

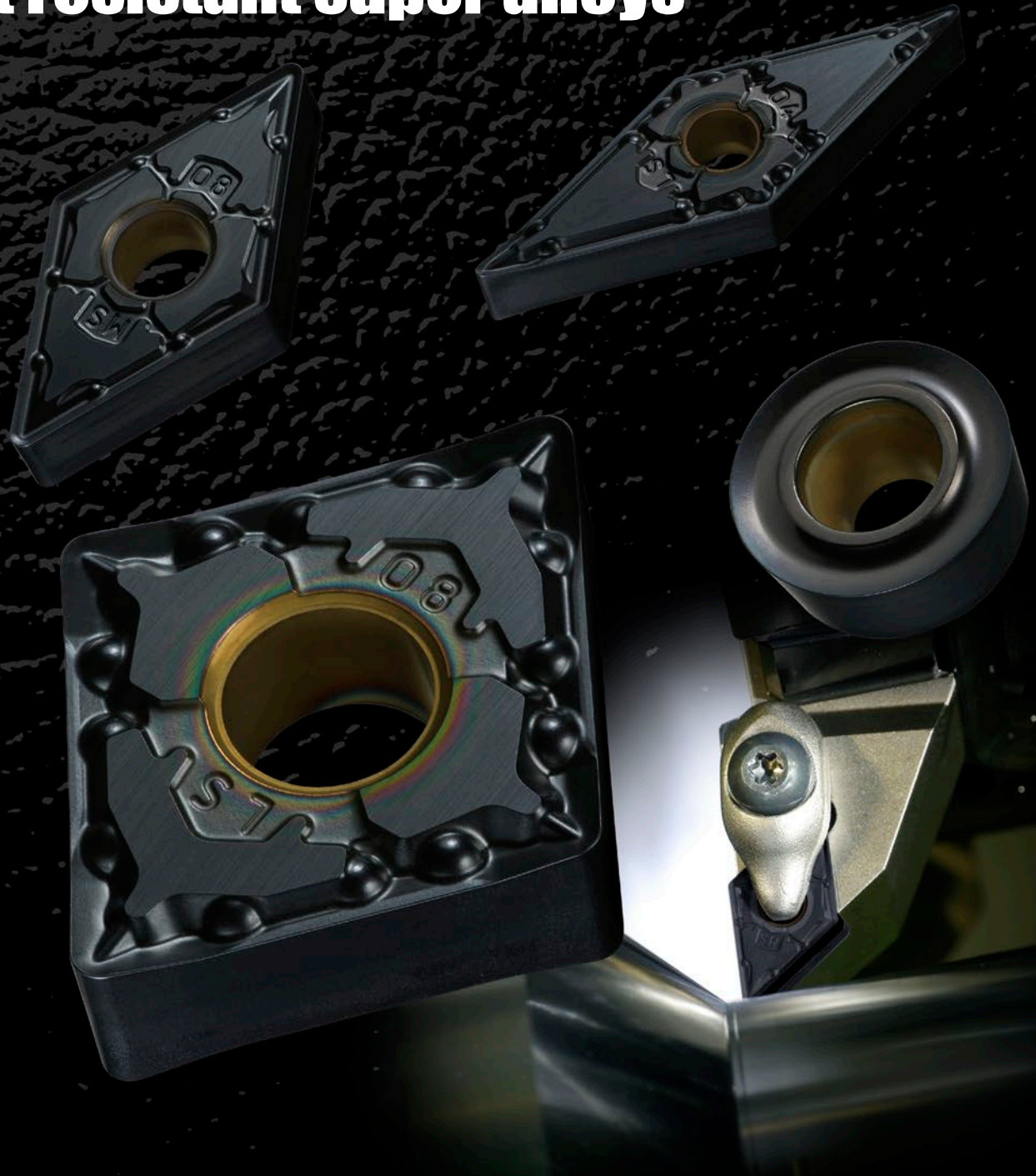
Coated Grade for Heat Resistant Super Alloys

Environmentally Friendly Product

# MV9005

NEW  
Products

**Exceeds all current standards of cutting speed and tool life when machining heat resistant super alloys**

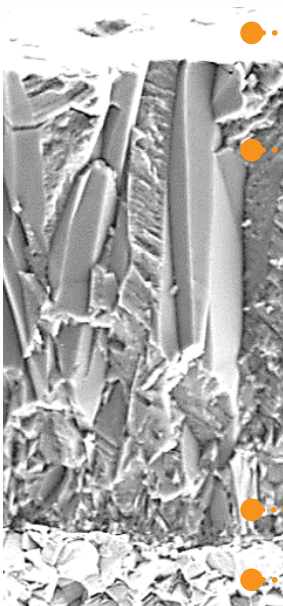
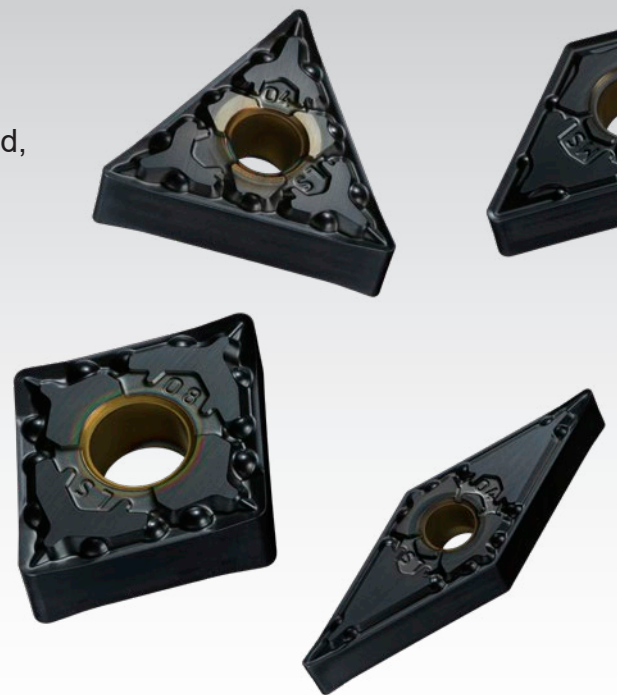


Coated Grade for Heat Resistant Super Alloys

# MV9005

## Advanced Wear Resistance

By adopting a newly developed Al-Rich coating technology, an (Al,Ti)N coating with a high Al content ratio for extreme hardness means that oxidation resistance is greatly improved, resulting in excellent wear resistance.



\*Graphical Representation.

- **Excellent welding resistance**  
Smooth surface
- **Outstanding wear resistance**  
Newly developed Al-Rich coating
- **Excellent chipping resistance for stable machining**  
Newly developed bonding layer
- **Excellent Resistance to Plastic Deformation**  
Extremely hard dedicated cemented carbide substrate



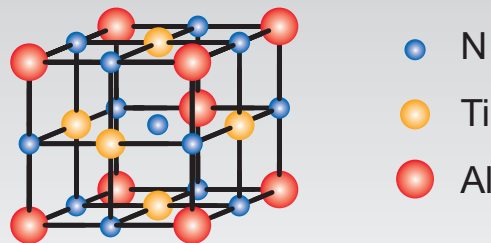
Please refer to the last page for more information on certified environmentally friendly products.

# Complete Coating Technology that Topples Current Tool Life Standards

Due to

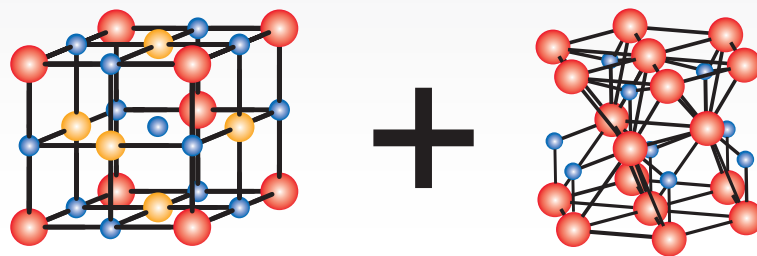
## the Newly Developed Al-Rich Coating

Aluminium titanium nitride (Al,Ti)N is a compound of aluminium and titanium that is widely used as a coating for cutting tools due to its extremely hard and heat-resistant properties.



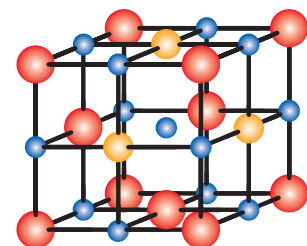
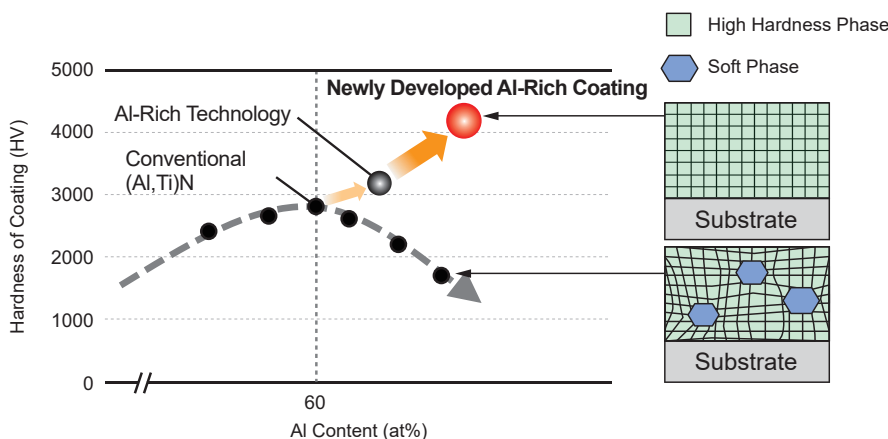
The combination of atoms with different sizes creates an exceptionally hard crystal structure.

The hardness of (Al,Ti)N increases as the Al content ratio increases, but with conventional technology, when the Al content ratio exceeds 60%, the crystal structure changes and the hardness of (Al,Ti)N decreases.



When the Al ratio is over 60%, a softer crystal phase is formed.

Using a new coating process based on Mitsubishi Materials' own original technology, a way in which an Al-Rich coating does not change its crystal structure even when the Al content is increased was developed. This also achieves a higher Al content and high the hardness of (Al,Ti)N.



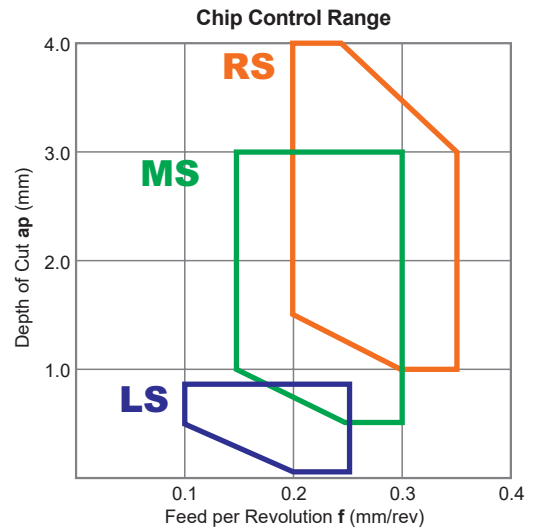
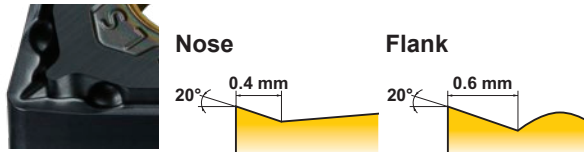
Crystal image of **MV9005**

# Chip Breaker System

## Negative Inserts

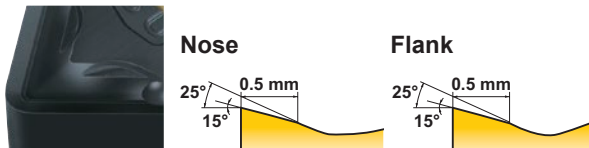
### LS Breaker for Light Cutting

Enhanced chip disposal for depths of cut smaller than the corner R.



### MS Breaker Newly Designed for Medium Cutting

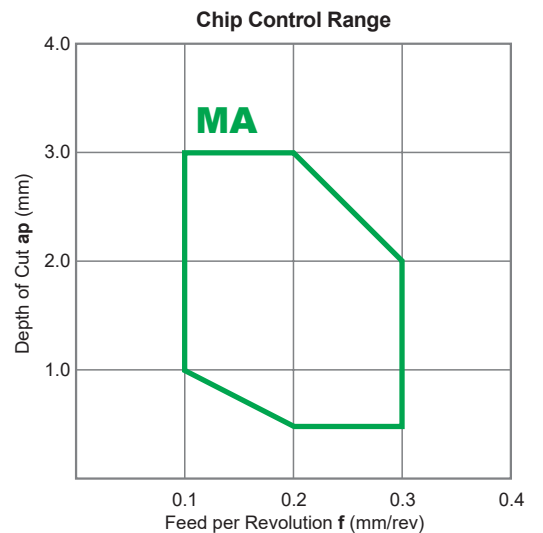
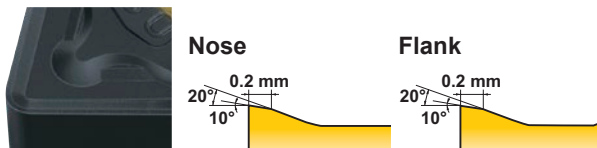
The large 2-step rake angle generates chips smoothly and without tangling during low feed cutting.



The chip breaker control range was tested for optimum chip evacuation when cutting Inconel718 with a CNMG120408 insert.

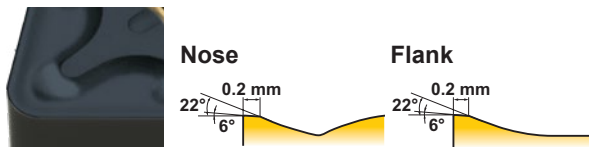
### RS Breaker for Rough Cutting

During low speed cutting the positive land controls chip welding and abrasion at the depth of cut line.



### MA Breaker Multi-assist Chip Breaker

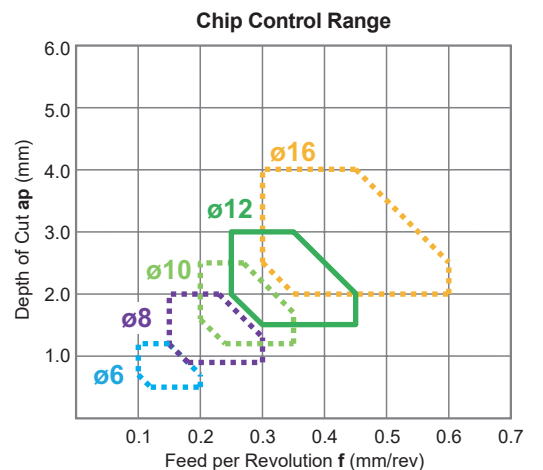
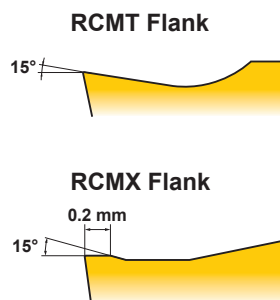
Suitable for medium cutting range.



## Positive Inserts

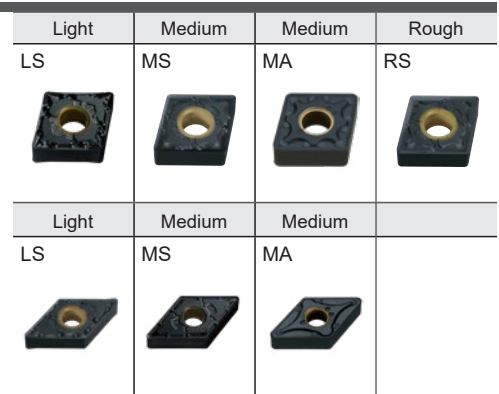
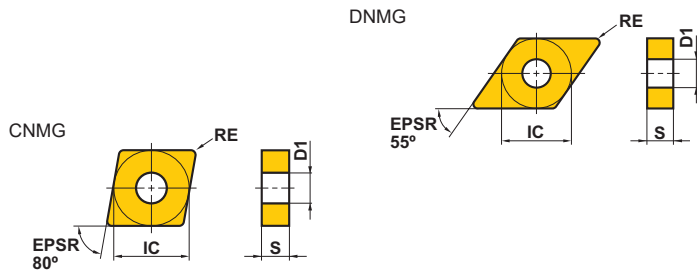
### RCMT, RCMX for Medium Cutting

Balance of strength and sharpness due to a combination of a flat land and rake angle.



# MV9005

## Negative Inserts (With Hole) M Class



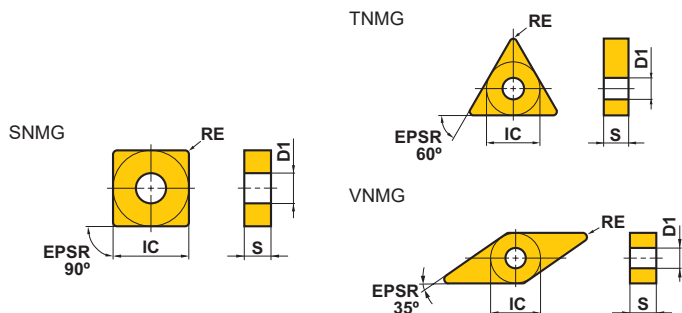
(mm)

Order Number	Cutting Area	MV9005	IC	S	RE	D1
CNMG120402-LS	L	●	12.7	4.76	0.2	5.16
CNMG120404-LS	L	●	12.7	4.76	0.4	5.16
CNMG120408-LS	L	●	12.7	4.76	0.8	5.16
CNMG120404-MS	M	●	12.7	4.76	0.4	5.16
CNMG120408-MS	M	●	12.7	4.76	0.8	5.16
CNMG120412-MS	M	●	12.7	4.76	1.2	5.16
CNMG120408-MA	M	●	12.7	4.76	0.8	5.16
CNMG120412-MA	M	●	12.7	4.76	1.2	5.16
CNMG120416-MA	M	●	12.7	4.76	1.6	5.16
CNMG120408-RS	R	●	12.7	4.76	0.8	5.16
CNMG120412-RS	R	●	12.7	4.76	1.2	5.16
CNMG120416-RS	R	●	12.7	4.76	1.6	5.16
CNMG190616-RS	R	●	19.05	6.35	1.6	7.93
DNMG150402-LS	L	●	12.7	4.76	0.2	5.16
DNMG150404-LS	L	●	12.7	4.76	0.4	5.16
DNMG150408-LS	L	●	12.7	4.76	0.8	5.16
DNMG150404-MS	M	●	12.7	4.76	0.4	5.16
DNMG150408-MS	M	●	12.7	4.76	0.8	5.16
DNMG150412-MS	M	●	12.7	4.76	1.2	5.16
DNMG150404-MA	M	●	12.7	4.76	0.4	5.16
DNMG150408-MA	M	●	12.7	4.76	0.8	5.16
DNMG150412-MA	M	●	12.7	4.76	1.2	5.16

● : Inventory maintained in Japan. (10 inserts in one case)

# MV9005

## Negative Inserts (With Hole) M Class



Medium	Medium	Rough	Light	Medium
MS	MA	RS	LS	MS
Light	Medium	Medium		
LS	MS	MA		

(mm)

Order Number	Cutting Area	MV9005	IC	S	RE	D1
SNMG120404-MS	M	●	12.7	4.76	0.4	5.16
SNMG120408-MS	M	●	12.7	4.76	0.8	5.16
SNMG120412-MS	M	●	12.7	4.76	1.2	5.16
SNMG120404-MA	M	●	12.7	4.76	0.4	5.16
SNMG120408-MA	M	●	12.7	4.76	0.8	5.16
SNMG120412-MA	M	●	12.7	4.76	1.2	5.16
SNMG120408-RS	R	●	12.7	4.76	0.8	5.16
SNMG120412-RS	R	●	12.7	4.76	1.2	5.16
SNMG120416-RS	R	●	12.7	4.76	1.6	5.16
TNMG160402-LS	L	●	9.525	4.76	0.2	3.81
TNMG160404-LS	L	●	9.525	4.76	0.4	3.81
TNMG160408-LS	L	●	9.525	4.76	0.8	3.81
TNMG160404-MS	M	●	9.525	4.76	0.4	3.81
TNMG160408-MS	M	●	9.525	4.76	0.8	3.81
TNMG160412-MS	M	●	9.525	4.76	1.2	3.81
VNMG160402-LS	L	●	9.525	4.76	0.2	3.81
VNMG160404-LS	L	●	9.525	4.76	0.4	3.81
VNMG160408-LS	L	●	9.525	4.76	0.8	3.81
VNMG160404-MS	M	●	9.525	4.76	0.4	3.81
VNMG160408-MS	M	●	9.525	4.76	0.8	3.81
VNMG160404-MA	M	●	9.525	4.76	0.4	3.81
VNMG160408-MA	M	●	9.525	4.76	0.8	3.81

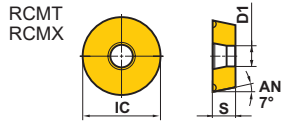
● : Inventory maintained in Japan. (10 inserts in one case)

# 7° Positive Inserts (With Hole) M Class

Medium  
Standard



Medium  
Standard



(mm)

Order Number	Cutting Area	MV9005	IC	S	RE	D1
<b>RCMT0602M0</b>	M	●	6.0	2.38	—	2.8
<b>RCMT0803M0</b>	M	●	8.0	3.18	—	3.4
<b>RCMT10T3M0</b>	M	●	10.0	3.97	—	4.4
<b>RCMT1204M0</b>	M	●	12.0	4.76	—	4.4
<b>RCMT1606M0</b>	M	●	16.0	6.35	—	5.5
<b>RCMX1003M0</b>	M	●	10.0	3.18	—	3.6
<b>RCMX1204M0</b>	M	●	12.0	4.76	—	4.2
<b>RCMX1606M0</b>	M	●	16.0	6.35	—	5.2

## Recommended Cutting Conditions

### ■ Negative Inserts

(mm)

	Workpiece Material	Cutting Conditions	Cutting Area	Chip Breaker	Grade	vc (m/min)	f (mm/rev)	ap
<b>S</b>	Ni Based Heat Resistant Alloys (Inconel718, Hastelloy, WASPALOY)	Stable Cutting	Light Cutting	<b>LS</b>	<b>MV9005</b>	50–110	0.10–0.25	0.2–0.8
			Medium Cutting	<b>MS</b>	<b>MV9005</b>	50–100	0.15–0.30	0.5–3.0

Note 1) Verify the recommended conditions for each boring bar as cutting conditions for internal machining can differ.

### ■ Positive Inserts

#### RCMT, RCMX

(mm)

	Workpiece Material	Cutting Conditions	Cutting Area	Grade	vc (m/min)	f (mm/rev)	ap
<b>S</b>	Ni Based Heat Resistant Alloys (Inconel718, Hastelloy, WASPALOY)	Stable Cutting	Medium Cutting	<b>MV9005</b>	40–80	0.25–0.45	1.5–3.0

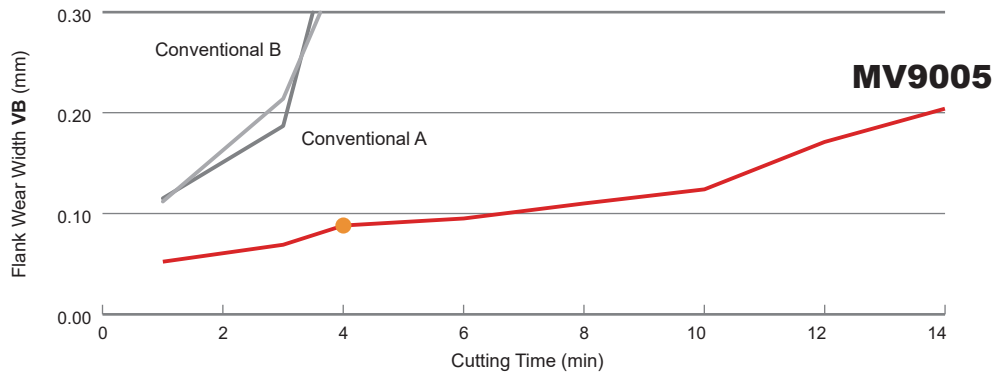
Note 1) Verify the recommended conditions for each boring bar as cutting conditions for internal machining can differ.



# Cutting Performance

## Comparison of wear resistance when machining Inconel718

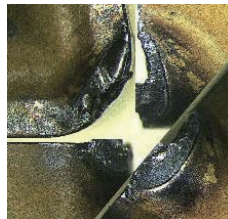
Exhibits excellent wear resistance and extended tool life.



Taken after machining 4 minutes



**MV9005 MS Br**



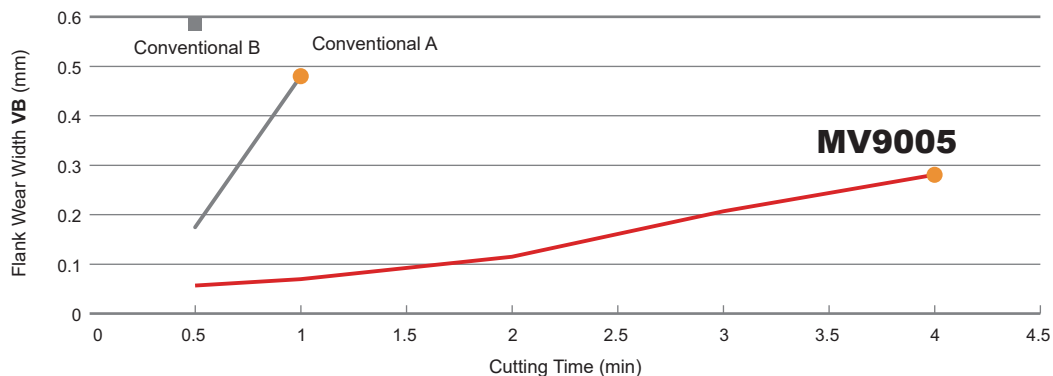
Conventional A

<Cutting Conditions>

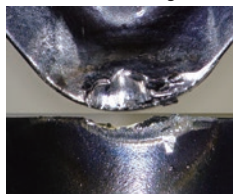
Workpiece Material : Inconel718  
 Inserts : CNMG120412-00  
 Cutting Speed :  $vc=100\text{m/min}$   
 Feed per Rev. :  $f=0.3\text{mm/rev}$   
 Depth of Cut :  $ap=0.75\text{mm}$   
 Cutting Mode : Wet Cutting

## Comparison of wear resistance when machining Inconel718

Demonstrates excellent wear resistance even during high-speed cutting of heat resistant alloys, thus improving machining efficiency.



4 minutes machining



**MV9005 MS Br**

1 minute machining



Conventional A

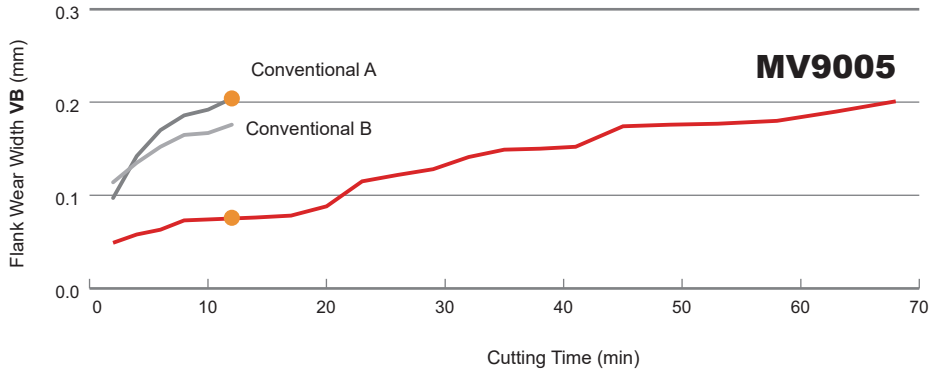
<Cutting Conditions>

Workpiece Material : Inconel718  
 Inserts : CNMG120412-00  
 Cutting Speed :  $vc=150\text{m/min}$   
 Feed per Rev. :  $f=0.3\text{mm/rev}$   
 Depth of Cut :  $ap=0.75\text{mm}$   
 Cutting Mode : Wet Cutting

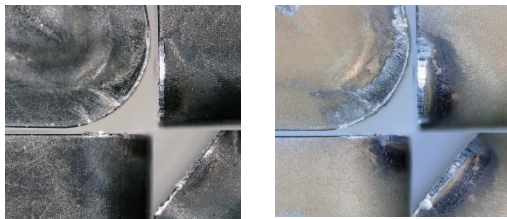
# Cutting Performance

## Comparison of wear resistance when machining Rene41

Exhibits excellent wear resistance even when machining heat resistant alloy components that are used in high temperature environments of 800°C or higher.



Taken after machining 12 minutes



**MV9005 MS Br**

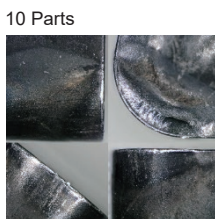
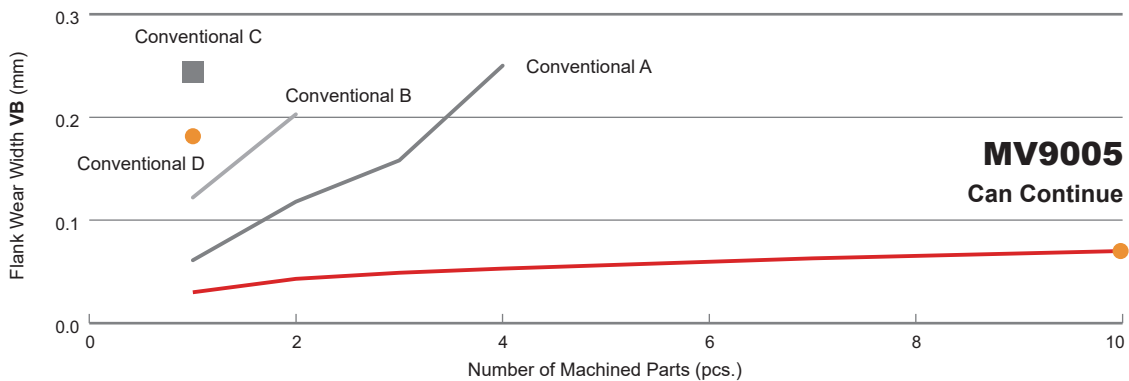
Conventional A

<Cutting Conditions>

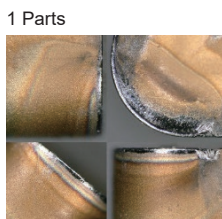
Workpiece Material : Rene41  
(Ni Based Heat Resistant Alloys)  
Inserts : CNMG120412-○○○  
Cutting Speed :  $v_c=30$  m/min  
Feed per Rev. :  $f=0.1$  mm/rev  
Depth of Cut :  $a_p=0.5$  mm  
Cutting Mode : Wet Cutting

## Comparison when machining a nickel-based super alloy containing cobalt

Exhibits excellent wear resistance across a wide range of nickel-based heat resistant alloys.



**MS9005 MS Br**

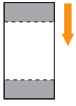
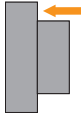





Conventional D

<Cutting Conditions>

Workpiece Material : Nickel-base super alloy containing cobalt  
Inserts : CNMG120412-○○○  
Cutting Speed :  $v_c=40$  m/min  
Feed per Rev. :  $f=0.15$  mm/rev  
Depth of Cut :  $a_p=1.5$  mm  
Cutting Mode : Wet Cutting

## Examples of Usage

Insert		CNMG120412-MS	CNMG120412-MS
Workpiece Material	Nickel-base super alloy containing cobalt		Inconel718
			
Component		Aerospace Component	Aerospace Component
Application		Face	Turning
Cutting Conditions	Cutting Speed $v_c$ (m/min)	40	Conventional 80, <b>MV9005</b> 100
	Feed per Rev. $f$ (mm/rev)	0.15	Conventional 0.25, <b>MV9005</b> 0.30
	Depth of Cut $a_p$ (mm)	1.5	0.15-0.35
Cutting Mode		Wet Cutting	Wet Cutting
Results	<p>Cutting Length (m)</p> <p>500 1000 1500 2000</p> <p><b>MV9005</b> </p> <p>Conventional </p> <p>Notch wear is suppressed, and it is possible to significantly extend the tool life.</p>		Cutting conditions improve machining efficiency by 50% compared to conventional products. Wear is also suppressed and stable machining is achieved.

Insert		CNMG120412-MS
Workpiece Material	Inconel718	
		
Component		Aerospace Component
Application		Internal
Cutting Conditions	Cutting Speed $v_c$ (m/min)	Conventional 80, <b>MV9005</b> 100
	Feed per Rev. $f$ (mm/rev)	Conventional 0.15, <b>MV9005</b> 0.18
	Depth of Cut $a_p$ (mm)	0.15-0.35
Cutting Mode		Wet Cutting
Results	Machining efficiency is 50% higher than conventional products. Wear is suppressed even under increased cutting conditions, enabling stable machining.	

The application examples are from customers workpieces and can therefore differ from the recommended cutting conditions.



Coated Grade for Heat Resistant Super Alloys

# MV9005

## Environmentally Friendly Product

This product has been certified as an environmentally friendly product in the machine tool industry by the Japan Cutting & Wear-resistant Tool Association. This is a product unique to the industry, in harmony with the environment, and with the aim of fulfilling the social responsibilities of the machine tool industry.

The Japan Cutting & Wear-resistant Tool Association evaluates the product's environmental impact during the manufacturing and usage stages and issues a certification according to the evaluation score.



## MV9005

## For People, Society and the Earth

More information about MITSUBISHI MATERIALS' efforts to address social and environmental issues can be found in the website below or by scanning the QR code.

<https://mmc.disclosure.site/en/>



### 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 driver. ●When using rotating tools, please make a trial run to check run-out, vibration and abnormal sounds etc.

## MITSUBISHI MATERIALS CORPORATION

### MITSUBISHI MATERIALS CORPORATION

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<http://www.mmc-carbide.com/>

(Tools specifications subject to change without notice.)