining. ● Cemented carbide grade R 010 Good balance of wear and fracture resistance. First choice for turning of titanium alloys. ● Cemented carbide grade F15 High-strength micro-grain cemented carbide grade. Ideal for interrupted cutting that re uires high fracture resistance.

FJ/MJ/GJ/MS breaker

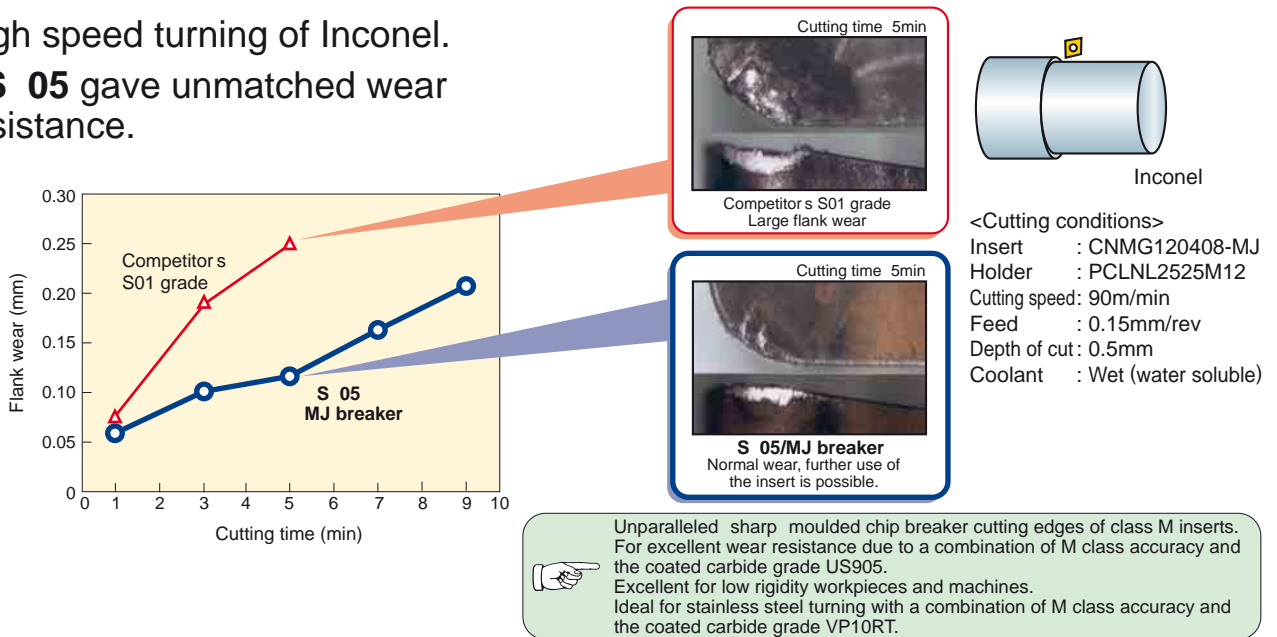
Cutting performance of FJ breaker

● Comparison of surface finishes on Inconel.



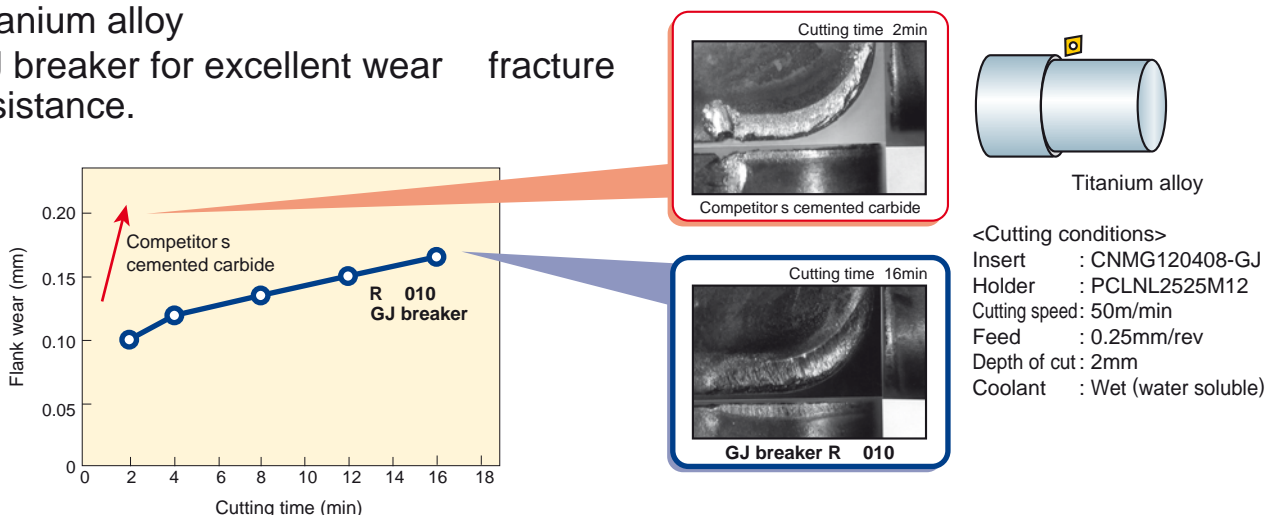
Cutting performance of MJ breaker

● High speed turning of Inconel.
S 05 gave unmatched wear resistance.






Cutting performance of GJ breaker

● Titanium alloy
 GJ breaker for excellent wear fracture resistance.



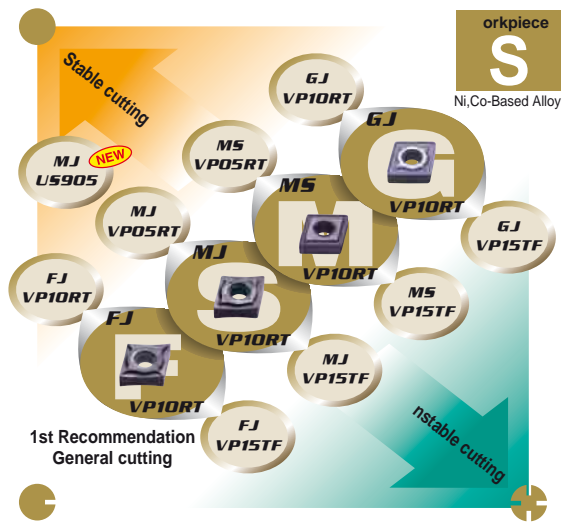
Recommended cutting conditions

Cutting conditions

- 
Stable cutting
 Continuous cutting
 Constant depth of cut machining
 Pre-machined
 Securely clamped component machining
- 
General cutting
- 
Unstable cutting
 Heavy interrupted cutting
 Irregular depth of cut machining
 Low clamping rigidity machining

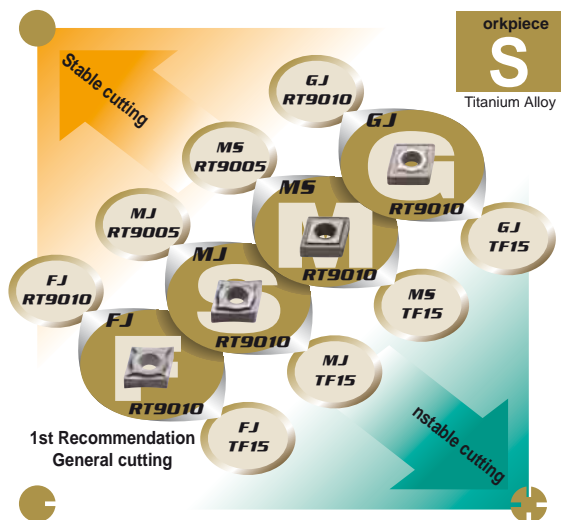
Cutting area

- 
Finish cutting
- 
Medium cutting
- 
Light cutting
- 
Semi-heavy cutting



Negative Inserts for Heat-resistant Alloy

Cutting area	Breaker	1st Recommendation grade	Cutting speed (m/min)	Feed (mm/rev)	Depth of cut (mm)
Finish cutting	FJ	VP10RT	20 60	0.20	0.8
Finish cutting	MJ	VP10RT	20 50	0.20	0.5 1.5
Medium cutting		US905	50 100		
Medium cutting	MS	VP10RT	20 50	0.10 0.25	0.5 2.0
Semi-heavy cutting	GJ	VP10RT	20 40	0.15 0.30	1.0 3.0



Negative Inserts for Titanium Alloy

Cutting area	Breaker	1st Recommendation grade	Cutting speed (m/min)	Feed (mm/rev)	Depth of cut (mm)
Finish cutting	FJ	RT9010	50 100	0.20	0.8
Finish cutting	MJ	RT9010	40 90	0.20	0.5 1.5
Medium cutting		RT9010	40 80		
Medium cutting	MS	RT9010	40 80	0.10 0.25	0.5 2.0
Semi-heavy cutting	GJ	RT9010	40 70	0.15 0.30	1.0 3.0

Special Breakers for Difficult-to-cut Materials

Inserts

Type	Shape	Order Number	Class	Coating				Carbide				Dimensions (mm)				Geometry	
				S 05	05R	10R	15 F	R 005	R 010	F15	i10	D1	S1	Re	D		
FJ (Finish cutting - G Class)		CNGG1 0 5-FJ	G			●			●				12.7	4.76	0.05	5.16	
		1 0 01-FJ	G			●			●				12.7	4.76	0.1	5.16	
		1 0 0 -FJ	G			●			●				12.7	4.76	0.2	5.16	
		1 0 0 -FJ	G			●	●		●	●	□		12.7	4.76	0.4	5.16	
		1 0 08-FJ	G			●	●		●	●	□		12.7	4.76	0.8	5.16	
		DNGG150 0 -FJ	G			●	●		●	●	□		12.7	4.76	0.4	5.16	
		150 08-FJ	G			●	●		●	●	□		12.7	4.76	0.8	5.16	
		NGG160 5-FJ	G			●			●				9.525	4.76	0.05	3.81	
		160 01-FJ	G			●			●				9.525	4.76	0.1	3.81	
		160 0 -FJ	G			●			●				9.525	4.76	0.2	3.81	
		CCG 0 01-FJ	G			●			●				9.525	3.97	0.1	4.4	
		0 0 -FJ	G			●			●				9.525	3.97	0.2	4.4	
0 0 -FJ		G			●			●				9.525	3.97	0.4	4.4		
MJ (Finish - Medium cutting - M Class)		CNMG1 0 0 -MJ	M	●	●	●		●	●			12.7	4.76	0.4	5.16		
		1 0 08-MJ	M	●	●	●		●	●			12.7	4.76	0.8	5.16		
		1 0 1 -MJ	M	●	●	●						12.7	4.76	1.2	5.16		
		1 0 16-MJ	M	●	●	●						12.7	4.76	1.6	5.16		
		DNMG150 0 -MJ	M	●	●	●		●	●				12.7	4.76	0.4	5.16	
		150 08-MJ	M	●	●	●		●	●			12.7	4.76	0.8	5.16		
		150 1 -MJ	M	●	●	●						12.7	4.76	1.2	5.16		
		150 16-MJ	M	●	●	●						12.7	4.76	1.6	5.16		
		15060 -MJ	M	●		●						12.7	6.35	0.4	5.16		
		150608-MJ	M	●		●						12.7	6.35	0.8	5.16		
		15061 -MJ	M	●		●						12.7	6.35	1.2	5.16		
		150616-MJ	M	★	★	★						12.7	6.35	1.6	5.16		
		NMG160 0 -MJ	M	●	●	●		●	●				9.525	4.76	0.4	3.81	
		160 08-MJ	M	●	●	●		●	●			9.525	4.76	0.8	3.81		
		160 1 -MJ	M	●	●	●						9.525	4.76	1.2	3.81		
		NMG160 0 -MJ	M	●	●	●		●	●				9.525	4.76	0.4	3.81	
		160 08-MJ	M	●	●	●		●	●			9.525	4.76	0.8	3.81		
		160 1 -MJ	M	●	●	●						9.525	4.76	1.2	3.81		
		NMG080 08-MJ	M	●	●	●							12.7	4.76	0.8	5.16	
		080 1 -MJ	M	●	●	●						12.7	4.76	1.2	5.16		
		080 16-MJ	M	●	●	●						12.7	4.76	1.6	5.16		
	MJ (Finish - Medium cutting - G Class)		CNGG1 0 0 -MJ	G		●	●		●	●	□		12.7	4.76	0.4	5.16	
			1 0 08-MJ	G		●	●		●	●	□		12.7	4.76	0.8	5.16	
			DNGM150 0 -MJ	G		●	●		●	●	□		12.7	4.76	0.4	5.16	
150 08-MJ			G		●	●		●	●	□		12.7	4.76	0.8	5.16		
		NGM160 0 -MJ	G		●			●					9.525	4.76	0.4	3.81	
		160 08-MJ	G		●			●				9.525	4.76	0.8	3.81		

● Inventory maintained. □ Non stock, produced to order only. ★ Inventory maintained in Japan.

Type	Shape	Order Number	Class	Coating				Carbide				Dimensions (mm)				Geometry
				S 05	05R	10R	15 F	R 005	R 010	F15	i10	D1	S1	Re	D	
MS (Medium cutting M Class)		CNMG1 0 0 -MS	M	●	●	●	●	□	●	●	★	12.7	4.76	0.4	5.16	
		1 0 08-MS	M	●	●	●	●	□	●	●	●	12.7	4.76	0.8	5.16	
		1 0 1 -MS	M	●	●	●	●	□	●	●	●	12.7	4.76	1.2	5.16	
		DNMG150 0 -MS	M	★	●	●	●	□	●	●		12.7	4.76	0.4	5.16	
		150 08-MS	M	★	●	●	●	□	●	●		12.7	4.76	0.8	5.16	
		150 1 -MS	M	★	●	●	●	□	●	●		12.7	4.76	1.2	5.16	
		NEW 15060 -MS	M	●	●	●						12.7	6.35	0.4	5.16	
		NEW 150608-MS	M	●	●	●						12.7	6.35	0.8	5.16	
		NEW 15061 -MS	M	●	●	●						12.7	6.35	1.2	5.16	
		SNMG1 0 08-MS	M	●	●	●	●	□	●	□	●	12.7	4.76	0.8	5.16	
		1 0 1 -MS	M	●	●	●	★	□	●	□		12.7	4.76	1.2	5.16	
		NMG160 0 -MS	M	●	●	●	●	□	●	□		9.525	4.76	0.4	3.81	
		160 08-MS	M	●	●	●	●	□	●	□	●	9.525	4.76	0.8	3.81	
		NEW 160 1 -MS	M	●	●	●						9.525	4.76	1.2	3.81	
		0 08-MS	M	●	●	●	●	□	●	□		12.7	4.76	0.8	5.16	
		NMG160 0 -MS	M	●	●	●		□	●			9.525	4.76	0.4	3.81	
		160 08-MS	M	●	●	●		□	●			9.525	4.76	0.8	3.81	
		NEW NMG080 08-MS	M	●	●	●	●	□	●	□		12.7	4.76	0.8	5.16	
080 1 -MS		M	●	●	●						12.7	4.76	1.2	5.16		
GJ (Semi-heavy cutting M Class)		CNMG1 0 08-GJ	M	●		●	●		●	●		12.7	4.76	0.8	5.16	
		1 0 1 -GJ	M	●		●	●		●	●		12.7	4.76	1.2	5.16	
		1 0 16-GJ	M	●		●	●		●	●		12.7	4.76	1.6	5.16	
		16061 -GJ	M	●		●			●			15.875	6.35	1.2	6.35	
		1 061 -GJ	M	●		●			●			19.05	6.35	1.2	7.93	
		1 0616-GJ	M	●		●			●			19.05	6.35	1.6	7.93	
		DNMG150 08-GJ	M	★	●	●			●	●		12.7	4.76	0.8	5.16	
		150 1 -GJ	M	★	●	●			●	●		12.7	4.76	1.2	5.16	
		150 16-GJ	M	★	●	●			●	●		12.7	4.76	1.6	5.16	
		NEW 150608-GJ	M	●	●							12.7	6.35	0.8	5.16	
		NEW 15061 -GJ	M	●	●							12.7	6.35	1.2	5.16	
	NEW 150616-GJ	M	●	●							12.7	6.35	1.6	5.16		
		NMG080 08-GJ	M	●	●				●			12.7	4.76	0.8	5.16	
		080 1 -GJ	M	●	●				●			12.7	4.76	1.2	5.16	
		080 16-GJ	M	★	●				●			12.7	4.76	1.6	5.16	
10061 -GJ		M		●				●			15.875	6.35	1.2	6.35		
RCMX Insert (Medium cutting M Class)		RCMX100 M0	M	●	●	●						10	3.18		3.6	
		1 0 M0	M	●	●	●						12	4.76		4.2	
		1606M0	M	●	●	●						16	6.35		5.2	



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