

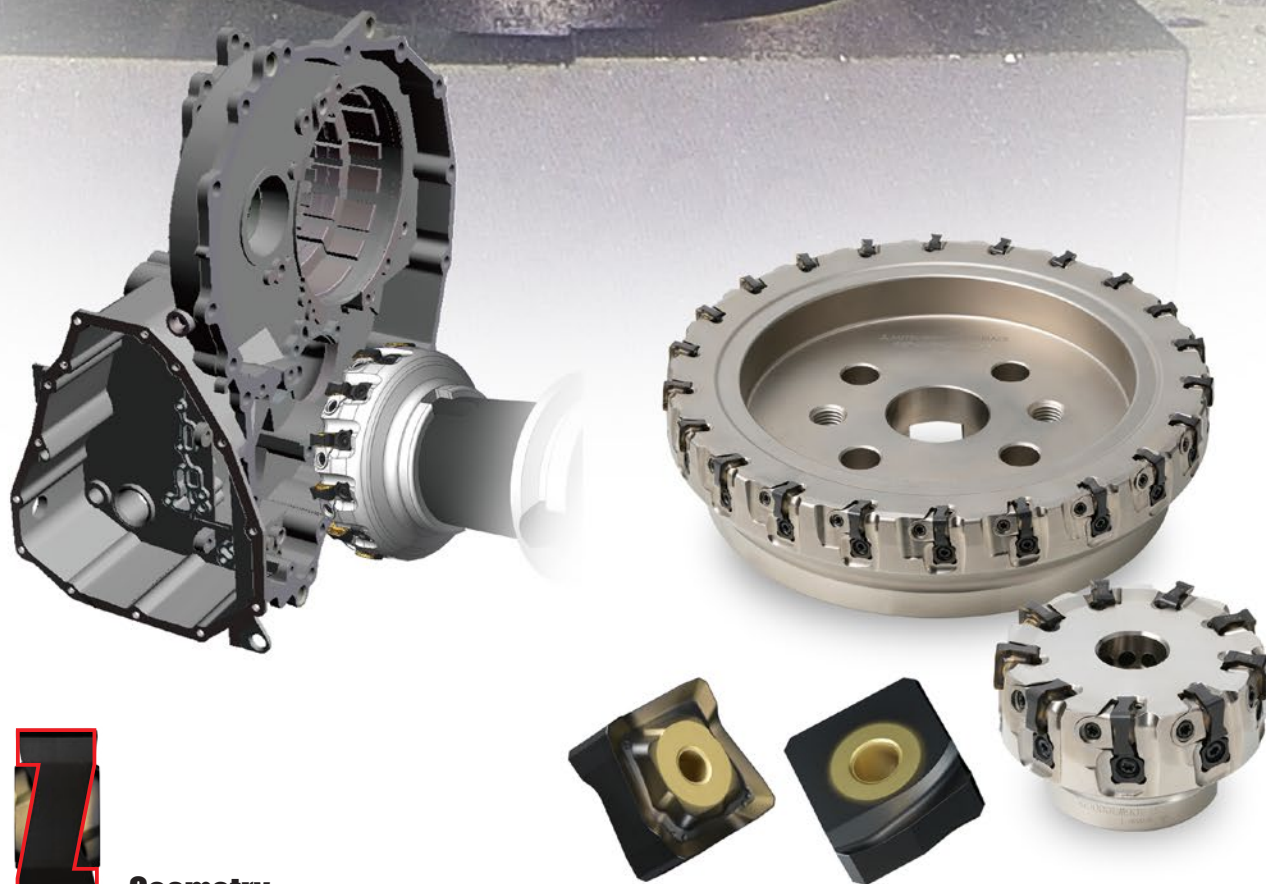
Face Milling Cutter for Cast Iron Machining with an Adjustable Run-Out System

Environmentally Friendly Product

WSF406W


Inserts
Expansion

**A New Generation of High Efficiency
Cast Iron Machining is Achieved
with Low Cutting Resistance and an
Adjustable Run-Out System**



Double



Geometry

Face Milling Cutter for Cast Iron Machining with an Adjustable Run-Out System



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

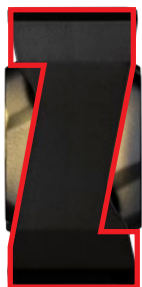
WSF406W

NEW

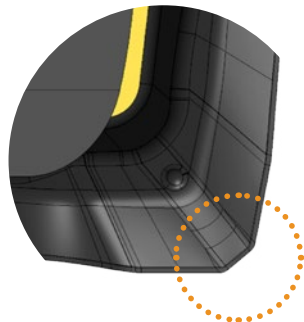
Low Cutting Resistance Insert and Adjustable Cutting Edge Run-Out Produce an Improved Surface Finish and Increase Productivity

Tough and Sharp Inserts for Low Cutting Resistance

MITSUBISHI MATERIAL's uniquely developed proprietary "Double Sided, Z Geometry" insert combines the features of conventional positive and negative rake inserts to achieve low resistance and sharpness. In addition, the chamfer geometry suppresses edge chipping that tends to occur during cast iron machining.



**Double Sided,
Z Geometry**

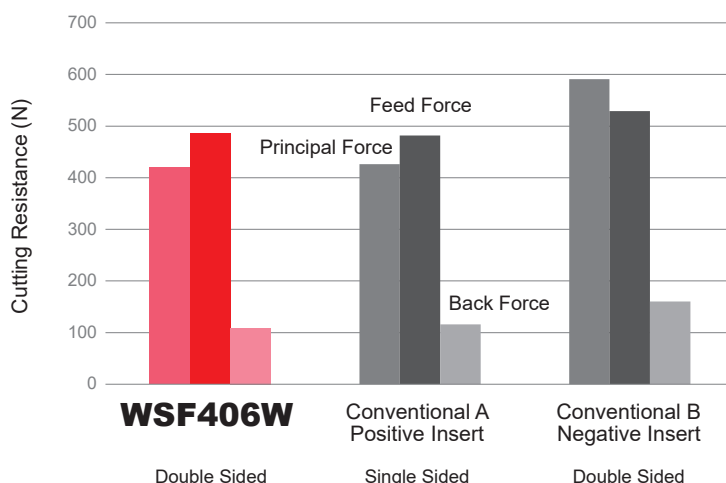


Chamfer Geometry



YouTube

Double sided insert with positive insert cutting resistance



**Reduces
negative
insert cutting
resistance by
23%**

<Cutting Conditions>

Workpiece Material : FC300
Tool : WSF406WR12516EN
Insert : SNMU1206C05ZNER-M (MC520)
Cutting Speed : $v_c = 160 \text{ m/min}$
Feed per Tooth : $f_z = 0.1 \text{ mm/t}$
Depth of Cut : $a_p = 3.0 \text{ mm}$
Width of Cut : $a_e = 100 \text{ mm}$
Cutting Mode : Dry Cutting

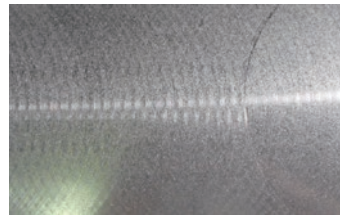
Easy-to-use Adjustable Run-out System

The M-Class insert gives a great cost performance ratio and allows for axial cutting edge adjustments of 0.01 mm or less. This helps to achieve surface finishes of Ra 1.6 μm or less over a wide range of feeds and speeds.

High precision machining is possible over a wide range of cutting conditions.

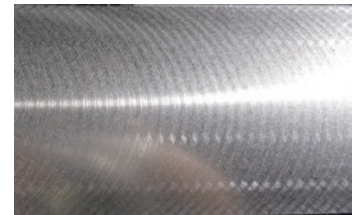
Finish Cutting Conditions

Ra : 0.612 μm



fz=0.1 mm/t. , ap=0.3 mm

Ra : 1.351 μm



fz=0.3 mm/t. , ap=1.5 mm

<Cutting Conditions>

Workpiece Material : FC300

Tool : WSF406WR12516EN

(Minur Cutting Edge Run-out Accuracy: 3 μm)

Insert : SNMU1206C05ZNER-M (MC520)

Cutting Speed : vc=250 m/min

Cutting Mode : Dry Cutting

Achieves High Accuracy with a Simple Operation

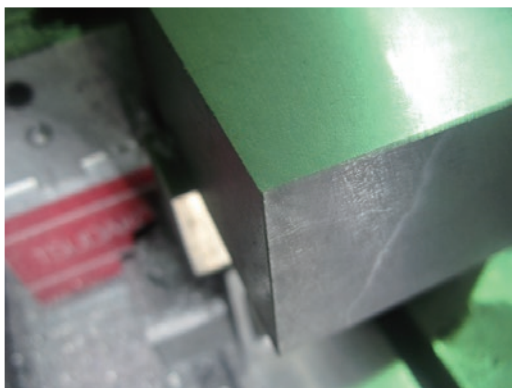
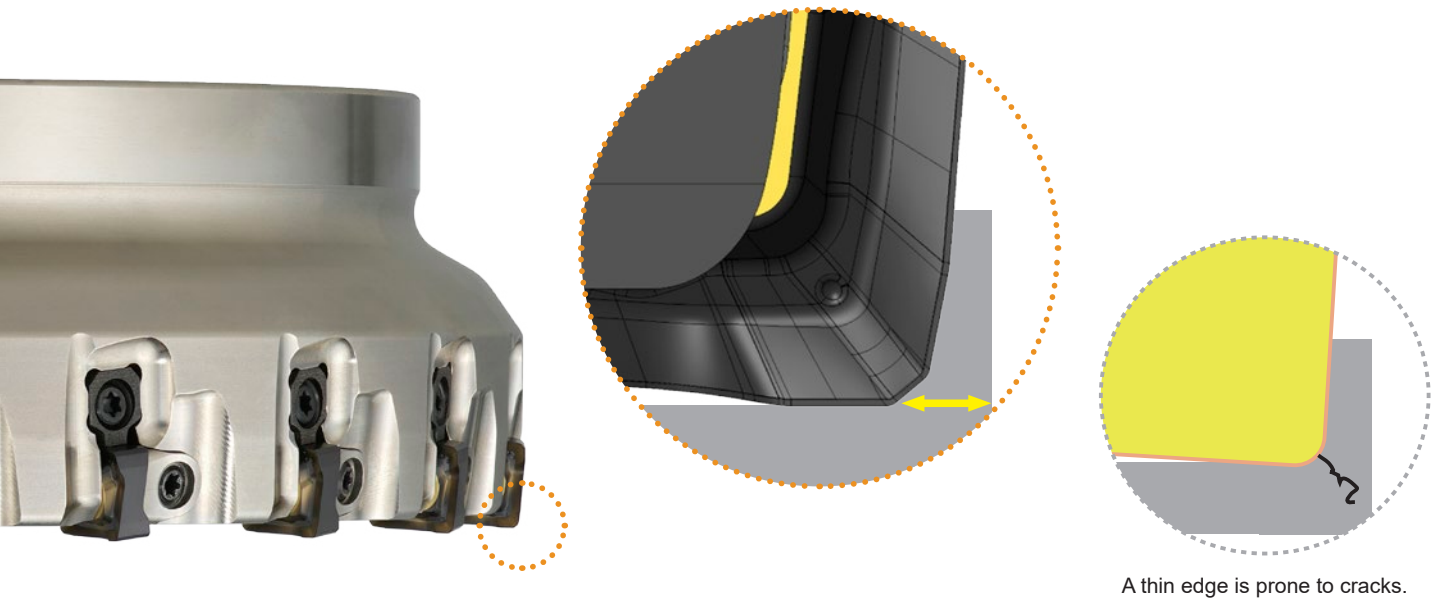
Cutting edge run-out is easily altered by turning the adjustment screw.



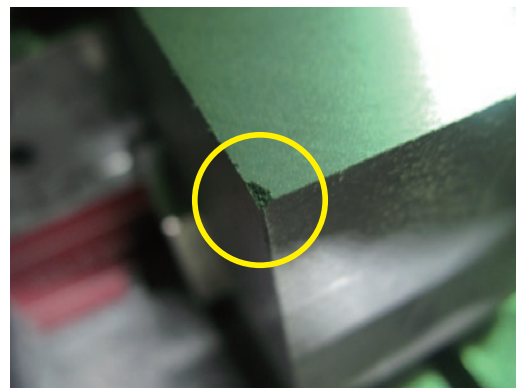
- ① Loosen the adjustment screw.
- ② Locate the insert and tighten so accurate adjustment can be made.
- ③ Turn the adjustment screw until the insert is in the required position.
- ④ Fully tighten the insert clamp.

Chamfer Geometry Prevents Chipping of the Workpiece Material

The insert corner is chamfered to provide extra material thickness at the corner to prevent workpiece material cracking.



WSF406W



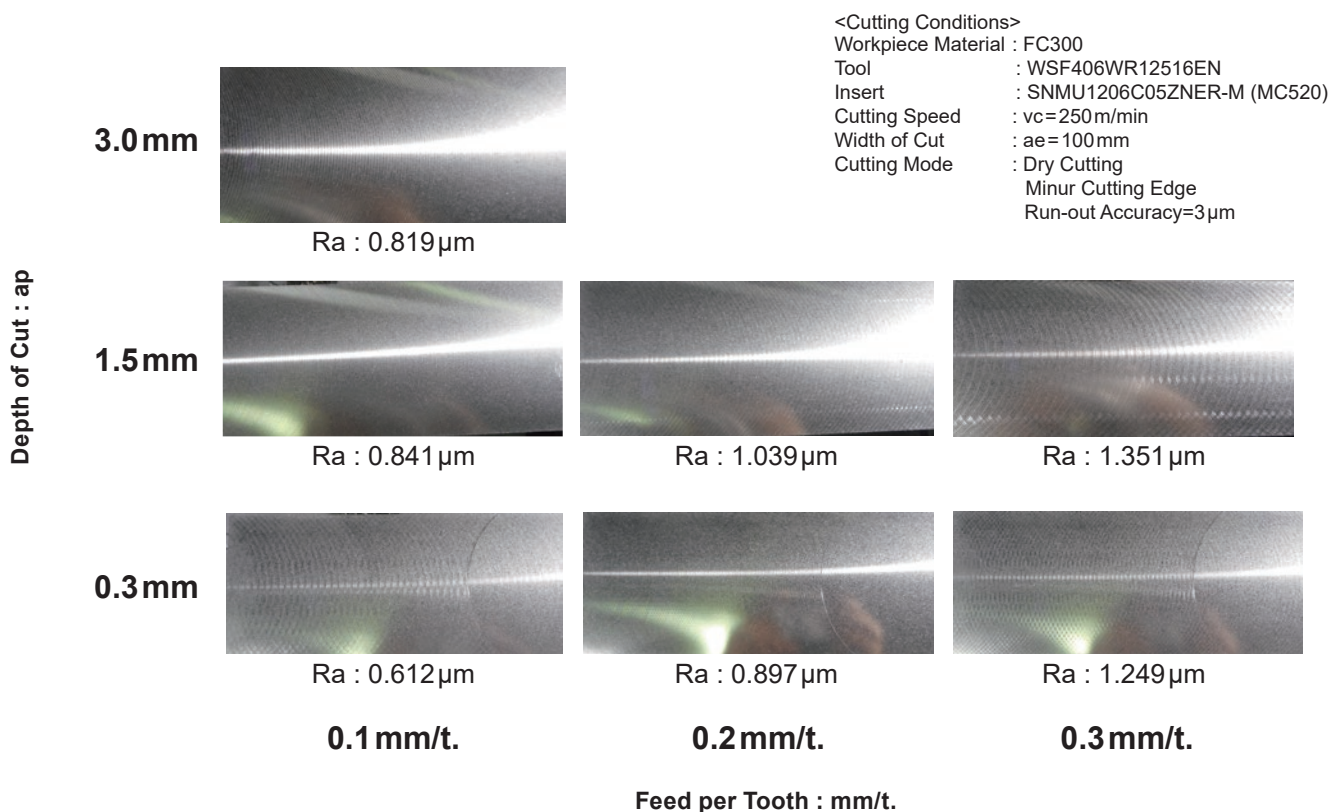
Conventional

<Cutting Conditions>
Workpiece Material : FC300
Tool : WSF406WR12516EN
Insert : SNMU1206C05ZNER-M (MC520)
Cutting Speed : $v_c = 160 \text{ m/min}$
Feed per Tooth : $f_z = 0.1 \text{ mm/t.}$
Depth of Cut : $a_p = 3.0 \text{ mm}$
Width of Cut : $a_e = 100 \text{ mm}$
Cutting Mode : Dry Cutting

Cutting Performance

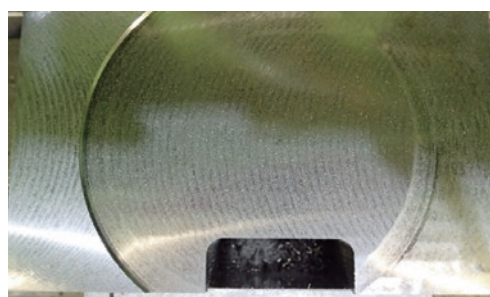
Comparison of Surface Finishes for Each Depth of Cut and Feed: JIS FC300

Achieves an Ra of 1.6μm or less for a wide range of feeds and depth of cut.

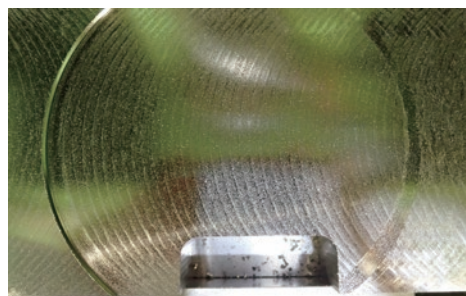


Comparison of Surface Finish for Wiper Insert : JIS FC250

Achieves excellent finished surface accuracy compared to conventional wiper inserts.



Conventional Ra 1.230 μm



WSF406W Ra 0.834 μm

<Cutting Conditions>
 Workpiece Material : FC250
 Tool : WSF406WR12516EN
 Insert : SNMU1206C05ZNER-M(MC520) 15 teeth
 WNGU1206ZNER5C-M(MC520) 1 teeth
 Cutting Speed : vc=250 m/min
 Feed per Tooth : fz=0.2 mm/t.
 Depth of Cut : ap=1.0 mm
 Width of Cut : ae=100 mm

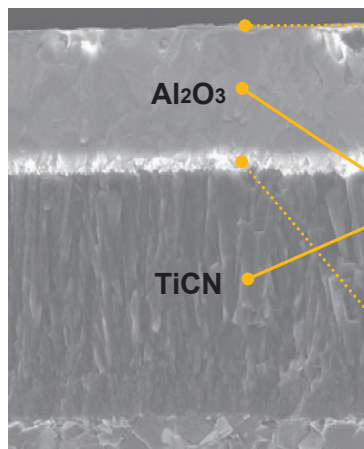
CVD Coated Carbide Grade for Cast Iron Milling

MC520 NEW

Ideal for machining grey cast iron due to the improved peeling resistance of the coating layer.

Improved Peeling Resistance

By optimising the coating layer and improving the adhesion with the cemented carbide base material, the plastic deformation of the cutting edge is suppressed. The coating layer has an excellent resistance to peeling, thereby providing longer tool life.



All Black Super-Even Coating

The new, smoother than standard surface coating prevents welding and edge chipping to allow reliable and stable cutting.

Nano-texture Coating Technology

The optimised crystal growth, and the Nano-texture coating technology provide outstanding wear and chipping resistance.

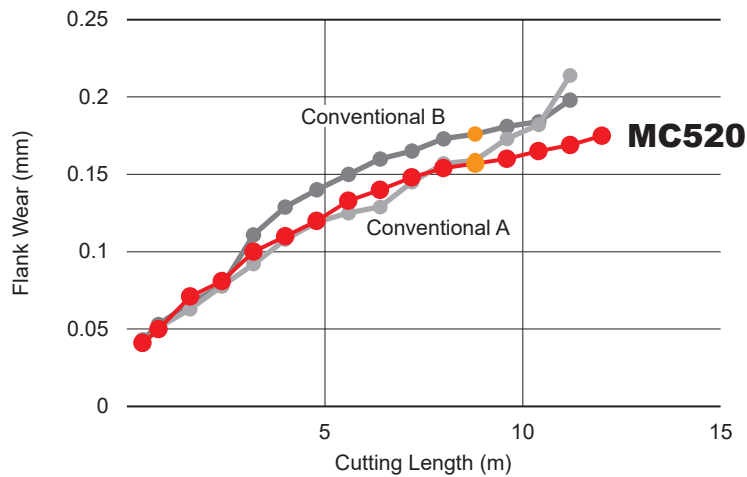
TOUGH-grip Coating Technology

The degree of adhesion between the coating layers has been improved exponentially allowing for greater strength and toughness.

Machining Performance

Comparison of Wear Resistance ; JIS FC300

The MC520 provides excellent wear resistance when machining gray cast iron.



<Cutting Conditions>

Workpiece Material : FC300

Tool : WSF406WR12516EN

Insert : SNMU1206C05ZNER-M

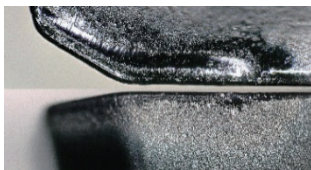
Cutting Speed : $v_c = 300$ m/min

Feed per Tooth : $f_z = 0.2$ mm/t.

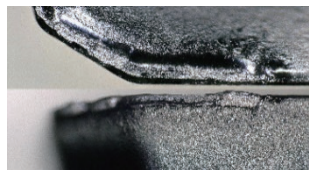
Depth of Cut : $a_p = 2.0$ mm

Cutting Mode : Dry Cutting, Single Insert
Center Cut

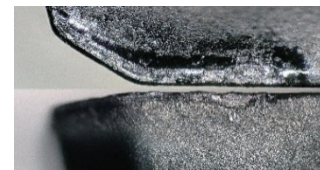
After Machining Cutting Length 8.0m



MC520



Conventional A



Conventional B

Face Milling Cutter for Cast Iron Machining with an Adjustable Run-Out System

FACE MILLING

<HIGH EFFICIENCY CUTTING FOR CAST IRON>



WSF406W

NEW

P M **K** N S H



Fig.1

ø80

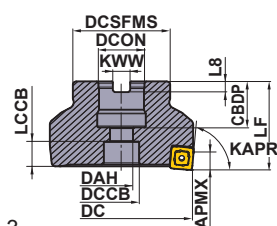


Fig.2

ø100
ø125
ø160

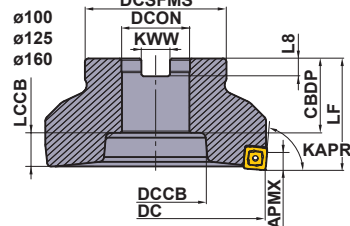
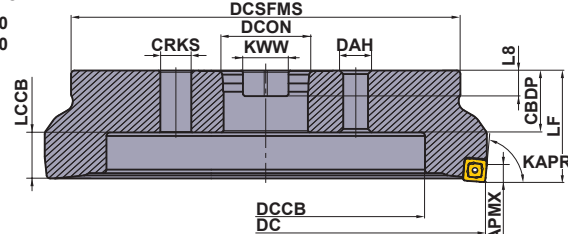


Fig.3

ø200
ø250



Arbor Type

KAPR : 84°

DCON = inch size, Without Coolant Hole

Right hand tool holder only.

DC	Order Number	Stock	*2	LF	DCON	WT (kg)	APMX	RPMX (min ⁻¹)	Fig.
		R	No.T						
80	WSF406WR08006CN	●	6	50	25.4	1.2	7.0	7,800	1
80	WSF406WR08009CN	●	9	50	25.4	1.2	7.0	7,800	1
100	WSF406WR10008DN	●	8	50	31.75	1.7	7.0	7,000	2
100	WSF406WR10012DN	●	12	50	31.75	1.7	7.0	7,000	2
125	WSF406WR12510EN	●	10	63	38.1	3.3	7.0	6,250	2
125	WSF406WR12516EN	●	16	63	38.1	3.2	7.0	6,250	2
160	WSF406WR16014FN	●	14	63	50.8	5	7.0	5,500	2
160	WSF406WR16020FN	●	20	63	50.8	4.9	7.0	5,500	2
200	WSF406WR20016KN	●	16	63	47.625	8.6	7.0	4,900	3
200	WSF406WR20024KN	●	24	63	47.625	8.5	7.0	4,900	3
250	WSF406WR25022KN	●	22	63	47.625	14	7.0	4,400	3
250	WSF406WR25032KN	●	32	63	47.625	13.9	7.0	4,400	3

* Number of Teeth

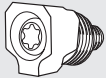
Note1) A set bolt for the arbor is not supplied with the body. Please refer to page 8 to find the correct type of set bolt to order.

Mounting Dimensions

DC	Order Number	DCON	CBDP	DAH	DCCB	CRKS	LCCB	DCSFMS	KWW	L8	Fig.
80	WSF406WR080	25.4	34	13	20	—	14	55	9.5	6	1
100	WSF406WR100	31.75	32	—	46	—	16	70	12.7	8	2
125	WSF406WR125	38.1	42	—	56	—	19	80	15.9	10	2
160	WSF406WR160	50.8	45	—	80	—	16	100	19.1	11	2
200	WSF406WR200	47.625	35	18	140	M16	26	175	25.4	14.22	3
250	WSF406WR250	47.625	35	18	180	M16	26	220	25.4	14.22	3

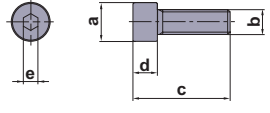
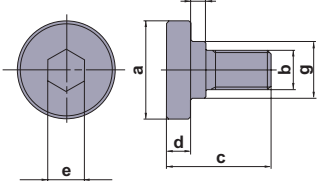
● : Inventory maintained in Japan. (10 inserts in one case)

Spare Parts

Tool Holder Type		 *		
	Wedge	Clamp Screw	Wrench	Adjustable Run-Out System
WSF406W	CWSF406N	LS0622T	TKY15T	ADW04

* Clamp Torque (N · m) : LS0622T = 6.0

Parts Sold Separately Set Bolt

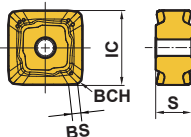
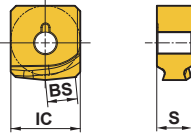
Tool Holder Type	Set Bolt	Fig.	Reference Dimensions							Geometry
			a	b	c	d	e	f	g	
	Order Number									
WSF406WR080	HSC12035	1	18	M12x1.75	47	12	10	—	—	Fig.1 
WSF406WR100	—	2	40	M16x2	43	10	14	6	23	
WSF406WR125	—	2	50	M20x2.5	54	14	17	6	27	
WSF406WR160	—	2	65	M24x3	59	14	17	10	37	
WSF406WR200	—	1	24	M16x2	61-	16	14	—	—	
WSF406WR250	—	1	24	M16x2	61-	16	14	—	—	
										Fig.2 

Note 1) Please purchase the appropriate set bolt after confirming the reference dimensions. The items with an order number listed under the Set Bolt columns are also sold by MITSUBISHI MATERIALS.

Face Milling Cutter for Cast Iron Machining with an Adjustable Run-Out System

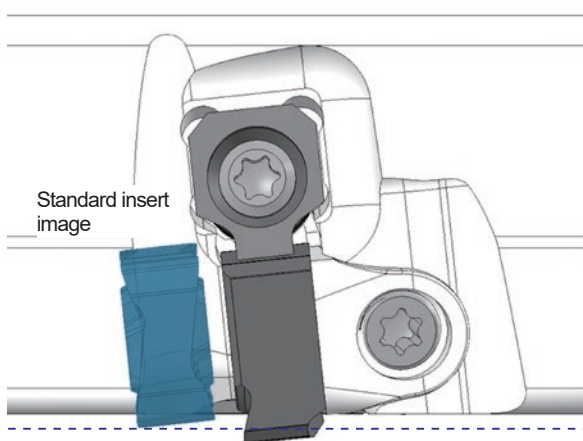
■ Inserts

(mm)

Workpiece Material	K	Cast Irons		◆					This is the selection guideline for WSF406W. Please note that the cutting conditions differ depending on multiple factors, for more details refer to the Recommended Cutting Conditions			
									Edge Preparation : E : Round			
Shape	Order Number	Class	Edge Preparation	Coated	MC520	IC	S	BS	BCH	Geometry		
NEW	SNMU1206C05ZNER-M	M	E	●		12.7	6.2	1.6	0.5			
												
NEW	WNGU1206ZNER5C-M	G	E	●		12.3	6.2	5.2	—			
 Wiper												

How to Use Wiper Insert for Best Results

- The WSF406W can obtain a good surface finish when using a standard insert due to the adjustable run-out system, but by using a wiper insert an excellent surface finish can be achieved without having to set a high accuracy face run out.
When a wiper insert is mounted, aim to set the standard insert run out accuracy to within 0.04mm.
- Just one wiper insert is enough to achieve excellent finished surfaces.
However, if the feed per revolution is greater than 5.0mm/rev, attach two or more wiper inserts so that they are evenly spaced in the cutter body and set the run out accuracy between multiple wiper inserts to within 0.003mm before use.



By figure image

Please set the wiper insert to protrude by up to 0.07 mm.

Cutting Conditions (Guide) :

● : Stable Cutting ● : General Cutting ✚ : Unstable Cutting

Recommended Cutting Conditions

■ Dry Cutting

(mm)

Workpiece Material	Properties	Cutting Conditions	Depth of Cut ap	Insert		Cutting Speed vc (m/min)	Feed per Tooth fz (mm/t.)	Width of Cut ae
				1st Recommended	2nd Recommended			
K	Gray Cast Irons	●	ap ≤ 0.5mm	MC520		300(250—300)	0.13(0.08—0.20)	≤ 0.8DC
			ap ≤ 2.0mm	MC520		250(210—300)	0.15(0.10—0.25)	≤ 0.8DC
			2.0mm < ap ≤ 4.0mm	MC520		220(190—260)	0.13(0.10—0.20)	≤ 0.8DC
			4.0mm < ap ≤ 7.5mm	MC520		200(180—230)	0.10(0.08—0.15)	≤ 0.8DC
		●	ap ≤ 0.5mm	MC520		250(210—300)	0.13(0.08—0.20)	≤ 0.8DC
			ap ≤ 2.0mm	MC520		220(190—260)	0.15(0.10—0.25)	≤ 0.8DC
			2.0mm < ap ≤ 4.0mm	MC520		200(180—230)	0.13(0.10—0.20)	≤ 0.8DC
			4.0mm < ap ≤ 7.5mm	MC520		180(160—210)	0.10(0.08—0.15)	≤ 0.8DC
		✚	ap ≤ 0.5mm	MC520		220(190—260)	0.13(0.08—0.20)	≤ 0.8DC
			ap ≤ 2.0mm	MC520		200(180—230)	0.15(0.10—0.25)	≤ 0.8DC
			2.0mm < ap ≤ 4.0mm	MC520		180(160—210)	0.13(0.10—0.20)	≤ 0.8DC
			4.0mm < ap ≤ 7.5mm	MC520		150(100—180)	0.10(0.08—0.15)	≤ 0.8DC
Ductile Cast Irons	Tensile Strength ≤ 450MPa	●	ap ≤ 0.5mm	MC520		230(200—250)	0.13(0.08—0.20)	≤ 0.8DC
			ap ≤ 2.0mm	MC520		200(170—230)	0.15(0.10—0.25)	≤ 0.8DC
			2.0mm < ap ≤ 4.0mm	MC520		180(150—210)	0.13(0.10—0.20)	≤ 0.8DC
			4.0mm < ap ≤ 7.5mm	MC520		160(130—190)	0.10(0.08—0.15)	≤ 0.8DC
		●	ap ≤ 0.5mm	MC520		200(170—230)	0.13(0.08—0.20)	≤ 0.8DC
			ap ≤ 2.0mm	MC520		180(150—210)	0.15(0.10—0.25)	≤ 0.8DC
			2.0mm < ap ≤ 4.0mm	MC520		160(130—190)	0.13(0.10—0.20)	≤ 0.8DC
			4.0mm < ap ≤ 7.5mm	MC520		140(110—170)	0.10(0.08—0.15)	≤ 0.8DC
		✚	ap ≤ 0.5mm	MC520		180(150—200)	0.13(0.08—0.20)	≤ 0.8DC
			ap ≤ 2.0mm	MC520		160(130—190)	0.15(0.10—0.25)	≤ 0.8DC
			2.0mm < ap ≤ 4.0mm	MC520		140(110—170)	0.13(0.10—0.20)	≤ 0.8DC
			4.0mm < ap ≤ 7.5mm	MC520		120(90—150)	0.10(0.08—0.15)	≤ 0.8DC
Ductile Cast Irons	Tensile Strength ≤ 800MPa	●	ap ≤ 0.5mm	MC520		230(200—250)	0.13(0.08—0.20)	≤ 0.8DC
			ap ≤ 2.0mm	MC520		200(170—230)	0.15(0.10—0.25)	≤ 0.8DC
			2.0mm < ap ≤ 4.0mm	MC520		180(150—210)	0.13(0.10—0.20)	≤ 0.8DC
			4.0mm < ap ≤ 7.5mm	MC520		160(130—190)	0.10(0.08—0.15)	≤ 0.8DC
		●	ap ≤ 0.5mm	MC520		200(170—230)	0.13(0.08—0.20)	≤ 0.8DC
			ap ≤ 2.0mm	MC520		180(150—210)	0.15(0.10—0.25)	≤ 0.8DC
			2.0mm < ap ≤ 4.0mm	MC520		160(130—190)	0.13(0.10—0.20)	≤ 0.8DC
			4.0mm < ap ≤ 7.5mm	MC520		140(110—170)	0.10(0.08—0.15)	≤ 0.8DC
		✚	ap ≤ 0.5mm	MC520		180(150—210)	0.13(0.08—0.20)	≤ 0.8DC
			ap ≤ 2.0mm	MC520		160(130—190)	0.15(0.10—0.25)	≤ 0.8DC
			2.0mm < ap ≤ 4.0mm	MC520		140(110—170)	0.13(0.10—0.20)	≤ 0.8DC
			4.0mm < ap ≤ 7.5mm	MC520		120(90—150)	0.10(0.08—0.15)	≤ 0.8DC

Note 1) Refer to the table above for more details on how to set the cutting conditions according to the usage.

Note 2) When using a wiper insert, the cutting conditions for the finishing area are ap ≤ 0.5mm.



Face Milling Cutter for Cast Iron Machining with an Adjustable Run-Out System

WSF406W

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.



WSF406W Subject : Arber Type
Inserts SNMU1206C05ZNER-M

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/ja/>



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.mitsubishicarbide.com/en/>
(Tools specifications subject to change without notice.)