

New
insert grade
for MS/GJ
breaker

Special Breakers for Difficult-to-cut Materials
FJ/MJ/GJ/MS breaker

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



■ CVD coated **U5905**
a new CVD coated grade, for efficient high-speed turning of heat-resistant alloys.



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

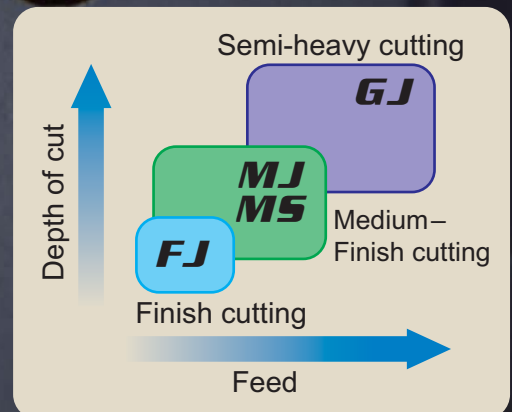
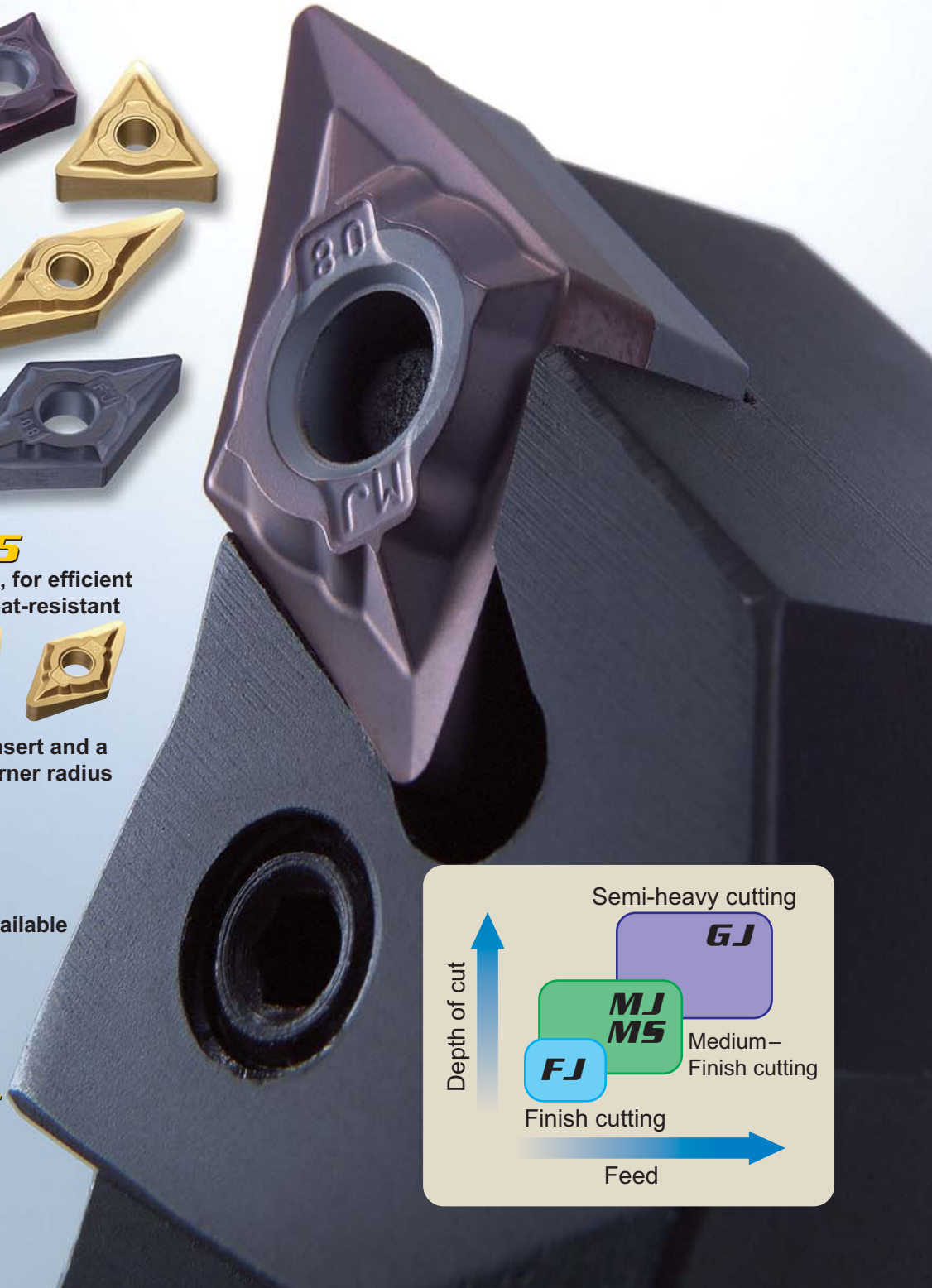


■ **RCMX** round insert available as standard.



U5905

■ CVD coated **U5905** available for M class MS / GJ breaker.



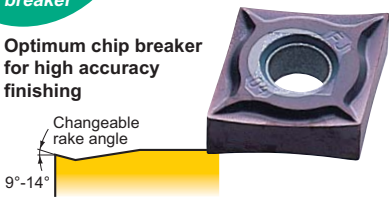
Special Breakers for Difficult-to-cut Materials

FJ/MJ/GJ/MS breaker **RCMX** type insert

Features of **FJ/MJ/MS/GJ** breaker

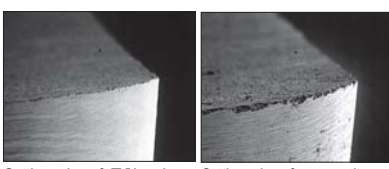
FJ breaker Finish cutting G Class

Optimum chip breaker for high accuracy finishing



Changeable rake angle
9°-14°

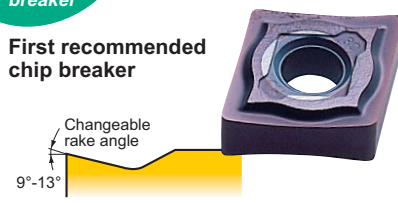
- Reduced heat generation with the use of a sharp cutting edge.
- Superior chip control at very small depths of cut with a special dot type chip breaker.



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

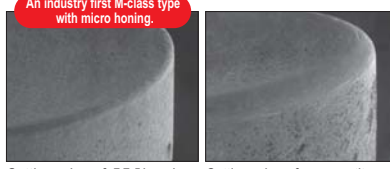
First recommended chip breaker



Changeable rake angle
9°-13°

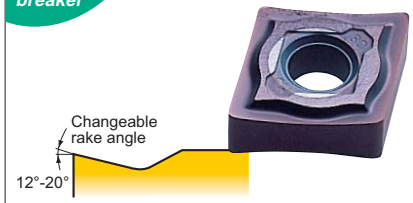
- M-class type with a smooth micro honing for highest sharpness.
- A curved edge design suitable for copy turning.
- A wide variety of corner radii, 0.4-1.6 available as standard.

An industry first M-class type with micro honing.



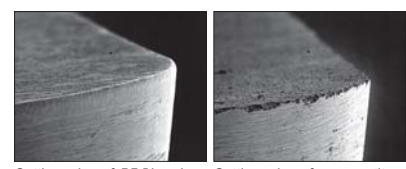
Cutting edge of **MJ** breaker for class M (Extremely sharp cutting edge) Cutting edge of a competitors breaker for class M

MJ breaker Medium-Finish cutting G Class



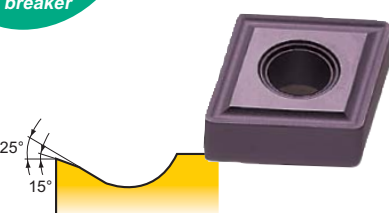
Changeable rake angle
12°-20°

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

MS breaker Medium cutting M Class

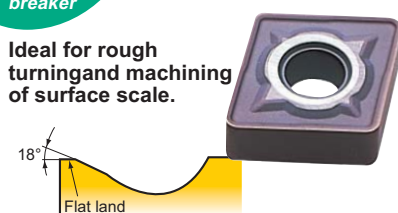


25°
15°

- The sharp edges reduces 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.

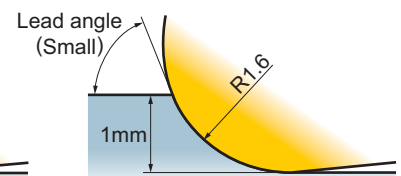
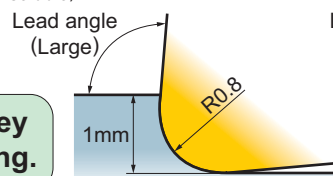
<Cutting conditions>
Workpiece : Inconel718
Insert : CNMG1204-MJ (US905)
Holder : PCLNL2525M12
Cutting speed : 70m/min
Feed : 0.2mm/rev
Depth of cut : 1.0mm
Coolant : Wet (water soluble)



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"> ● CVD coated <i>US905</i> Unequalled wear resistance enables machining at high speeds when compared to conventional products. ● Miracle Coated grade <i>VP05RT</i> The combination of MIRACLE coating and a high-strength micro-grain cemented carbide substrate increases wear resistance and exhibits high continuous cut performance. ● Miracle Coated grade <i>VP10RT</i> A good balance of wear and fracture resistance. First recommendation for turning heat-resistant alloys. Also suitable for stainless steels. ● Miracle Coated grade <i>VP15TF</i> High-strength micro-grain cemented carbide substrate. Ideal for interrupted cutting that requires high fracture resistance.

Features of *US905*

CVD Coated *US905*

Coating
A CVD coating layer with a close micro structure to prevent flank and face wear of edges that are subject 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 MIRACLE coating

MIRACLE coating features

Oxidation temperature/°C

Adhesion strength (N)

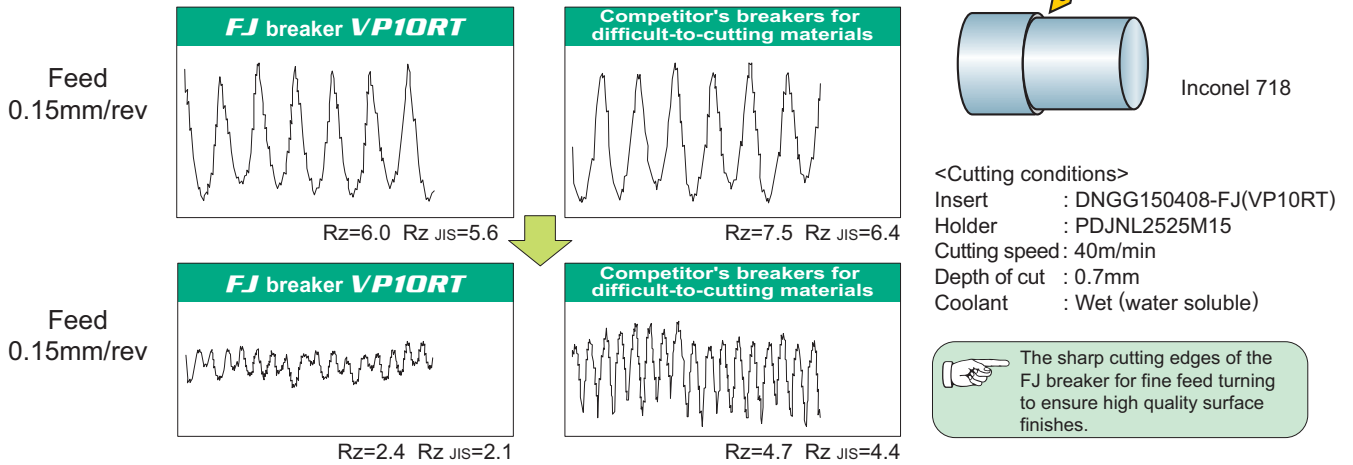
Titanium alloys

Properties	Titanium Alloys	
		<ul style="list-style-type: none"> ● Cemented carbide grade <i>RT9005</i> Unmatched resistance to heat and plastic deformation. Ideal for wear resistant high-speed machining. ● Cemented carbide grade <i>RT9010</i> Good balance of wear and fracture resistance. First choice for turning of titanium alloys. ● Cemented carbide grade <i>TF15</i> High-strength micro-grain cemented carbide grade. Ideal for interrupted cutting that requires high fracture resistance.

FJ/MJ/GJ/MS breaker

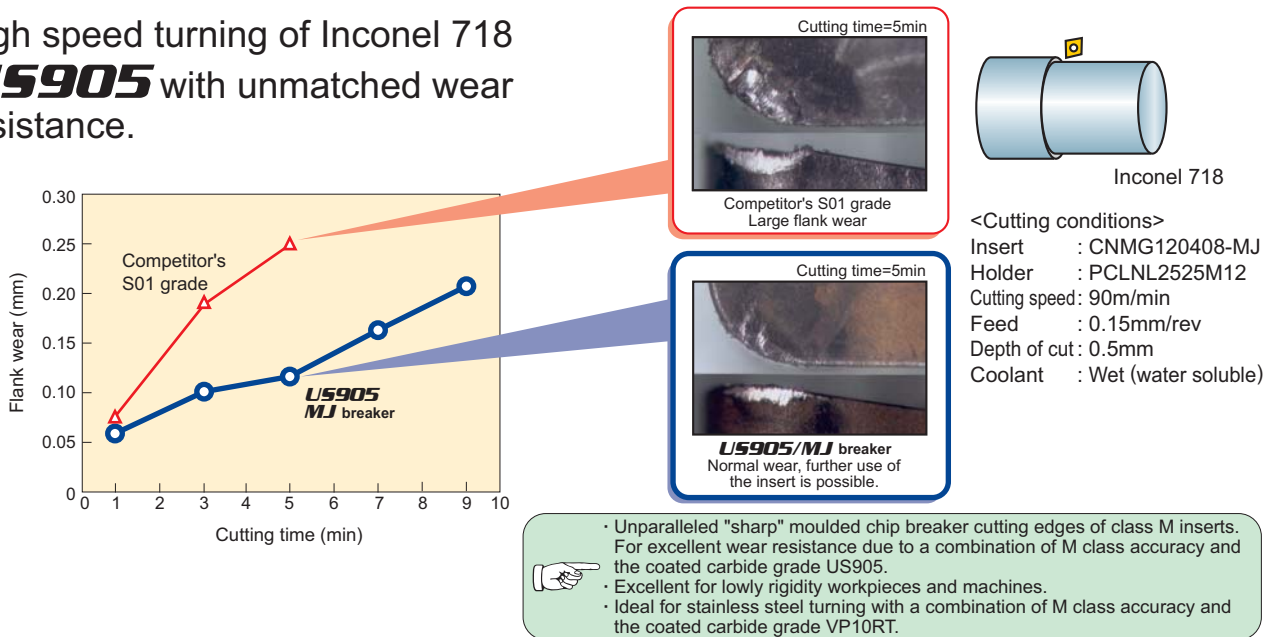
Cutting performance of FJ breaker

● Finished surface comparison on Inconel 718



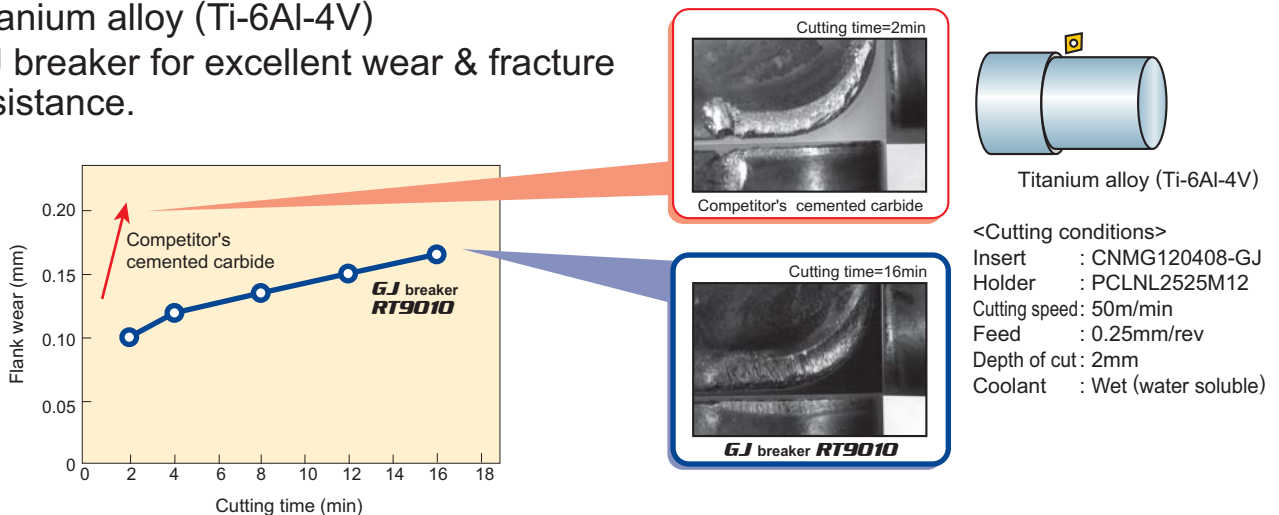
Cutting performance of MJ breaker

● High speed turning of Inconel 718 **US905** with unmatched wear resistance.






Cutting performance of GJ breaker

● Titanium alloy (Ti-6Al-4V)
 GJ breaker for excellent wear & fracture resistance.



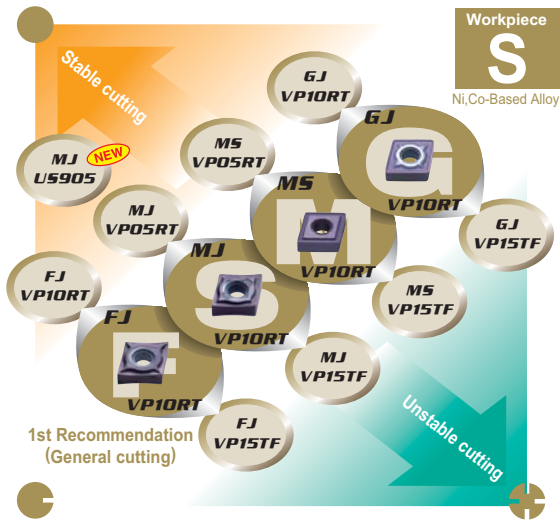
Recommended cutting conditions

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

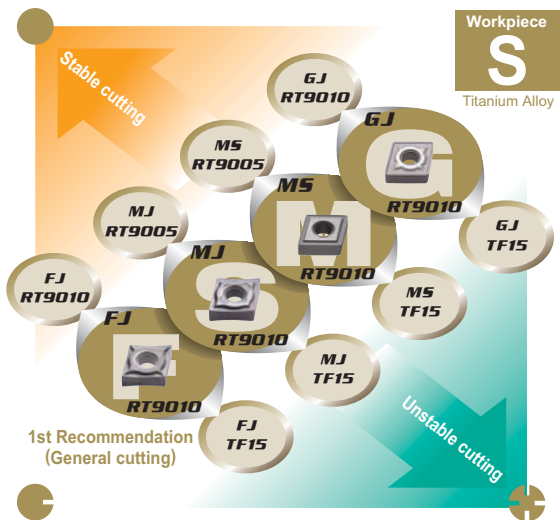
Cutting area

- 
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 Medium cutting	MJ	VP10RT	20–50	–0.20	0.5–1.5
		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 Medium cutting	MJ	RT9010	40–90	–0.20	0.5–1.5
		TF15			
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

Inserts

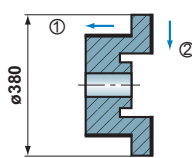

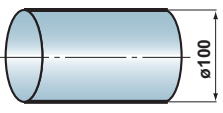
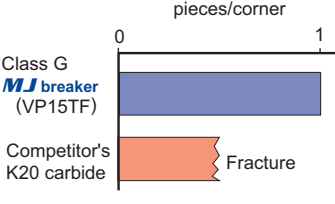


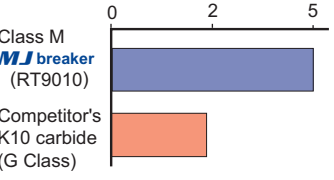
Type	Shape	Order Number	Class	Coating				Carbide				Dimensions (mm)				Geometry		
				US905	VP05RT	VP10RT	VP15TF	RT9005	RT9010	TF15	HT110	D1	S1	Re	D2			
FJ (Finish cutting · G Class)		CNGG1204V5-FJ	G										12.7	4.76	0.05	5.16		
		120401-FJ	G											12.7	4.76	0.1		5.16
		120402-FJ	G											12.7	4.76	0.2		5.16
		120404-FJ	G			●	●		●	●				12.7	4.76	0.4		5.16
			120408-FJ	G			●	●		●	●			12.7	4.76	0.8	5.16	
		DNGG150404-FJ	G			●	●		●	●				12.7	4.76	0.4	5.16	
		150408-FJ	G			●	●		●	●				12.7	4.76	0.8	5.16	
		VNGG1604V5-FJ	G											9.525	4.76	0.05	3.81	
		160401-FJ	G											9.525	4.76	0.1	3.81	
		160402-FJ	G											9.525	4.76	0.2	3.81	
		CCGT09T301-FJ	G											9.525	3.97	0.1	4.4	
		09T302-FJ	G											9.525	3.97	0.2	4.4	
09T304-FJ		G											9.525	3.97	0.4	4.4		
MJ (Finish - Medium cutting · M Class)		CNMG120404-MJ	M	●	●	●							12.7	4.76	0.4	5.16		
		120408-MJ	M	●	●	●								12.7	4.76	0.8		5.16
		120412-MJ	M	●	●	●								12.7	4.76	1.2		5.16
		120416-MJ	M	●	●	●								12.7	4.76	1.6		5.16
		DNMG150404-MJ	M	●	●	●								12.7	4.76	0.4	5.16	
		150408-MJ	M	●	●	●								12.7	4.76	0.8	5.16	
		150412-MJ	M	●	●	●								12.7	4.76	1.2	5.16	
		150416-MJ	M	●	●	●								12.7	4.76	1.6	5.16	
		150604-MJ	M	●	●	●								12.7	6.35	0.4	5.16	
		150608-MJ	M	●	●	●								12.7	6.35	0.8	5.16	
		150612-MJ	M	●	●	●								12.7	6.35	1.2	5.16	
		150616-MJ	M	●	●	●								12.7	6.35	1.6	5.16	
		TNMG160404-MJ	M	●	●	●								9.525	4.76	0.4	3.81	
		160408-MJ	M	●	●	●								9.525	4.76	0.8	3.81	
		160412-MJ	M	●	●	●								9.525	4.76	1.2	3.81	
		VNMG160404-MJ	M	●	●	●								9.525	4.76	0.4	3.81	
		160408-MJ	M	●	●	●								9.525	4.76	0.8	3.81	
		160412-MJ	M	●	●	●								9.525	4.76	1.2	3.81	
		WNMG080408-MJ	M	●	●	●								12.7	4.76	0.8	5.16	
		080412-MJ	M	●	●	●								12.7	4.76	1.2	5.16	
		080416-MJ	M	●	●	●								12.7	4.76	1.6	5.16	
	MJ (Finish - Medium cutting · G Class)		CNGG120404-MJ	G			●	●		●	●			12.7	4.76	0.4	5.16	
			120408-MJ	G			●	●		●	●				12.7	4.76	0.8	
			DNGM150404-MJ	G			●	●		●	●				12.7	4.76	0.4	5.16
150408-MJ			G			●	●		●	●				12.7	4.76	0.8	5.16	
		VNGM160404-MJ	G											9.525	4.76	0.4	3.81	
		160408-MJ	G											9.525	4.76	0.8	3.81	

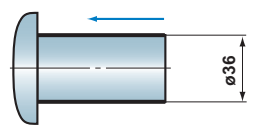
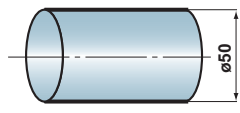
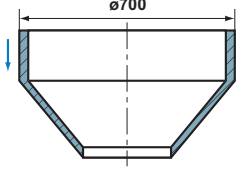
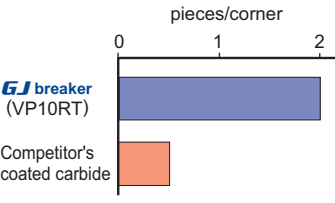
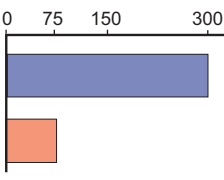


● : Inventory maintained. □ : Non stock, produced to order only.

Type	Shape	Order Number	Class	Coating				Carbide				Dimensions (mm)				Geometry	
				NEW US905	VP05RT	VP10RT	VP15TF	RT9005	RT9010	TF15	HT110	D1	S1	Re	D2		
MS (Medium cutting · M Class)		CNMG120404-MS	M	●	●	●	●	□	●	●	●	12.7	4.76	0.4	5.16		
		120408-MS	M	●	●	●	●	□	●	●	●	12.7	4.76	0.8	5.16		
		120412-MS	M	●	●	●	●	□	●	●	●	12.7	4.76	1.2	5.16		
		DNMG150404-MS	M	●	●	●	●	□	●	●	●	12.7	4.76	0.4	5.16		
		150408-MS	M	●	●	●	●	□	●	●	●	12.7	4.76	0.8	5.16		
		150412-MS	M	●	●	●	●	□	●	●	●	12.7	4.76	1.2	5.16		
		NEW 150604-MS	M	●	●	●	●	□	●	●	●	12.7	6.35	0.4	5.16		
		NEW 150608-MS	M	●	●	●	●	□	●	●	●	12.7	6.35	0.8	5.16		
		NEW 150612-MS	M	●	●	●	●	□	●	●	●	12.7	6.35	1.2	5.16		
		SNMG120408-MS	M	●	●	●	●	□	●	□	□	12.7	4.76	0.8	5.16		
		120412-MS	M	●	●	●	●	□	●	□	□	12.7	4.76	1.2	5.16		
		TNMG160404-MS	M	●	●	●	●	□	●	□	□	9.525	4.76	0.4	3.81		
		160408-MS	M	●	●	●	●	□	●	□	●	9.525	4.76	0.8	3.81		
		NEW 160412-MS	M	●	●	●	●	□	●	□	●	9.525	4.76	1.2	3.81		
		220408-MS	M	●	●	●	□	□	●	□	□	12.7	4.76	0.8	5.16		
		VNMG160404-MS	M	●	●	●	●	□	●	□	□	9.525	4.76	0.4	3.81		
		160408-MS	M	●	●	●	●	□	●	□	□	9.525	4.76	0.8	3.81		
		NEW WVMG080408-MS	M	●	●	●	●	□	●	□	□	12.7	4.76	0.8	5.16		
		080412-MS	M	●	●	●	●	□	●	□	□	12.7	4.76	1.2	5.16		
	GJ (Semi-heavy cutting · M Class)		CNMG120408-GJ	M	●	●	●	●	□	●	●	●	12.7	4.76	0.8	5.16	
			120412-GJ	M	●	●	●	●	□	●	●	●	12.7	4.76	1.2	5.16	
			120416-GJ	M	●	●	●	●	□	●	●	●	12.7	4.76	1.6	5.16	
			160612-GJ	M	●	●	●	●	□	●	□	□	15.875	6.35	1.2	6.35	
			190612-GJ	M	●	●	●	●	□	●	□	□	19.05	6.35	1.2	7.93	
190616-GJ			M	●	●	●	●	□	●	□	□	19.05	6.35	1.6	7.93		
		DNMG150408-GJ	M	●	●	●	●	□	●	●	●	12.7	4.76	0.8	5.16		
		150412-GJ	M	●	●	●	●	□	●	●	●	12.7	4.76	1.2	5.16		
		150416-GJ	M	●	●	●	●	□	●	●	●	12.7	4.76	1.6	5.16		
		150608-GJ	M	●	●	●	●	□	●	□	□	12.7	6.35	0.8	5.16		
		150612-GJ	M	●	●	●	●	□	●	□	□	12.7	6.35	1.2	5.16		
		150616-GJ	M	●	●	●	●	□	●	□	□	12.7	6.35	1.6	5.16		
		WVMG080408-GJ	M	●	●	●	●	□	●	□	□	12.7	4.76	0.8	5.16		
		080412-GJ	M	●	●	●	●	□	●	□	□	12.7	4.76	1.2	5.16		
		080416-GJ	M	●	●	●	●	□	●	□	□	12.7	4.76	1.6	5.16		
		100612-GJ	M	●	●	●	□	□	●	□	□	15.875	6.35	1.2	6.35		
RCMX Insert (Medium cutting · M Class)			RCMX1003M0	M	●	●	●	●					10	3.18	—	3.6	
	1204M0		M	●	●	●	●					12	4.76	—	4.2		
	1606M0		M	●	●	●	●					16	6.35	—	5.2		

FJ/MJ/GJ/MS breaker

Application Examples

Insert (Grade)	CNGG120408-MJ(VP15TF)	CNMG120408-MJ(US905)	DNMG150404-MJ(RT9010)
Workpiece	Ring (Inconel 718) 	Inconel 718 (AM5663) 	Titanium alloy (iTl-6Al-4V) 
Cutting conditions	Cutting speed (m/min)	① 50(Continuous) ② 30(Interrupted)	90
	Feed (mm/rev)	0.1	0.25
	Depth of cut (mm)	0.3	0.3
Coolant	Wet	W.S.O.	Wet
Result	<p>pieces/corner</p>  <p>Class G MJ breaker (VP15TF)</p> <p>Competitor's K20 carbide Fracture</p> <p>Stable machining without fracturing was possible with the MJ breaker.</p>	<p>Class M MJ breaker (US905) Cutting length: 1000m</p>  <p>Competitor's S01 coating Cutting length: 680m</p> 	<p>Cutting time (min)</p>  <p>Class M MJ breaker (RT9010)</p> <p>Competitor's K10 carbide (G Class)</p> <p>Doubled tool life with the MJ breaker.</p>

Insert (Grade)	CNMG120408-GJ(VP10RT)	TNMG160408-MJ(VP05RT)	RCMX1204M0(VP05RT)
Workpiece	Pin (Inconel 718) 	Sintered iron components (FH655) 	Case (Inconel 718) 
Cutting conditions	Cutting speed (m/min)	31	120
	Feed (mm/rev)	0.2	0.05
	Depth of cut (mm)	2.3	0.5
Coolant	W.S.O.	Wet	Wet
Result	<p>pieces/corner</p>  <p>GJ breaker (VP10RT)</p> <p>Competitor's coated carbide</p> <p>GJ breaker for excellent chip disposal and vastly increased tool life.</p>	<p>pieces/corner</p>  <p>Class M MJ breaker (VP05RT)</p> <p>Competitor's K10 carbide (G Class)</p> <p>50% longer tool life.</p>	<p>Standard breaker RCMX insert (VP05RT) Cutting time:11min</p>  <p>Competitor's S01 coating Cutting time:9min</p>  <p>Normal wear, further use of the insert is possible.</p>

For Your Safety

- Don't handle inserts and chips without gloves. ●Please machine within the recommended application range and exchange expired tools with new ones in advance of breakage. ●Please use safety covers and wear safety glasses. ●When using compounded cutting oils, please take fire precautions. ●When attaching inserts or spare parts, please use only the correct wrench or spanner.

MITSUBISHI MATERIALS CORPORATION



The Scope of the Registration: Design, Development and Production of Cemented Carbide Tools and Carbide Blanks



The Scope of the Registration: Design, Development and Production of Cutting Tools, Wear-resistant Tools, Rock Drilling Tools, Cemented Carbide Blanks and Coated Products



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(Tools specifications subject to change without notice.)