DIA EDGE

TOOL NEWS

2020.10 Update
B227G

PVD Coated Grade for High Precision and Small Parts Machining

MS9025

New Products

Improved Cutting Edge Delivers Next Generation Small Parts Machining

MITSUBISHI MATERIALS CORPORATION

PVD Coated Grade for High Precision and Small Parts Machining

MS9025

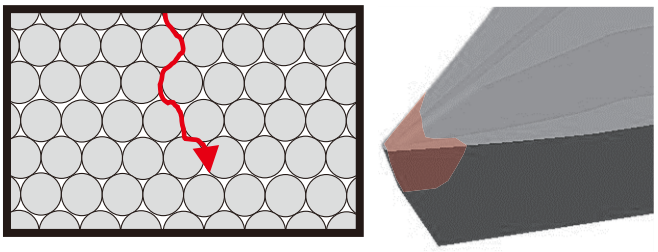
Effective reduction of notch wear with a balance of wear and fracture resistance.

Features

Improved Cemented Carbide

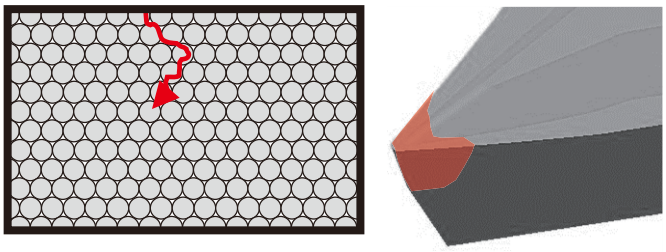
Thermal conductivity has been improved by optimising the grain size and therefore reducing the boundary contact between the WC particles. This optimisation reduces the temperature of the cutting edge during machining.

MS9025



Reducing the cutting edge temperature by improved thermal conductivity.

Conventional

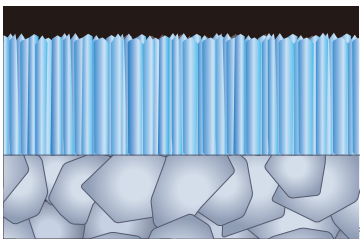


Higher cutting edge temperatures due to more particle boundary contact.

Smooth Surface of The Coating

The even surface of the coating has been achieved by first making the the carbide substrate smooth then by promoting straight growth of the coating crystals. This leads to excellent welding resistance.

MS9025

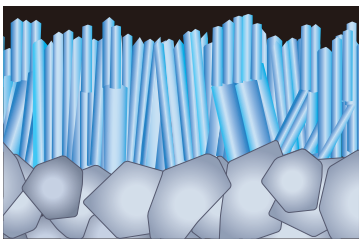


*By Image

Smooth Cemented Carbide

Straight crystal growth.
Smooth carbide surface.
Excellent welding resistance.

Conventional



Rough Cemented Carbide

Random crystal growth direction.
Performance is variable due to defects and voids in the surface.

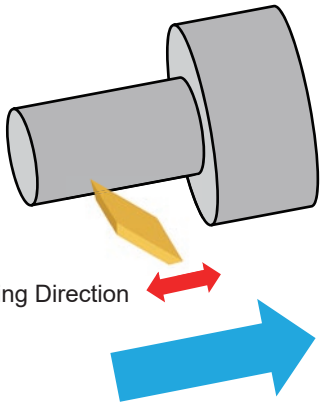
New Technology - Controlled Vibration of the Cutting Tool

Using new machine technology to deliberately vibrate the tool in relation to the cutting direction is an effective way of breaking chips.
This reduces production costs by reducing chip entanglement.

Without controlled vibration

With controlled vibration
frequency = 0.75/rev

With controlled vibration
frequency = 1.25/rev

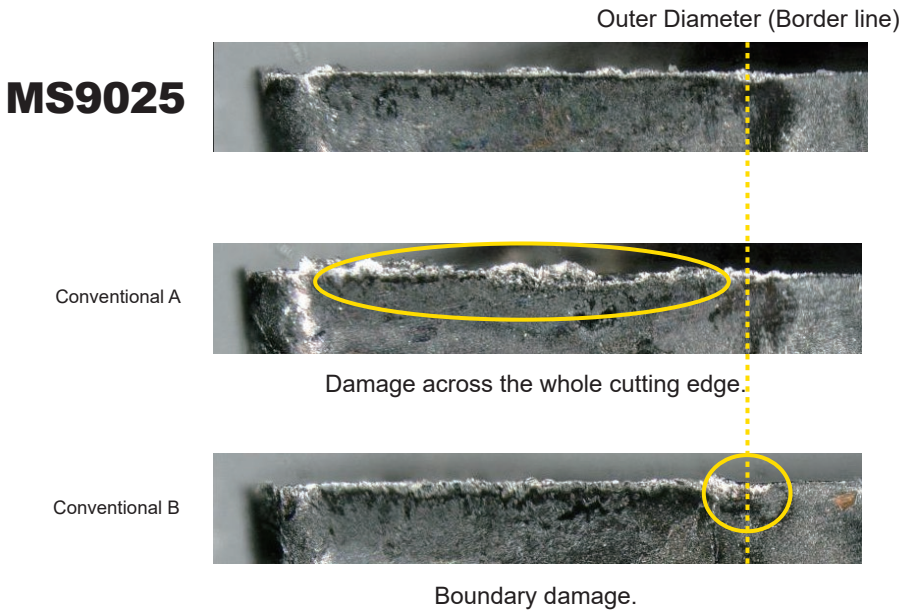


Challenges of controlled vibration machining:
Compared to standard machining there is a greater chance of edge chipping due to the extra stress on the cutting edge and also because of the impact of work hardening.

Benefits of using MS9025 for Controlled Vibration Machining

1. Excellent fracture resistance due to the inherent toughness of the base material.
2. Effectively suppresses boundary wear damage during machining of difficult-to-cut materials. This is achieved by the optimised cemented carbide grain size that reduces thermal conductivity and heating of the cutting edge.

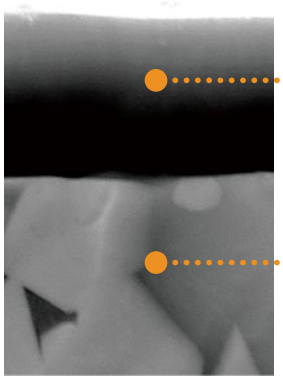
After 500 passes at 15m per pass



<Cutting Conditions>

Workpiece Material	: JIS SUS304
Inserts	: DCGT11T302M
Cutting Speed	: vc = 100 m/min
Feed per Rev.	: f =0.08 mm/rev
Depth of Cut	: ap = 1.0 mm
The Number of Vibration	: D = 1.25/rev
Cutting Mode	: External Continuous Cutting Wet Cutting (Oil)

High Al-rich(Al,Ti)N Single Layer Coating Technology

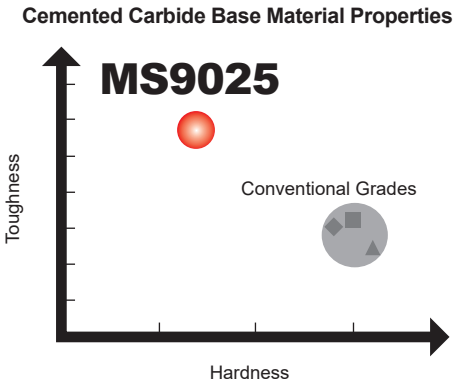


Al-rich (Al,Ti)N

Superior Flank Wear Resistance
Superior Crater Wear Resistance
Excellent Welding Resistance

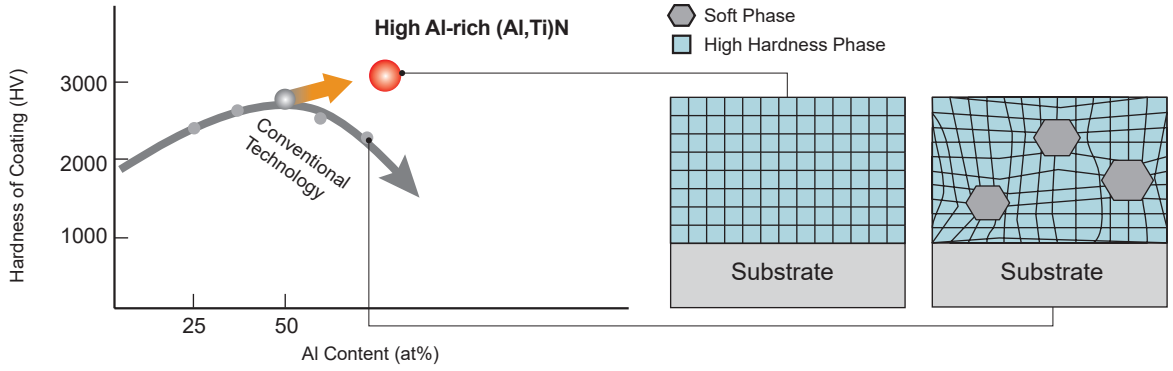
Special Cemented Carbide for MS9025

Superior Fracture Resistance
Excellent Chipping Resistance



High Al and Conventional Coating Comparison

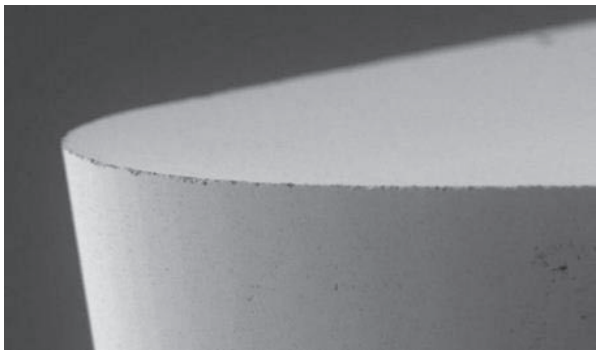
The high Al-rich (Al,Ti)N single layer coating provides stabilization of the high hardness phase and succeeds in dramatically improving wear, creater and welding resistance.



Extremely High Quality Cutting Edge

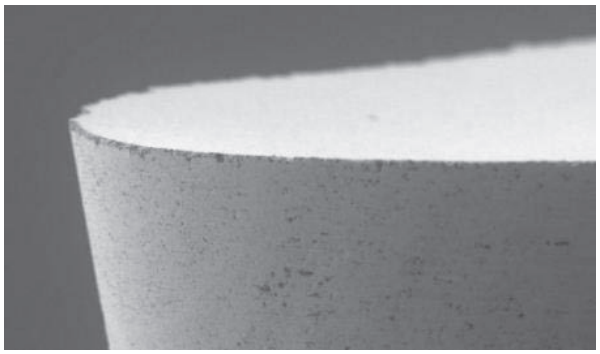
Technology that provides superior dimensional stability and reduces burrs.

MS9025



Rz=0.14 µm

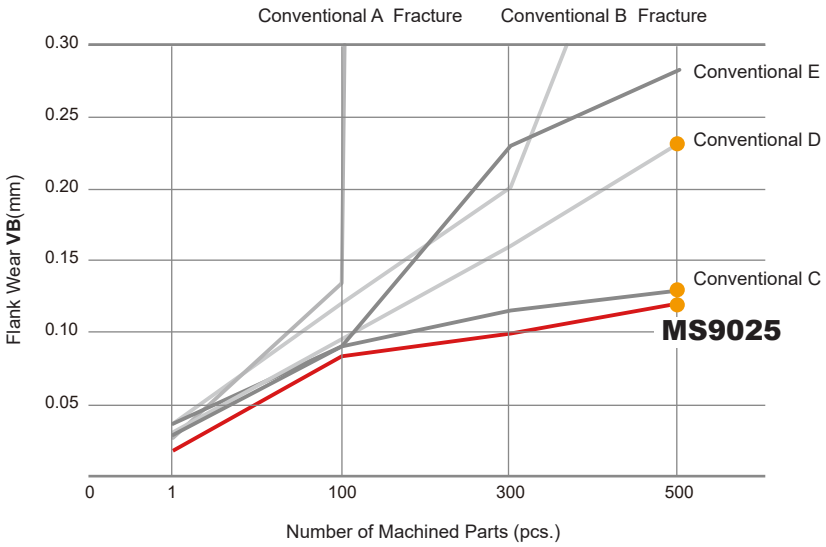
Conventional



Rz=0.61 µm

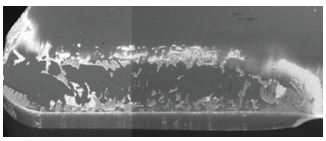
Cutting Performance

Stainless Steel SUS440C, Wear Resistance Comparison

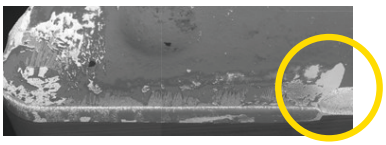


<Cutting Conditions>
Workpiece Material : JIS SUS440C
Inserts : DCGT11T302
Machining Methods : External Continuous Cutting
Cutting Speed : vc = 100 m/min
Feed per Rev. : f =0.08 mm/rev
Depth of Cut : ap = 1.0 mm
Cutting Mode : Wet Cutting (Oil)

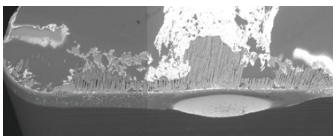
Taken after machining 500 Parts



MS9025



Conventional C : Flaking

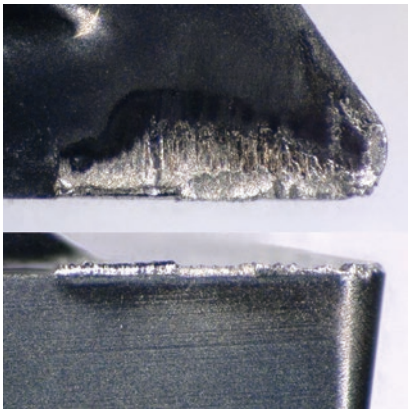


Conventional D : Base material exposure

Stainless Steel SUS304, Cutting Edge Comparison

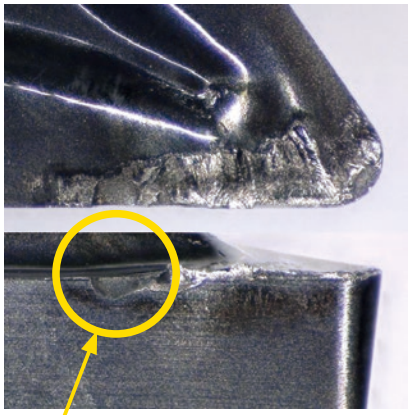
After machining 500 parts

MS9025



VB=0.03mm

Conventional



Notch Wear

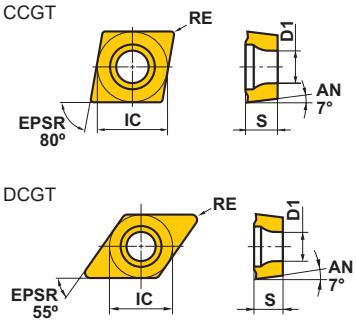
VB=0.07mm

<Cutting Conditions>
Workpiece Material : JIS SUS304
Inserts : DCGT11T302
Machining Methods : External Continuous Cutting
Cutting Speed : vc = 57 m/min
Feed per Rev. : f =0.03 mm/rev
Depth of Cut : Rough ap = 0.05 mm Finish ap = 0.02 mm
Cutting Mode : Wet Cutting (Oil)

MS9025 NEW

7° Positive Inserts (With Hole)

G Class



Finish	Light	Medium	
FS-P	LS-P	R-SN	

Finish	Finish	Light	Medium
FS-P	R-SRF	LS-P	R-SN

(mm)

Order Number	Cutting Area	MS9025	IC	S	RE	D1
CCGT060201M-FS-P	F	●	6.35	2.38	0.1	2.8
CCGT060202M-FS-P	F	●	6.35	2.38	0.2	2.8
CCGT09T301M-FS-P	F	●	9.525	3.97	0.1	4.4
CCGT09T302M-FS-P	F	●	9.525	3.97	0.2	4.4
CCGT09T304M-FS-P	F	●	9.525	3.97	0.4	4.4
CCGT060201M-LS-P	L	●	6.35	2.38	0.1	2.8
CCGT060202M-LS-P	L	●	6.35	2.38	0.2	2.8
CCGT09T301M-LS-P	L	●	9.525	3.97	0.1	4.4
CCGT09T302M-LS-P	L	●	9.525	3.97	0.2	4.4
CCGT09T304M-LS-P	L	●	9.525	3.97	0.4	4.4
CCGT060201MR-SN	M	●	6.35	2.38	0.1	2.8
CCGT060202MR-SN	M	●	6.35	2.38	0.2	2.8
CCGT09T301MR-SN	M	●	9.525	3.97	0.1	4.4
CCGT09T302MR-SN	M	●	9.525	3.97	0.2	4.4
CCGT09T304MR-SN	M	●	9.525	3.97	0.4	4.4
DCGT070201M-FS-P	F	●	6.35	2.38	0.1	2.8
DCGT070202M-FS-P	F	●	6.35	2.38	0.2	2.8
DCGT070204M-FS-P	F	●	6.35	2.38	0.4	2.8
DCGT11T301M-FS-P	F	●	9.525	3.97	0.1	4.4
DCGT11T302M-FS-P	F	●	9.525	3.97	0.2	4.4
DCGT11T304M-FS-P	F	●	9.525	3.97	0.4	4.4
DCGT11T301MR-SRF	F	●	9.525	3.97	0.1	4.4
DCGT11T302MR-SRF	F	●	9.525	3.97	0.2	4.4
DCGT11T304MR-SRF	F	●	9.525	3.97	0.4	4.4
DCGT070201M-LS-P	L	●	6.35	2.38	0.1	2.8
DCGT070202M-LS-P	L	●	6.35	2.38	0.2	2.8
DCGT070204M-LS-P	L	●	6.35	2.38	0.4	2.8
DCGT11T301M-LS-P	L	●	9.525	3.97	0.1	4.4
DCGT11T302M-LS-P	L	●	9.525	3.97	0.2	4.4
DCGT11T304M-LS-P	L	●	9.525	3.97	0.4	4.4
DCGT070201MR-SN	M	●	6.35	2.38	0.1	2.8
DCGT070202MR-SN	M	●	6.35	2.38	0.2	2.8
DCGT070204MR-SN	M	●	6.35	2.38	0.4	2.8
DCGT11T301MR-SN	M	●	9.525	3.97	0.1	4.4
DCGT11T302MR-SN	M	●	9.525	3.97	0.2	4.4
DCGT11T304MR-SN	M	●	9.525	3.97	0.4	4.4

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

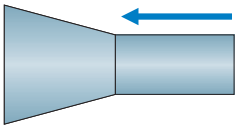
Recommended Cutting Conditions

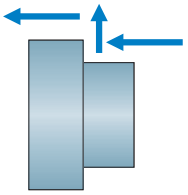
(mm)

	Workpiece Material	Properties	Cutting Area		Chip Breaker	Grade	Cutting Speed **vc** (m/min)	Feed per Rev. **f** (mm/rev)	Depth of Cut **ap**
M	Electromagnetic Stainless Steels (SUS440C, SUS420J2 etc.)	Hardness 230HBW	●	F	FS-P	MS9025	100(50—180)	0.04—0.12	0.2—1.4
			◔	F	R-SRF	MS9025	100(50—180)	0.05—0.12	0.1—0.5
			◔	L	LS-P	MS9025	100(50—180)	0.04—0.15	0.3—3.0
			◔	M	R-SN	MS9025	100(50—180)	0.01—0.10	0.1—5.0
S	Heat Resistant Alloys (SUH etc.)	—	●	F	FS-P	MS9025	80(40—140)	0.04—0.12	0.2—1.4
			◔	F	R-SRF	MS9025	80(40—140)	0.05—0.12	0.1—0.5
			◔	L	LS-P	MS9025	80(40—140)	0.04—0.15	0.3—3.0
			◔	M	R-SN	MS9025	80(40—140)	0.01—0.10	0.1—5.0

Cutting Conditions (Guide) :
● : Stable Cutting ◔ : General Cutting ✱ : Unstable Cutting

Application Examples

Insert		DCGT11T302M-LS-P	DCGT070201M-FS-P
Workpiece		JIS SUS420J2 Stainless Steel 	JIS SUS440C Electromagnetic Stainless Steel 
Component		Solenoid Parts	Brake Parts
Application		External Continuous Turning	External Continuous Turning
Cutting Conditions	Cutting Speed **vc** (m/min)	117	38
	Feed per Rev. **f** (mm/rev)	0.1	0.05
	Depth of Cut **ap** (mm)	0.2	0.2
Cutting Mode		Wet Cutting (Oil)	Wet Cutting (Oil)
Results		Number of Workpieces 5000 1000 1500 **MS9025** Conventional Improved wear resistance and tool life increased by a factor of 1.7.	Number of Workpieces 1000 2000 3000 **MS9025** Conventional Improved welding resistance and double tool life when compared to a conventional tool.

Insert		DCGT11T304M-LS-P
Workpiece		SUH3 Heat Resistant Alloy 
Component		Valve
Application		External and Face Continuous Turning
Cutting Conditions	Cutting Speed **vc** (m/min)	80
	Feed per Rev. **f** (mm/rev)	0.12-0.15
	Depth of Cut **ap** (mm)	0.3-0.5
Cutting Mode		Wet Cutting (Oil)
Results		Number of Workpieces 200 400 **MS9025** Conventional Conventional products tend to have a worsened surface during processing. On the other hand, the machined surface of MS9025 is stable even with a tool life of 5 times or more.

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

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

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(Tools specifications subject to change without notice.)

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