MITSUBISHI MATERIALS

TOOLS NEWS 2017.12 Update B220G

General Purpose Double Sided Insert Type Face Mill Features Low Cutting Resistance

WSX445

Series Expansion

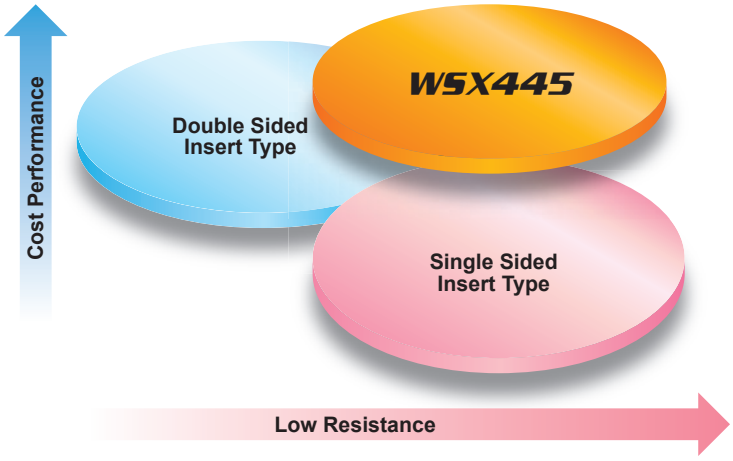
Unique Double Z Insert Geometry

Double Geometry

General Purpose Double Sided Insert Type Face Mill Features Low Cutting Resistance

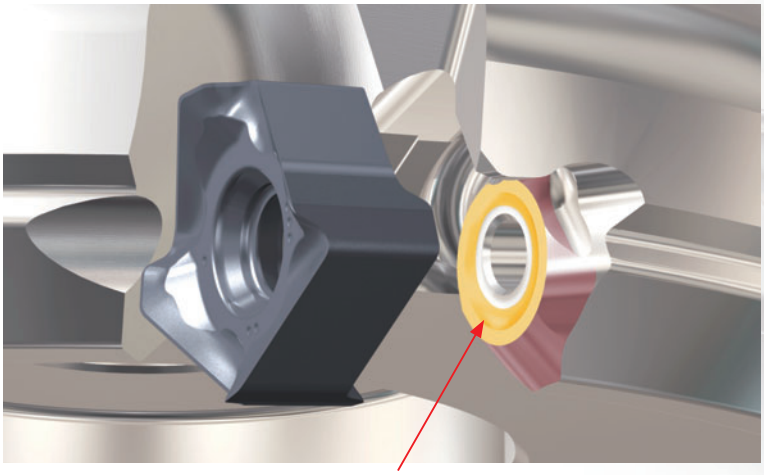
WSX445

New double sided insert type face milling cutter with innovative cutting edge. Perfect balance between convenience and high efficiency.



Designed to control abnormal insert breakage and body damage

The unique conical insert pocket seating and Anti Fly Insert mechanism (A.F.I.) combine to securely hold the insert. Since the outer edge of the insert is not in contact with the cutter body damage from sudden fracturing is unlikely to cause damage to the cutter body.
Shims are not needed due to the high rigidity of the very thick insert.



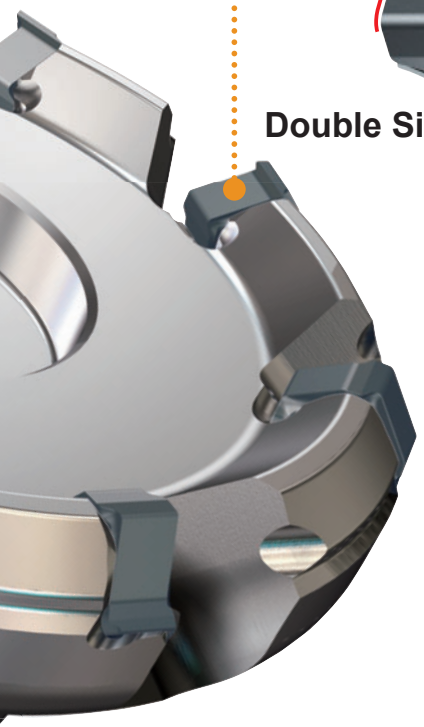
Anti Fly Insert Mechanism (A.F.I.)

Through Coolant Holes

Improves chip discharge and prevents chip welding.

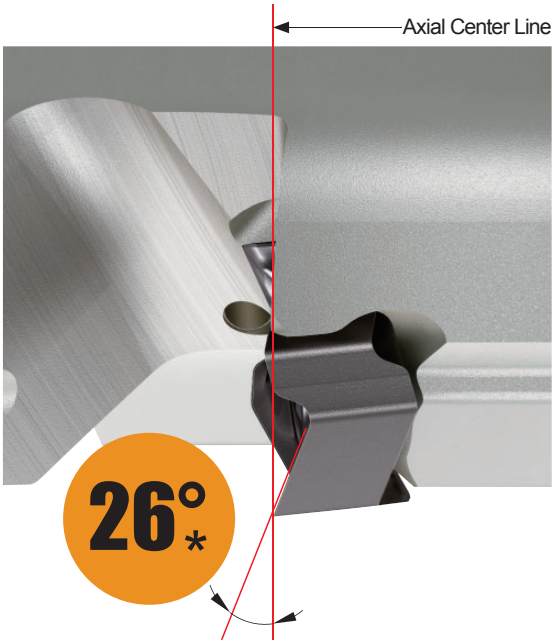
Unique Double Z Insert Geometry

Mitsubishi Materials' proprietary "Double sided, Z Geometry" insert features sharp cutting edges with low cutting resistance by utilizing features of conventional positive and negative rake inserts.



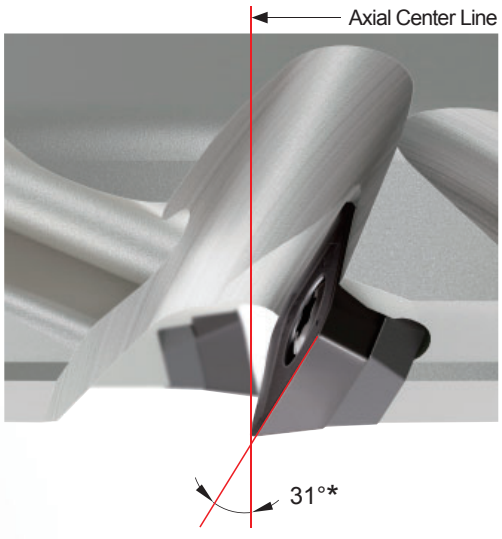
Double Sided, Z Geometry

WSX445



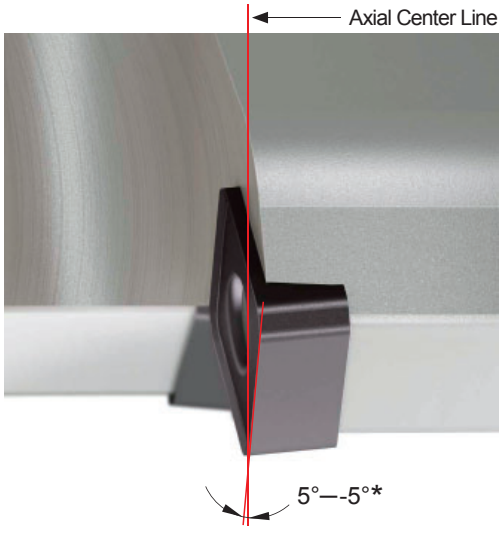
For Sharper Cutting Edge **Double Sided Insert**

Conventional Positive Insert



For Sharper Cutting Edge **Single Sided Insert**

Conventional Negative Insert



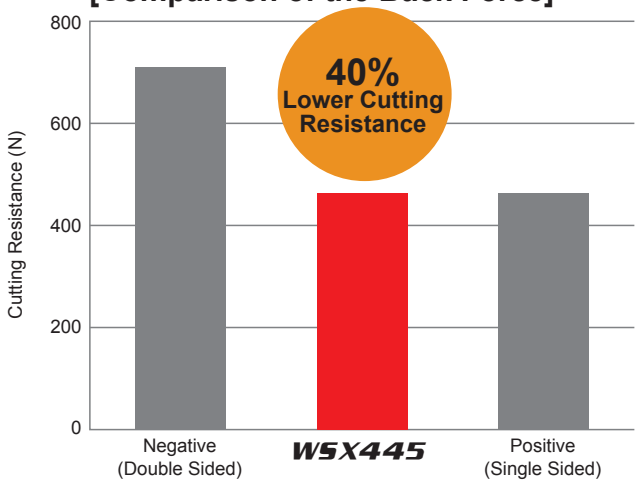
For Higher Edge Strength **Double Sided Insert**

*Rake angle mounted an insert.

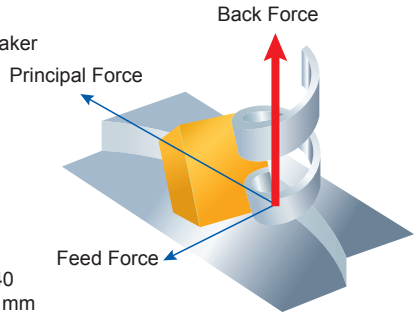
Cutting Resistance

WSX445's low cutting resistance equals that of single sided insert cutters.
The low axial and radial forces reduce vibrations to a minimum.

[Comparison of the Back Force]



WSX445 M Breaker
Conventional Insert



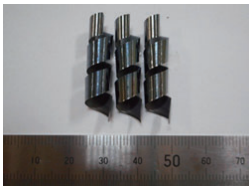
<Cutting Conditions>
Work Material : AISI 4140
Cutter Dia. : DC=125mm
Cutting Speed : 200m/min
Feed per Tooth : 0.2mm/t.
Depth of Cut : ap=4.0mm
Width of Cut : ae=100mm
Cutting Mode : Dry Cutting
Single Insert

<Back Force>
Cutting force in the axial direction. Back force can cause inaccuracy and vibration, resulting in deflection of the workpiece as well as cutting tools.

Chip Discharge Effect

Chips are discharged outwardly because of the negative / positive edge design.
This helps prevent jamming of continuous chips and damage of coolant hole.

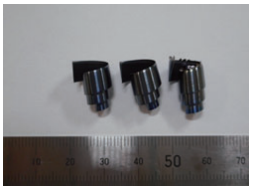
Conventional Positive Insert



WSX445

Chips generated are cylindrical and are discharged away from the cutter.

Conventional Negative Insert A



Conventional Negative Insert B

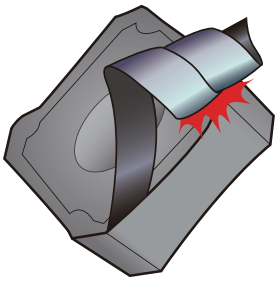
Chips enter the inside of the cutter and cause machining problems.

<Cutting Conditions>
Work Material : AISI 4140
Cutting Speed : 150m/min
Feed per Tooth : 0.2mm/t.
Depth of Cut : ap=4.0mm
Width of Cut : ae=100mm
Cutting Mode : Dry Cutting

Abrasive Damage from Chips

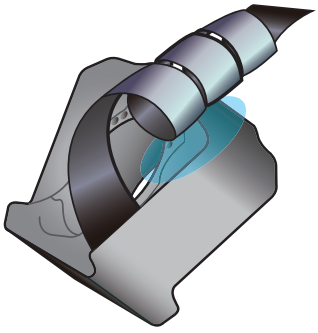
Depth of cut can be set without regard to the unused corner.

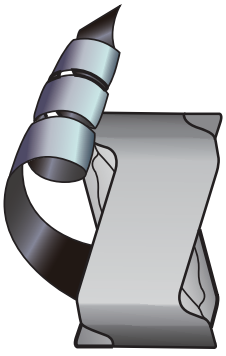
Conventional Double Sided Insert



Chips can contact the unused corner.

WSX445

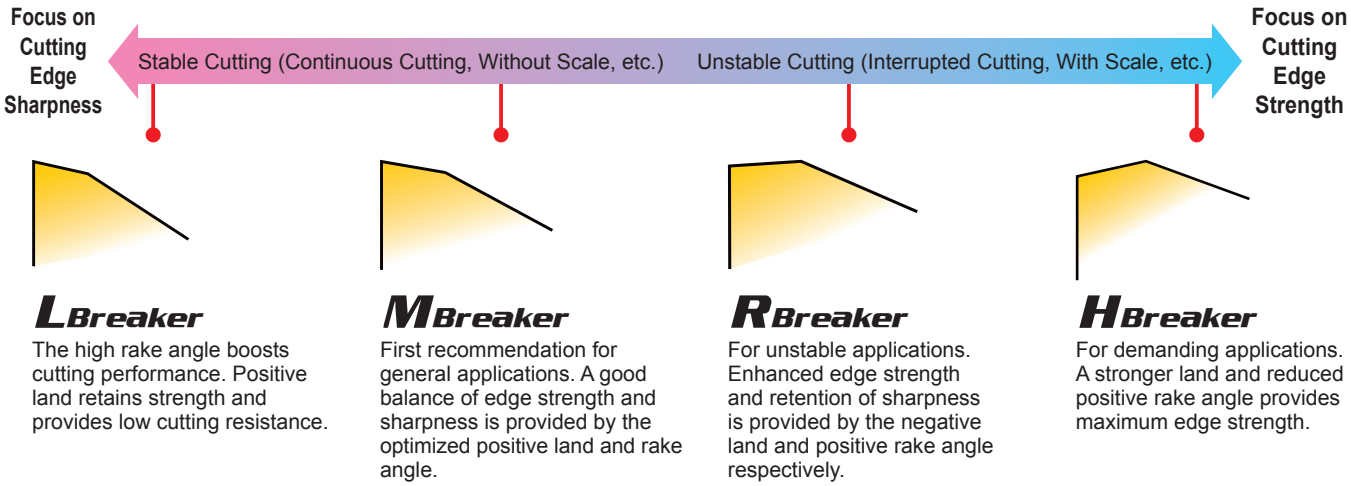




The chips generated do not contact the unused corner.

Chip Breaker System

Chip breaker series for varied cutting condition.



LBreaker

The high rake angle boosts cutting performance. Positive land retains strength and provides low cutting resistance.

MBreaker

First recommendation for general applications. A good balance of edge strength and sharpness is provided by the optimized positive land and rake angle.

RBreaker

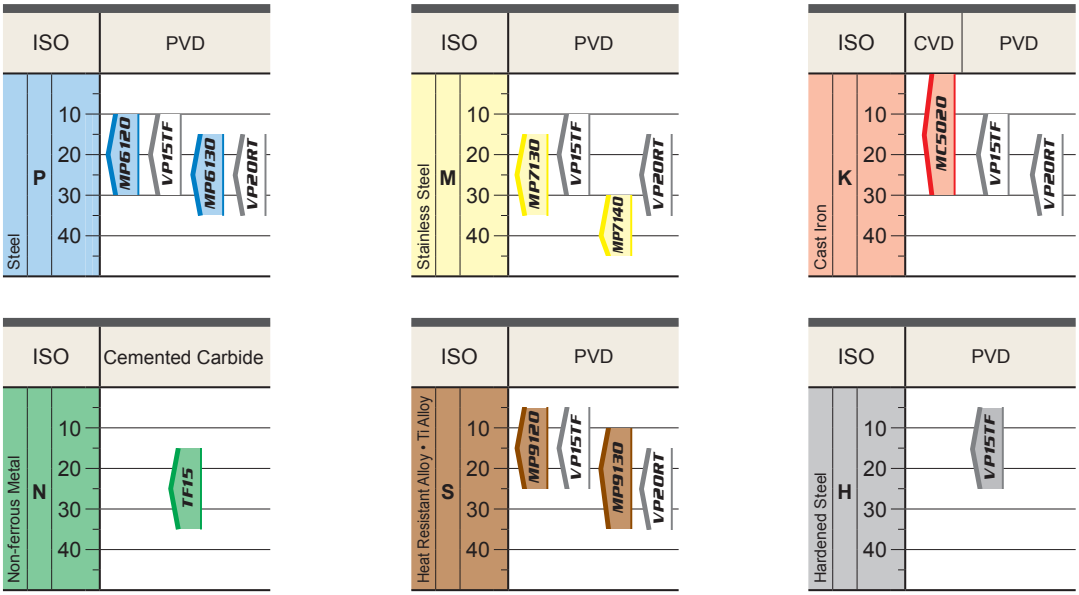
For unstable applications. Enhanced edge strength and retention of sharpness is provided by the negative land and positive rake angle respectively.

HBreaker

For demanding applications. A stronger land and reduced positive rake angle provides maximum edge strength.

Work Material	Cutting Conditions		
	Light	General	Heavy
P	L	M	R, H
M	L	M	
K	L	M	R, H
N	L		
S	L	M	
H	M	R	H

Insert Grades for a Wide Range of Materials



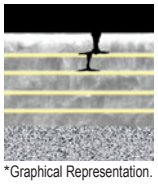
MP6100, MP7100, MP9100

TOUGH-Σ Technology

A fusion of the separate coating technologies; PVD and multi-layering provides extra toughness.

Base Layer
High Al-(Al, Ti)N

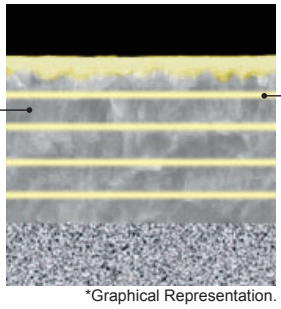
The new technology Al-(Al, Ti)N provides stability of the high hardness phase and succeeds in dramatically improving wear, crater and welding resistance.



Multi-layering of the coating prevents any cracks penetrating through to the substrate.

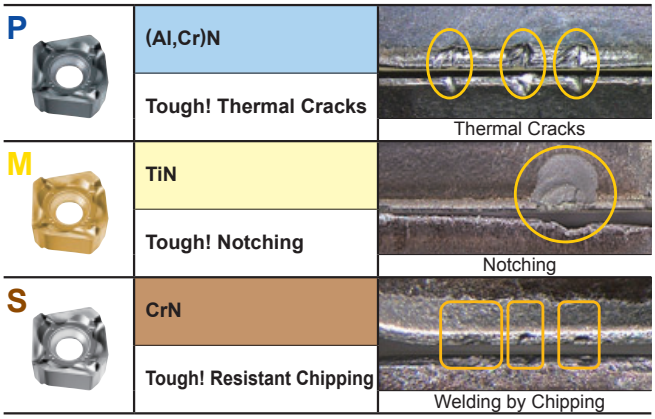
*Graphical Representation.

Al-Ti-Cr-N Based PVD Coating



*Graphical Representation.

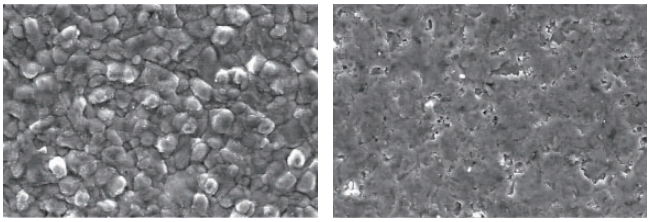
Best Layer of Each Work Material



CVD Coating *MC5020*

First recommendation for cast iron milling.
MC5020 has excellent wear resistance and also controls thermal cracking and chipping that are common when machining ductile cast iron.

Comparison of Coating Surface



Conventional Coating | Black Super-smooth Coating

Black Super-smooth Coating

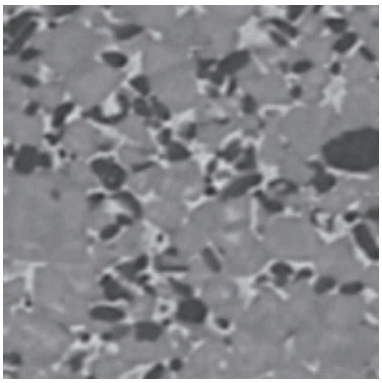
Black super-smooth coating prevents abnormal damage such as weld chipping.

Cermet Grade *MX3020/MX3030*

Cermet grade can provide shiny surface finishes than coated grades.

NEW *MX3020*

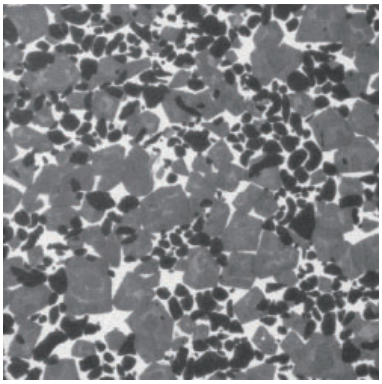
Cermet type of wiper insert lineup. It is designed with higher wear resistance than MX3030.



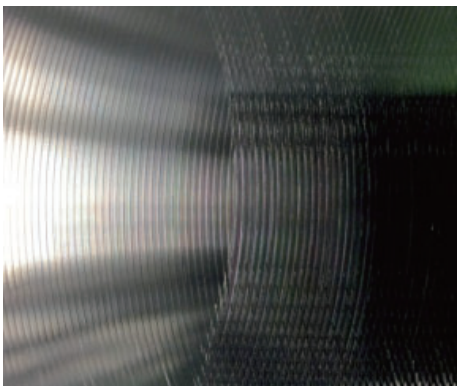
NEW *MX3020*

MX3030

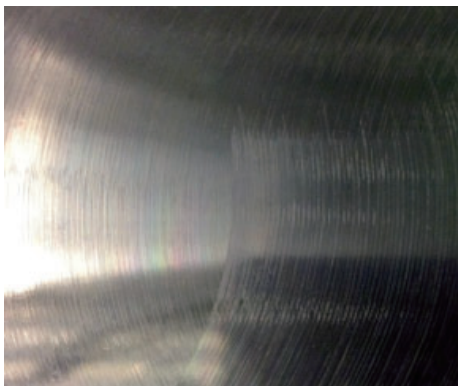
The cermet grade MX3030 is a suitable for finishing and light cutting,etc.



MX3030



Conventional



MX3030

<Cutting Conditions>
Work Material : ASTM A36M
Cutter Dia. : DC=125mm
Cutting Speed : 200m/min
Feed per Tooth : 0.1mm/t.
Depth of Cut : ap=2.0mm
Width of Cut : ae=100mm
Cutting Mode : Dry Cutting
8 Inserts
Center Cut
After 8m Cutting Work

FACE MILLING
<GENERAL CUTTING>

45° KAPR

F R

WSX445

P M K N S H

- Double sided Z Geometry.
- Smooth chip discharge.

Fig.1

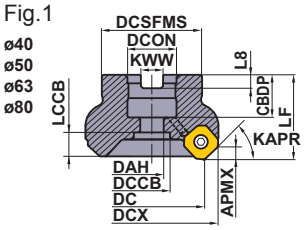
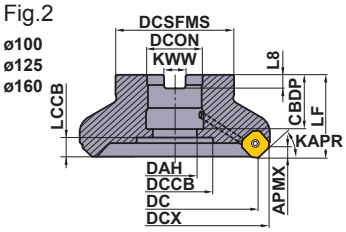


Fig.2



Right hand tool holder shown.

Arbor Type
Right Hand Tool Holder

GAMP: +17° T: -7°—-2°
GAMF: -6°—+1° I: +16°—+19°

DC = mm size, DCON = Inch size, DCON = mm size (mm)

DC	Order Number	Stock	Coolant Hole	* No.T	Pitch	DCX	LF	DCON	WT(kg)	APMX	Fig.
40	**WSX445-040A03AR**	●	○	3	Coarse	52.8	40	16	0.3	5	1
40	**WSX445-040A04AR**	●	○	4	Fine	52.8	40	16	0.3	5	1
50	**WSX445-050A03AR**	●	○	3	Coarse	62.9	40	22	0.5	5	1
50	**WSX445-050A04AR**	●	○	4	Fine	62.9	40	22	0.4	5	1
50	**WSX445-050A05AR**	●	○	5	Extra Fine	62.9	40	22	0.4	5	1
63	**WSX445-063A04AR**	●	○	4	Coarse	75.9	40	22	0.6	5	1
63	**WSX445-063A05AR**	●	○	5	Fine	75.9	40	22	0.6	5	1
63	**WSX445-063A06AR**	●	○	6	Extra Fine	75.9	40	22	0.6	5	1
80	**WSX445R08004CA**	●	○	4	Coarse	92.9	50	25.4	1.3	5	1
80	**WSX445R08006CA**	●	○	6	Fine	92.9	50	25.4	1.2	5	1
80	**WSX445R08008CA**	●	○	8	Extra Fine	92.9	50	25.4	1.1	5	1
100	**WSX445R10005DA**	●	○	5	Coarse	112.9	50	31.75	1.8	5	2
100	**WSX445R10007DA**	●	○	7	Fine	112.9	50	31.75	1.7	5	2
100	**WSX445R10010DA**	●	○	10	Extra Fine	112.9	50	31.75	1.6	5	2
125	**WSX445R12506EA**	●	○	6	Coarse	137.9	63	38.1	3.2	5	2
125	**WSX445R12508EA**	●	○	8	Fine	137.9	63	38.1	3.1	5	2
125	**WSX445R12512EA**	●	○	12	Extra Fine	137.9	63	38.1	3.0	5	2
160	**WSX445R16007FA**	●	○	7	Coarse	172.9	63	50.8	4.9	5	2
160	**WSX445R16010FA**	●	○	10	Fine	172.9	63	50.8	4.8	5	2
160	**WSX445R16016FA**	●	○	16	Extra Fine	172.8	63	50.8	4.6	5	2
200	**WSX445R20008KN**	●	–	8	Coarse	212.9	63	47.625	8.7	5	3
200	**WSX445R20012KN**	●	–	12	Fine	212.9	63	47.625	8.6	5	3
200	**WSX445R20020KN**	●	–	20	Extra Fine	212.8	63	47.625	8.4	5	3
NEW 250	**WSX445R25010KN**	●	–	10	Coarse	262.9	63	47.625	13.1	5	3
NEW 250	**WSX445R25014KN**	●	–	14	Fine	262.9	63	47.625	13.2	5	3
NEW 315	**WSX445R31514PN**	●	–	14	Coarse	327.9	63	47.625	21.5	5	4

(Note1) A set bolt to the arbor is not supplied with the body. Please refer to page 8, when ordering.
(Note2) Please use a set bolt of the FMC(metric) type on the cutter body from 40 to 63 in diameter(DC).
(Note3) Please use a set bolt of the FMA type on the cutter body from 80 to 315 in diameter(DC).
* Number of Teeth

Spare Parts

Tool Holder Type	 * Clamp Screw	 Wrench (Insert)
WSX445	TPS4R	TIP15W

* Clamp Torque (N • m) : TPS4R=3.5

MOUNTING DIMENSION ➤ P17

● : **Inventory maintained in Japan.**

Fig.3
ø200
ø250

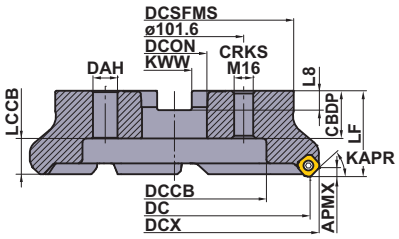
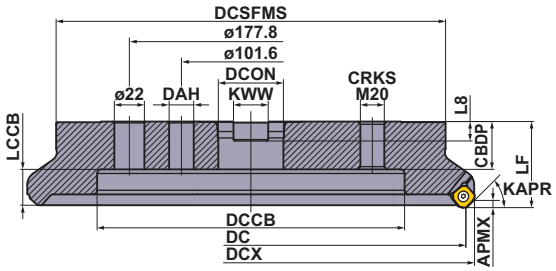


Fig.4
ø315



Right hand tool holder shown.

Arbor Type
Left Hand Tool Holder

DC = mm size, DCON = Inch size (mm)

DC	Order Number	Stock	Coolant Hole	* No.T	Pitch	DCX	LF	DCON	WT(kg)	APMX	Fig.
80	**WSX445L08004CA**	●	○	4	Coarse	92.9	50	25.4	1.3	5	1
100	**WSX445L10005DA**	●	○	5	Coarse	112.9	50	31.75	1.8	5	2
125	**WSX445L12506EA**	●	○	6	Coarse	137.9	63	38.1	3.2	5	2
160	**WSX445L16007FA**	●	○	7	Coarse	172.9	63	50.8	4.9	5	2
200	**WSX445L20008KN**	●	–	8	Coarse	212.9	63	47.625	8.7	5	3
NEW 250	**WSX445L25010KN**	●	–	10	Coarse	262.9	63	47.625	13.1	5	3

(Note1) A set bolt to the arbor is not supplied with the body. Please refer to page 8, when ordering.
(Note2) Please use a set bolt of the FMC(metric) type on the cutter body from 40 to 63 in diameter(DC).
(Note3) Please use a set bolt of the FMA type on the cutter body from 80 to 315 in diameter(DC).
* Number of Teeth

Set Bolt (Sold Separately)

(mm)

Tool Holder Type	Set Bolt: With Coolant Hole	Set Bolt: Without Coolant Hole	Fig.	Reference Dimensions							Geometry
	Order Number	Order Number		a	b	c	d	e	f	g	
WSX445-040A○○AR	HSC08025H	HSC08040	1	13	M8×1.25	33	8	5	–	–	
WSX445-050A○○AR	HSC10030H	HSC10035	1	16	M10×1.5	40	10	6	–	–	
WSX445-063A○○AR	HSC10030H	HSC10035	1	16	M10×1.5	40	10	6	–	–	
WSX445-080A○○A○	HSC12035H	HSC12035 HSC12045	1	18	M12×1.75	47 57	12	10	–	–	Fig.1
WSX445-100B○○A○	MBA16033H	—	2	40	M16×2	43	10	14	6	23	
WSX445-125B○○A○	MBA20040H	—	2	50	M20×2.5	54	14	17	6	27	
WSX445-160C○○N○	No Coolant Hole	—	2	50	M20×2.5	54	14	17	6	27	
WSX445-200C○○NR	No Coolant Hole	—	1	24	M16×2	43	16	14	–	–	
WSX445-250C○○NR	No Coolant Hole	—	1	24	M16×2	43	16	14	–	–	
WSX445-315C○○NR	No Coolant Hole	—	1	24	M16×2	43	16	14	–	–	Fig.2
WSX445○080○○CA	HSC12035H	HSC12035 HSC12045	1	18	M12×1.75	47 57	12	10	–	–	
WSX445○100○○DA	MBA16033H	—	2	40	M16×2	43	10	14	6	23	
WSX445○125○○EA	MBA20040H	—	2	50	M20×2.5	54	14	17	6	27	
WSX445○160○○FA	MBA24045H	—	2	65	M24×3	59	14	17	10	37	
WSX445○200○○KN	No Coolant Hole	—	1	24	M16×2	43	16	14	–	–	
WSX445○250○○KN	No Coolant Hole	—	1	24	M16×2	43	16	14	–	–	
WSX445○315○○PN	No Coolant Hole	—	1	30	M20×2.5	43	20	17	–	–	

(Note 1) Internal coolant is necessary with the set bolt.

MOUNTING DIMENSION ➤ P17

FACE MILLING
<GENERAL CUTTING>

45° KAPR

F R

WSX445

P M K N S H

- Double sided Z Geometry.
- Smooth chip discharge.

Fig.1

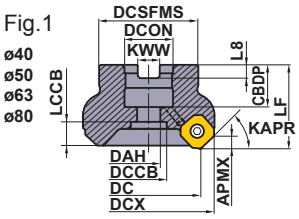
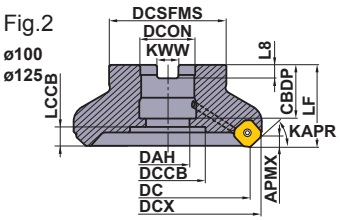


Fig.2



Right hand tool holder shown.

Arbor Type
Right Hand Tool Holder

GAMP: +17° T: -7°—-2°
GAMF: -6°—+1° I: +16°—+19°

DC = mm size, DCON = mm size (mm)

DC	Order Number	Stock	Coolant Hole	* No.T	Pitch	DCX	LF	DCON	WT(kg)	APMX	Fig.
40	**WSX445-040A03AR**	●	○	3	Coarse	52.8	40	16	0.3	5	1
40	**WSX445-040A04AR**	●	○	4	Fine	52.8	40	16	0.3	5	1
50	**WSX445-050A03AR**	●	○	3	Coarse	62.9	40	22	0.5	5	1
50	**WSX445-050A04AR**	●	○	4	Fine	62.9	40	22	0.4	5	1
50	**WSX445-050A05AR**	●	○	5	Extra Fine	62.9	40	22	0.4	5	1
63	**WSX445-063A04AR**	●	○	4	Coarse	75.9	40	22	0.6	5	1
63	**WSX445-063A05AR**	●	○	5	Fine	75.9	40	22	0.6	5	1
63	**WSX445-063A06AR**	●	○	6	Extra Fine	75.9	40	22	0.6	5	1
80	**WSX445-080A04AR**	●	○	4	Coarse	92.9	50	27	1.3	5	1
80	**WSX445-080A06AR**	●	○	6	Fine	92.9	50	27	1.2	5	1
80	**WSX445-080A08AR**	●	○	8	Extra Fine	92.9	50	27	1.1	5	1
100	**WSX445-100B05AR**	●	○	5	Coarse	112.9	50	32	1.9	5	2
100	**WSX445-100B07AR**	●	○	7	Fine	112.9	50	32	1.9	5	2
100	**WSX445-100B10AR**	●	○	10	Extra Fine	112.9	50	32	1.8	5	2
125	**WSX445-125B06AR**	●	○	6	Coarse	137.9	63	40	3.4	5	2
125	**WSX445-125B08AR**	●	○	8	Fine	137.9	63	40	3.4	5	2
125	**WSX445-125B12AR**	●	○	12	Extra Fine	137.9	63	40	3.2	5	2
160	**WSX445-160C07NR**	●	–	7	Coarse	172.9	63	40	4.9	5	3
160	**WSX445-160C10NR**	●	–	10	Fine	172.9	63	40	4.8	5	3
160	**WSX445-160C16NR**	●	–	16	Extra Fine	172.8	63	40	4.6	5	3
200	**WSX445-200C08NR**	●	–	8	Coarse	212.9	63	60	7.5	5	4
200	**WSX445-200C12NR**	●	–	12	Fine	212.9	63	60	7.4	5	4
200	**WSX445-200C20NR**	●	–	20	Extra Fine	212.8	63	60	7.2	5	4

(Note1) A set bolt to the arbor is not supplied with the body. Please refer to page 10, when ordering.
(Note2) Please use a set bolt of the FMC(metric) type on the cutter body from 40 to 100 in diameter(DC).
(Note3) Please use a set bolt of the FMB type on the cutter body from 125 to 200 in diameter(DC).
* Number of Teeth

Spare Parts

Tool Holder Type	* Clamp Screw	Wrench (Insert)
WSX445	TPS4R	TIP15W

* Clamp Torque (N • m) : TPS4R=3.5

MOUNTING DIMENSION ➤ P17

● : **Inventory maintained in Japan.**

Fig.3

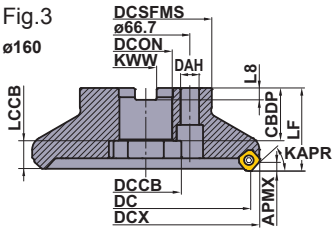
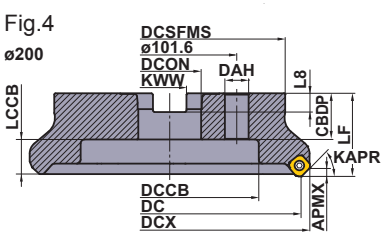


Fig.4



Right hand tool holder shown.

Arbor Type
Left Hand Tool Holder

DC = mm size, DCON = mm size (mm)

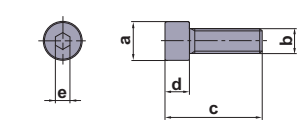
DC	Order Number	Stock	Coolant Hole	* No.T	Pitch	DCX	LF	DCON	WT(kg)	APMX	Fig.
80	**WSX445-080A04AL**	●	○	4	Coarse	92.9	50	27	1.3	5	1
100	**WSX445-100B05AL**	●	○	5	Coarse	112.9	50	32	1.9	5	2
125	**WSX445-125B06AL**	●	○	6	Coarse	137.9	63	40	3.4	5	2
160	**WSX445-160C07NL**	●	–	7	Coarse	172.9	63	40	4.9	5	3

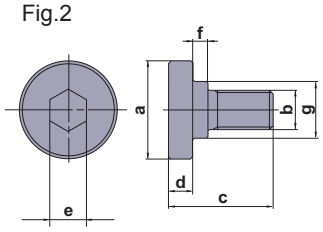
(Note1) A set bolt to the arbor is not supplied with the body. Please refer to page 10, when ordering.
(Note2) Please use a set bolt of the FMC(metric) type on the cutter body from 40 to 100 in diameter(DC).
(Note3) Please use a set bolt of the FMB type on the cutter body from 125 to 200 in diameter(DC).
* Number of Teeth

Set Bolt (Sold Separately)

(mm)

Tool Holder Type	Set Bolt: With Coolant Hole – Order Number	Set Bolt: Without Coolant Hole – Order Number	Fig.	Reference Dimensions a	b	c	d	e	f	g	Geometry
WSX445-040A○○AR	HSC08025H	HSC08040	1	13	M8×1.25	33	8	5	–	–	Fig.1
WSX445-050A○○AR	HSC10030H	HSC10035	1	16	M10×1.5	40	10	6	–	–	
WSX445-063A○○AR	HSC10030H	HSC10035	1	16	M10×1.5	40	10	6	–	–	
WSX445-080A○○A○	HSC12035H	HSC12035 HSC12045	1	18	M12×1.75	47 57	12	10	–	–	
WSX445-100B○○A○	MBA16033H	—	2	40	M16×2	43	10	14	6	23	Fig.2
WSX445-125B○○A○	MBA20040H	—	2	50	M20×2.5	54	14	17	6	27	
WSX445-160C○○N○	No Coolant Hole	—	2	50	M20×2.5	54	14	17	6	27	
WSX445-200C○○NR	No Coolant Hole	—	1	24	M16×2	43	16	14	–	–	

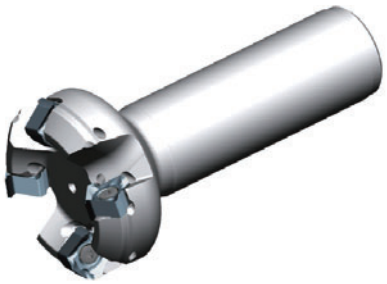


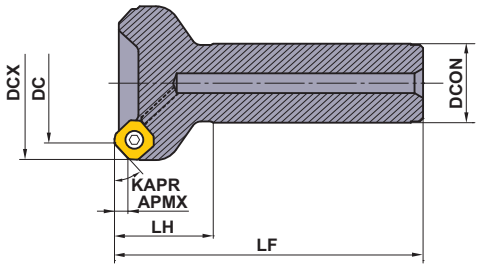


(Note 1) Internal coolant is necessary with the set bolt.

MOUNTING DIMENSION ➢ P17

General Purpose Double Sided Insert Type Face Mill Features Low Cutting Resistance





Right hand tool holder only.

Shank Type

(mm)

DC	Order Number	Stock	Coolant Hole	* No.T	Pitch	DCX	LF	DCON	LH	WT(kg)	APMX
40	**WSX445R4003SA32M**	●	○	3	Coarse	52.8	125	32	40	0.8	5
40	**WSX445R4004SA32M**	●	○	4	Fine	52.8	125	32	40	0.8	5
50	**WSX445R5003SA32M**	●	○	3	Coarse	62.9	125	32	40	1.0	5
50	**WSX445R5004SA32M**	●	○	4	Fine	62.9	125	32	40	1.0	5
63	**WSX445R6304SA32M**	●	○	4	Coarse	75.9	125	32	40	1.2	5
63	**WSX445R6305SA32M**	●	○	5	Fine	75.9	125	32	40	1.2	5
80	**WSX445R8004SA32M**	●	○	4	Coarse	92.9	125	32	40	1.6	5
80	**WSX445R8006SA32M**	●	○	6	Fine	92.9	125	32	40	1.5	5

* Number of Teeth

Spare Parts

Tool Holder Type	 * Clamp Screw	 Wrench (Insert)
WSX445	TPS4R	TIP15W

* Clamp Torque (N • m) : TPS4R=3.5

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

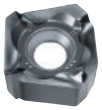
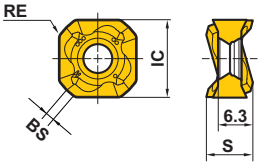
Inserts with Breaker

(mm)

Work Material		
	P	Steel
	M	Stainless Steel
	K	Cast Iron
	N	Non-ferrous Metal
	S	Heat-resistant Alloy, Titanium Alloy
	H	Hardened Steel

Cutting Conditions :
● : Stable Cutting ◐ : General Cutting
✣ : Unstable Cutting

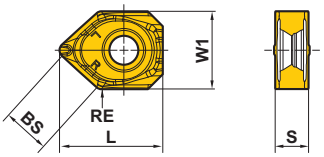
Honing : **E :** Round **F :** Sharp

Shape	Order Number	Class	Hand	Honing	Coated									Cermet		Carbide		IC	S	BS	RE	Geometry
					MC5020	MP6120	MP6130	MP7130	MP7140	MP9120	MP9130	VP15TF	VP20RT	MX3030		TF15						
	SNGU140812ANFR-L	G	R	F												●		14	8.4	1.5	1.2	
	SNGU140812ANER-L	G	R	E	●	●	●	●	●	●	●	●	●	●				14	8.4	1.5	1.2	
	SNGU140812ANER-M	G	R	E	●	●	●	●	●	●	●	●	●	●				14	8.4	1.5	1.2	
	SNMU140812ANER-M	M	R	E	●	●	●	●	●	●	●	●	●	●				14	8.4	1.5	1.2	
	SNMU140812ANER-R	M	R	E	●	●	●					●	●					14	8.4	1.5	1.2	
	SNMU140812ANER-H	M	R	E	●	●	●					●	●					14	8.4	1.5	1.2	
NEW	SNGU140812ANFL-L	G	L	F												●		14	8.4	1.5	1.2	
NEW	SNGU140812ANEL-L	G	L	E	●	●	●					●		●				14	8.4	1.5	1.2	
	SNGU140812ANEL-M	G	L	E	●	●	●					●		●				14	8.4	1.5	1.2	
	SNMU140812ANEL-M	M	L	E	●	●	●					●		●				14	8.4	1.5	1.2	
	SNMU140812ANEL-R	M	L	E	●	●	●					●						14	8.4	1.5	1.2	

Right hand insert shown.

Wiper Inserts

(mm)

Shape	Order Number	Class	Honing	Coated			Cermet		L	W1	S	BS	RE	Geometry
				MC5020	MP6120	VP15TF	MX3020 NEW							
	WNGU1406ANEN8C-M	G	E	●	●	●	●		18.1	14	6	8	1.0	

Instructions for Use of Wiper Inserts

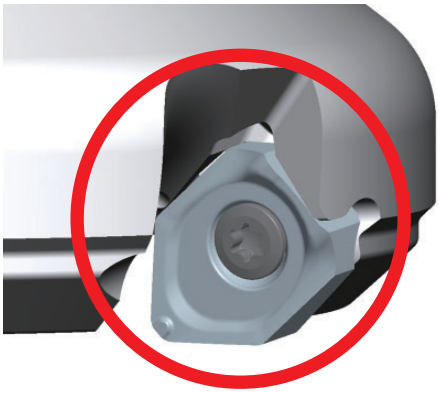


Fig.1

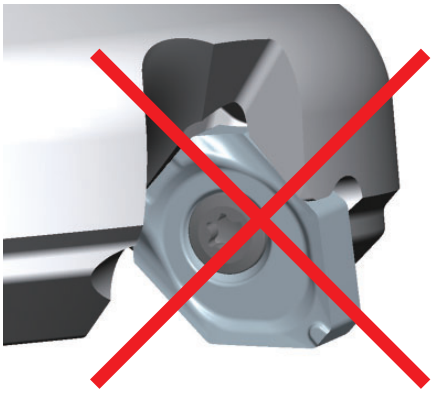


Fig.2

Wiper inserts for WSX445 are two-cornered. Please set as shown in Fig.1.
Excellent surface finish can be achieved with one wiper.
Set more than 2 wiper inserts, equally spaced, when the feed per revolution is larger than 8mm/rev.

Recommended Cutting Conditions

Dry Cutting

Work Material		Hardness	1st Recommendation	2nd Recommendation	**vc** (m/min)	Finish Cutting	
						fz (mm/t.)	**ap**
P						L Breaker	
	Mild Steel	≤ 180HB	MP6120	VP15TF	250 (200—300)	0.15 (0.1—0.2)	≤ 1.0
			MP6130	VP20RT	240 (190—290)	0.15 (0.1—0.2)	≤ 1.0
			MX3030	—	180 (130—230)	0.15 (0.1—0.2)	≤ 1.0
	Carbon Steel Alloy Steel	180—350HB	MP6120	VP15TF	220 (170—270)	0.15 (0.1—0.2)	≤ 1.0
			MP6130	VP20RT	200 (150—250)	0.15 (0.1—0.2)	≤ 1.0
			MX3030	—	150 (120—180)	0.15 (0.1—0.2)	≤ 1.0
	Alloy Tool Steel	≤ 350HB (Annealing)	MP6120	VP15TF	220 (170—270)	0.15 (0.1—0.2)	≤ 1.0
			MP6130	VP20RT	200 (150—250)	0.15 (0.1—0.2)	≤ 1.0
			MX3030	—	150 (120—180)	0.15 (0.1—0.2)	≤ 1.0
	Pre-hardened Steel	35—45HRC	MP6120	VP15TF	140 (100—180)	0.15 (0.1—0.2)	≤ 1.0
			MP6130	VP20RT	120 (90—150)	0.15 (0.1—0.2)	≤ 1.0
M						L Breaker	
	Austenitic Stainless Steel	≤ 200HB	MP7130	VP15TF	200 (150—250)	0.15 (0.1—0.2)	≤ 1.0
			MP7140	VP20RT	200 (150—250)	0.15 (0.1—0.2)	≤ 1.0
			MX3030	—	130 (100—180)	0.15 (0.1—0.2)	≤ 1.0
	Austenitic Stainless Steel	>200HB	MP7130	VP15TF	170 (120—220)	0.15 (0.1—0.2)	≤ 1.0
			MP7140	VP20RT	170 (120—220)	0.15 (0.1—0.2)	≤ 1.0
	Duplex Stainless Steel	≤ 280HB	MP7130	VP15TF	160 (110—210)	0.15 (0.1—0.2)	≤ 1.0
			MP7140	VP20RT	160 (110—210)	0.15 (0.1—0.2)	≤ 1.0
	Precipitation Hardening Stainless Steel	≤ 450HB	MP7130	VP15TF	150 (100—200)	0.15 (0.1—0.2)	≤ 1.0
			MP7140	VP20RT	150 (100—200)	0.15 (0.1—0.2)	≤ 1.0
K						L Breaker	
	Gray Cast Iron	Tensile Strength ≤ 350MPa	MC5020	—	220 (200—270)	0.15 (0.1—0.2)	≤ 1.0
			VP15TF	—	180 (130—250)	0.15 (0.1—0.2)	≤ 1.0
			VP20RT	—	170 (120—240)	0.15 (0.1—0.2)	≤ 1.0
			MX3030	—	150 (120—180)	0.15 (0.1—0.2)	≤ 1.0
	Ductile Cast Iron	Tensile Strength ≤ 450MPa	MC5020	—	200 (180—250)	0.15 (0.1—0.2)	≤ 1.0
			VP15TF	VP20RT	160 (110—240)	0.15 (0.1—0.2)	≤ 1.0
	Ductile Cast Iron	Tensile Strength ≤ 800MPa	MC5020	—	200 (180—250)	0.15 (0.1—0.2)	≤ 1.0
			VP15TF	—	160 (110—240)	0.15 (0.1—0.2)	≤ 1.0
			VP20RT	—	150 (100—200)	0.15 (0.1—0.2)	≤ 1.0
H						M Breaker	
	Hardened Steel	40—55HRC	VP15TF	—	50 (30—70)	0.05 (0.05—0.1)	≤ 1.0
	Hardened Steel	55—62HRC	VP15TF	—	40 (20—50)	0.05 (0.05—0.1)	≤ 1.0

(Note 1) Refer to the table above and set the cutting conditions to match the application.
(Note 2) Wet cutting is recommended, when focusing on the surface finish. (Life is lower than dry cutting.)

(mm)

Light Cutting		Medium Cutting		Rough Cutting		Heavy Cutting	
fz (mm/t.)	**ap**	**fz** (mm/t.)	**ap**	**fz** (mm/t.)	**ap**	**fz** (mm/t.)	**ap**
L,M Breaker		M Breaker		M,R Breaker		R,H Breaker	
0.15 (0.1–0.2)	≤ 2.0	0.2 (0.15–0.25)	≤ 3.0	0.2 (0.15–0.25)	≤ 4.0	0.25 (0.2–0.3)	≤ 5.0
0.15 (0.1–0.2)	≤ 2.0	0.2 (0.15–0.25)	≤ 3.0	0.2 (0.15–0.25)	≤ 4.0	0.25 (0.2–0.3)	≤ 5.0
0.15 (0.1–0.2)	≤ 2.0	0.2 (0.15–0.25)	≤ 3.0	–	–	–	–
0.15 (0.1–0.2)	≤ 2.0	0.2 (0.15–0.25)	≤ 3.0	0.2 (0.15–0.25)	≤ 4.0	0.25 (0.2–0.3)	≤ 5.0
0.15 (0.1–0.2)	≤ 2.0	0.2 (0.15–0.25)	≤ 3.0	0.2 (0.15–0.25)	≤ 4.0	0.25 (0.2–0.3)	≤ 5.0
0.15 (0.1–0.2)	≤ 2.0	0.2 (0.15–0.25)	≤ 3.0	–	–	–	–
0.15 (0.1–0.2)	≤ 2.0	0.2 (0.15–0.25)	≤ 3.0	0.2 (0.15–0.25)	≤ 4.0	0.25 (0.2–0.3)	≤ 5.0
0.15 (0.1–0.2)	≤ 2.0	0.2 (0.15–0.25)	≤ 3.0	0.2 (0.15–0.25)	≤ 4.0	0.25 (0.2–0.3)	≤ 5.0
0.15 (0.1–0.2)	≤ 2.0	0.2 (0.15–0.25)	≤ 3.0	–	–	–	–
0.15 (0.1–0.2)	≤ 2.0	0.2 (0.15–0.25)	≤ 3.0	0.2 (0.15–0.25)	≤ 4.0	0.25 (0.2–0.3)	≤ 5.0
0.15 (0.1–0.2)	≤ 2.0	0.2 (0.15–0.25)	≤ 3.0	0.2 (0.15–0.25)	≤ 4.0	0.25 (0.2–0.3)	≤ 5.0
L,M Breaker		M Breaker					
0.15 (0.1–0.2)	≤ 2.0	0.2 (0.15–0.25)	≤ 3.0	–	–	–	–
0.15 (0.1–0.2)	≤ 2.0	0.2 (0.15–0.25)	≤ 3.0	–	–	–	–
0.15 (0.1–0.2)	≤ 2.0	–	–	–	–	–	–
0.15 (0.1–0.2)	≤ 2.0	0.2 (0.15–0.25)	≤ 3.0	–	–	–	–
0.15 (0.1–0.2)	≤ 2.0	0.2 (0.15–0.25)	≤ 3.0	–	–	–	–
0.15 (0.1–0.2)	≤ 2.0	0.2 (0.15–0.25)	≤ 3.0	–	–	–	–
0.15 (0.1–0.2)	≤ 2.0	0.2 (0.15–0.25)	≤ 3.0	–	–	–	–
0.15 (0.1–0.2)	≤ 2.0	0.2 (0.15–0.25)	≤ 3.0	–	–	–	–
0.15 (0.1–0.2)	≤ 2.0	0.2 (0.15–0.25)	≤ 3.0	–	–	–	–
L,M Breaker		M Breaker		M,R Breaker		R,H Breaker	
0.15 (0.1–0.2)	≤ 2.0	0.2 (0.15–0.25)	≤ 3.0	0.2 (0.15–0.25)	≤ 4.0	0.25 (0.2–0.3)	≤ 5.0
0.15 (0.1–0.2)	≤ 2.0	0.2 (0.15–0.25)	≤ 3.0	0.2 (0.15–0.25)	≤ 4.0	0.25 (0.2–0.3)	≤ 5.0
0.15 (0.1–0.2)	≤ 2.0	0.2 (0.15–0.25)	≤ 3.0	0.2 (0.15–0.25)	≤ 4.0	0.25 (0.2–0.3)	≤ 5.0
0.15 (0.1–0.2)	≤ 2.0	0.2 (0.15–0.25)	≤ 3.0	–	–	–	–
0.15 (0.1–0.2)	≤ 2.0	0.2 (0.15–0.25)	≤ 3.0	0.2 (0.15–0.25)	≤ 4.0	0.25 (0.2–0.3)	≤ 5.0
0.15 (0.1–0.2)	≤ 2.0	0.2 (0.15–0.25)	≤ 3.0	0.2 (0.15–0.25)	≤ 4.0	0.25 (0.2–0.3)	≤ 5.0
0.15 (0.1–0.2)	≤ 2.0	0.2 (0.15–0.25)	≤ 3.0	0.2 (0.15–0.25)	≤ 4.0	0.25 (0.2–0.3)	≤ 5.0
0.15 (0.1–0.2)	≤ 2.0	0.2 (0.15–0.25)	≤ 3.0	0.2 (0.15–0.25)	≤ 4.0	0.25 (0.2–0.3)	≤ 5.0
0.15 (0.1–0.2)	≤ 2.0	0.2 (0.15–0.25)	≤ 3.0	0.2 (0.15–0.25)	≤ 4.0	0.25 (0.2–0.3)	≤ 5.0
M,R Breaker		R,H Breaker					
0.05 (0.05–0.1)	≤ 1.5	0.1 (0.05–0.15)	≤ 2.0	–	–	–	–
0.05 (0.05–0.1)	≤ 1.5	0.1 (0.05–0.15)	≤ 2.0	–	–	–	–

Recommended Cutting Conditions

Wet Cutting

	Work Material	Hardness	1st Recommendation	2nd Recommendation	**vc** (m/min)	Finish Cutting	
						fz (mm/t.)	**ap**
P						L Breaker	
	Mild Steel	≤ 180HB	MP6120	VP15TF	150 (100—200)	0.15 (0.1—0.2)	≤ 1.0
			MP6130	VP20RT	150 (100—200)	0.15 (0.1—0.2)	≤ 1.0
	Carbon Steel Alloy Steel	180—350HB	MP6120	VP15TF	120 (80—160)	0.15 (0.1—0.2)	≤ 1.0
			MP6130	VP20RT	120 (80—160)	0.15 (0.1—0.2)	≤ 1.0
	Alloy Tool Steel	≤ 350HB (Annealing)	MP6120	VP15TF	120 (80—160)	0.15 (0.1—0.2)	≤ 1.0
			MP6130	VP20RT	120 (80—160)	0.15 (0.1—0.2)	≤ 1.0
	Pre-hardened Steel	35—45HRC	MP6120	VP15TF	100 (80—120)	0.15 (0.1—0.2)	≤ 1.0
			MP6130	VP20RT	100 (80—120)	0.15 (0.1—0.2)	≤ 1.0
M						L Breaker	
	Austenitic Stainless Steel	≤ 200HB	MP7130	VP15TF	130 (80—180)	0.15 (0.1—0.2)	≤ 1.0
			MP7140	VP20RT	130 (80—180)	0.15 (0.1—0.2)	≤ 1.0
	Austenitic Stainless Steel	> 200HB	MP7130	VP15TF	100 (80—150)	0.15 (0.1—0.2)	≤ 1.0
			MP7140	VP20RT	100 (80—150)	0.15 (0.1—0.2)	≤ 1.0
	Duplex Stainless Steel	≤ 280HB	MP7130	VP15TF	100 (80—150)	0.15 (0.1—0.2)	≤ 1.0
			MP7140	VP20RT	100 (80—150)	0.15 (0.1—0.2)	≤ 1.0
	Precipitation Hardening Stainless Steel	≤ 450HB	MP7130	VP15TF	90 (50—140)	0.15 (0.1—0.2)	≤ 1.0
			MP7140	VP20RT	90 (50—140)	0.15 (0.1—0.2)	≤ 1.0
K						L Breaker	
	Gray Cast Iron	Tensile Strength ≤ 350MPa	MC5020	—	180 (160—200)	0.15 (0.1—0.2)	≤ 1.0
			VP15TF	VP20RT	130 (100—160)	0.15 (0.1—0.2)	≤ 1.0
	Ductile Cast Iron	Tensile Strength ≤ 450MPa	MC5020	—	180 (160—200)	0.15 (0.1—0.2)	≤ 1.0
			VP15TF	VP20RT	130 (100—160)	0.15 (0.1—0.2)	≤ 1.0
	Ductile Cast Iron	Tensile Strength ≤ 800MPa	MC5020	—	180 (160—200)	0.15 (0.1—0.2)	≤ 1.0
			VP15TF	VP20RT	110 (80—140)	0.15 (0.1—0.2)	≤ 1.0
N						L Breaker	
	Aluminum Alloy	—	TF15	—	≥ 300	0.15 (0.1—0.2)	≤ 1.0
S						L Breaker	
	Titanium Alloy	—	MP9120	VP15TF	50 (40—60)	0.05 (0.05—0.1)	≤ 1.0
			MP9130	VP20RT	50 (40—60)	0.05 (0.05—0.1)	≤ 1.0
	Heat Resistant Alloy	—	MP9120	VP15TF	40 (20—50)	0.05 (0.05—0.1)	≤ 1.0
			MP9130	VP20RT	40 (20—50)	0.05 (0.05—0.1)	≤ 1.0

(Note 1) Refer to the table above and set the cutting conditions to match the application.
(Note 2) Wet cutting is recommended, when focusing on the surface finish. (Life is lower than dry cutting.)

(mm)

Light Cutting		Medium Cutting		Rough Cutting		Heavy Cutting	
fz (mm/t.)	**ap**	**fz** (mm/t.)	**ap**	**fz** (mm/t.)	**ap**	**fz** (mm/t.)	**ap**
L,M Breaker		M Breaker		M,R Breaker		R,H Breaker	
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	0.2 (0.15—0.25)	≤ 4.0	0.25 (0.2—0.3)	≤ 5.0
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	0.2 (0.15—0.25)	≤ 4.0	0.25 (0.2—0.3)	≤ 5.0
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	0.2 (0.15—0.25)	≤ 4.0	0.25 (0.2—0.3)	≤ 5.0
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	0.2 (0.15—0.25)	≤ 4.0	0.25 (0.2—0.3)	≤ 5.0
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	0.2 (0.15—0.25)	≤ 4.0	0.25 (0.2—0.3)	≤ 5.0
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	0.2 (0.15—0.25)	≤ 4.0	0.25 (0.2—0.3)	≤ 5.0
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	0.2 (0.15—0.25)	≤ 4.0	0.25 (0.2—0.3)	≤ 5.0
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	0.2 (0.15—0.25)	≤ 4.0	0.25 (0.2—0.3)	≤ 5.0
L,M Breaker		M Breaker					
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	—	—	—	—
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	—	—	—	—
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	—	—	—	—
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	—	—	—	—
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	—	—	—	—
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	—	—	—	—
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	—	—	—	—
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	—	—	—	—
L,M Breaker		M Breaker		M,R Breaker		R,H Breaker	
0.15 (0.1—0.2)	≤ 2.0	0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 4.0	0.25 (0.2—0.3)	≤ 5.0
0.15 (0.1—0.2)	≤ 2.0	0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 4.0	0.25 (0.2—0.3)	≤ 5.0
0.15 (0.1—0.2)	≤ 2.0	0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 4.0	0.25 (0.2—0.3)	≤ 5.0
0.15 (0.1—0.2)	≤ 2.0	0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 4.0	0.25 (0.2—0.3)	≤ 5.0
0.15 (0.1—0.2)	≤ 2.0	0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 4.0	0.25 (0.2—0.3)	≤ 5.0
0.15 (0.1—0.2)	≤ 2.0	0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 4.0	0.25 (0.2—0.3)	≤ 5.0
L Breaker		L Breaker		L Breaker		L Breaker	
0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	0.2 (0.15—0.25)	≤ 4.0	0.25 (0.2—0.3)	≤ 5.0
L,M Breaker		M Breaker					
0.05 (0.05—0.1)	≤ 1.5	0.1 (0.05—0.15)	≤ 2.0	—	—	—	—
0.05 (0.05—0.1)	≤ 1.5	0.1 (0.05—0.15)	≤ 2.0	—	—	—	—
0.05 (0.05—0.1)	≤ 1.5	0.1 (0.05—0.15)	≤ 2.0	—	—	—	—
0.05 (0.05—0.1)	≤ 1.5	0.1 (0.05—0.15)	≤ 2.0	—	—	—	—

Arbor Type Mounting Dimensions

Fig.1

ø40
ø50
ø63
ø80

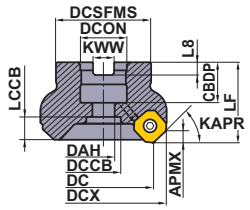


Fig.2

ø100
ø125
ø160

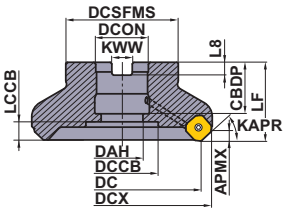
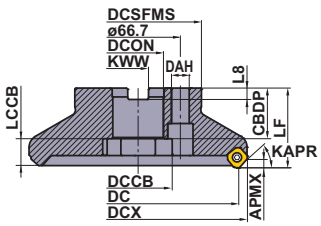


Fig.3

ø160



Right hand tool holder shown.

(mm)

DC	Order Number	DCON	CBDP	DAH	DCCB	LCCB	DCSFMS	KWW	L8	Fig.
40	**WSX445-040A03AR**	16	18	9	14	13.3	37	8.4	5.6	1
40	**WSX445-040A04AR**	16	18	9	14	13.3	37	8.4	5.6	1
50	**WSX445-050A03AR**	22	20	11	17	11.3	47	10.4	6.3	1
50	**WSX445-050A04AR**	22	20	11	17	11.3	47	10.4	6.3	1
50	**WSX445-050A05AR**	22	20	11	17	11.3	47	10.4	6.3	1
63	**WSX445-063A04AR**	22	20	11	17	11.3	50	10.4	6.3	1
63	**WSX445-063A05AR**	22	20	11	17	11.3	50	10.4	6.3	1
63	**WSX445-063A06AR**	22	20	11	17	11.3	50	10.4	6.3	1
80	**WSX445R08004CA**	25.4	26	13	20	14.3	56	9.5	6	1
80	**WSX445R08006CA**	25.4	26	13	20	14.3	56	9.5	6	1
80	**WSX445R08008CA**	25.4	26	13	20	14.3	56	9.5	6	1
80	**WSX445L08004CA**	25.4	26	13	20	14.3	56	9.5	6	1
80	**WSX445-080A04AR**	27	23	13	20	14.3	56	12.4	7	1
80	**WSX445-080A06AR**	27	23	13	20	14.3	56	12.4	7	1
80	**WSX445-080A08AR**	27	23	13	20	14.3	56	12.4	7	1
80	**WSX445-080A04AL**	27	23	13	20	14.3	56	12.4	7	1
100	**WSX445R10005DA**	31.75	32	26	45	11.3	70	12.7	8	2
100	**WSX445R10007DA**	31.75	32	26	45	11.3	70	12.7	8	2
100	**WSX445R10010DA**	31.75	32	26	45	11.3	70	12.7	8	2
100	**WSX445L10005DA**	31.75	32	26	45	11.3	70	12.7	8	2
100	**WSX445-100B05AR**	32	26	26	45	16.3	78	14.4	8	2
100	**WSX445-100B07AR**	32	26	26	45	16.3	78	14.4	8	2
100	**WSX445-100B10AR**	32	26	26	45	16.3	78	14.4	8	2
100	**WSX445-100B05AL**	32	26	26	45	16.3	78	14.4	8	2
125	**WSX445R12506EA**	38.1	36	30	56	19.3	80	15.9	10	2
125	**WSX445R12508EA**	38.1	36	30	56	19.3	80	15.9	10	2
125	**WSX445R12512EA**	38.1	36	30	56	19.3	80	15.9	10	2
125	**WSX445L12506EA**	38.1	36	30	56	19.3	80	15.9	10	2
125	**WSX445-125B06AR**	40	28	30	56	21.3	89	16.4	9	2
125	**WSX445-125B08AR**	40	28	30	56	21.3	89	16.4	9	2
125	**WSX445-125B12AR**	40	28	30	56	21.3	89	16.4	9	2
125	**WSX445-125B06AL**	40	28	30	56	21.3	89	16.4	9	2

Fig.4

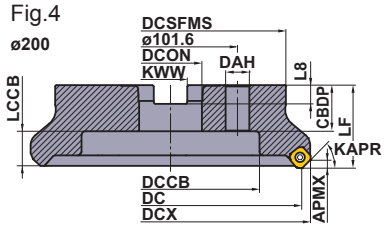


Fig.5

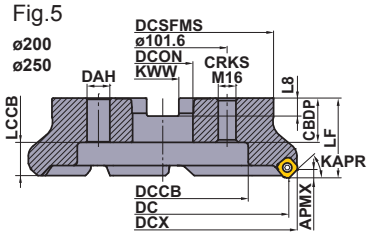
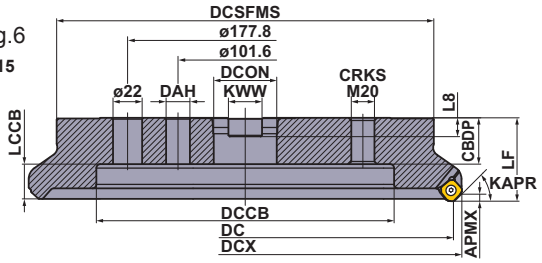


Fig.6



Right hand tool holder shown.

(mm)

DC	Order Number	DCON	CBDP	DAH	DCCB	LCCB	DCSFMS	KWW	L8	Fig.
160	**WSX445-160C07NR**	40	40	14	56	21.3	100	16.4	9	3
160	**WSX445-160C10NR**	40	40	14	56	21.3	100	16.4	9	3
160	**WSX445-160C16NR**	40	40	14	56	21.3	100	16.4	9	3
160	**WSX445-160C07NL**	40	40	14	56	21.3	100	16.4	9	3
160	**WSX445R16007FA**	50.8	38	40	72	16.3	100	19.1	11	2
160	**WSX445R16010FA**	50.8	38	40	72	16.3	100	19.1	11	2
160	**WSX445R16016FA**	50.8	38	40	72	16.3	100	19.1	11	2
160	**WSX445L16007FA**	50.8	38	40	72	16.3	100	19.1	11	2
200	**WSX445R20008KN**	47.625	35	18	135	26.3	175	25.4	14.22	5
200	**WSX445R20012KN**	47.625	35	18	135	26.3	175	25.4	14.22	5
200	**WSX445R20020KN**	47.625	35	18	135	26.3	175	25.4	14.22	5
200	**WSX445L20008KN**	47.625	35	18	135	26.3	175	25.4	14.22	5
200	**WSX445-200C08NR**	60	32	18	135	29.3	160	25.7	14.22	4
200	**WSX445-200C12NR**	60	32	18	135	29.3	160	25.7	14.22	4
200	**WSX445-200C20NR**	60	32	18	135	29.3	160	25.7	14.22	4
250	**WSX445R25010KN**	47.625	35	18	180	26.3	220	25.4	14.22	5
250	**WSX445R25014KN**	47.625	35	18	180	26.3	220	25.4	14.22	5
250	**WSX445L25010KN**	47.625	35	18	180	26.3	220	25.4	14.22	5
315	**WSX445R31514PN**	47.625	35	18	225	26.3	285	25.4	14.22	6

Memo

Memo

Cutting Performance

Comparison of Finished Surface - Aluminum (AISI 6061)

Chip Breaker for Aluminum

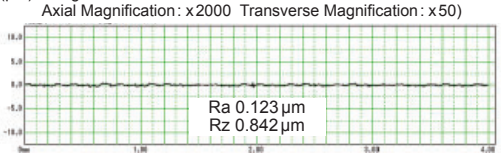
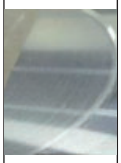
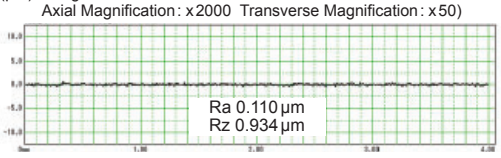
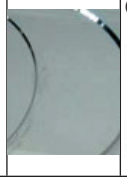
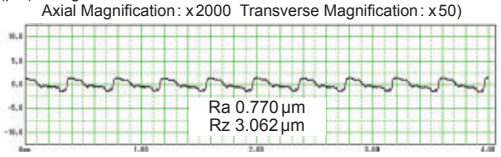
Polished Rake Face

→Improved Welding Resistance

Sharp Edge

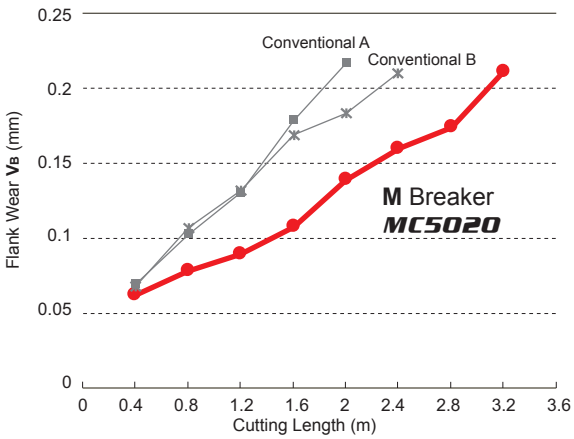
→Provides Smooth Cutting

- Chip breaker for aluminum have sharp cutting edges. Handling them with bare hands may cause injuries.

Insert	Surface	Measured Value	Surface Roughness	Surface Quality
L Breaker ***TF15***		(μm) Roughness Profile Axial Magnification : x2000 Transverse Magnification : x50)  Ra 0.123 μm Rz 0.842 μm	○	○
Conventional A		(μm) Roughness Profile Axial Magnification : x2000 Transverse Magnification : x50)  Ra 0.110 μm Rz 0.934 μm	○	× Cloudiness
Conventional B		(μm) Roughness Profile Axial Magnification : x2000 Transverse Magnification : x50)  Ra 0.770 μm Rz 3.062 μm	× Rough	○

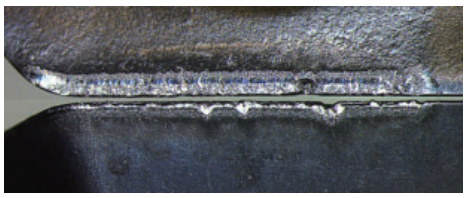
<Cutting Conditions>
Cutter Dia. : DC=125mm
Cutting Speed : 500m/min
Feed per Tooth : 0.1mm/t.
Depth of Cut : ap=2.0mm
Width of Cut : ae=100mm
Cutting Mode : Dry Cutting
4 Inserts
Center cut

Tool Life Comparison when Cutting Ductile Cast Iron



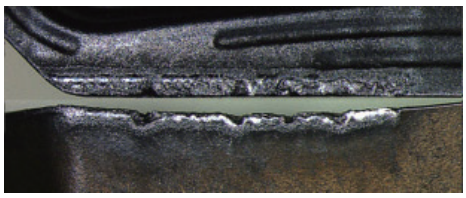
<Cutting Conditions>
Cutter Dia. : DC=125mm
Cutting Speed : 200m/min
Feed per Tooth : 0.2mm/t.
Depth of Cut : ap=3.0mm
Width of Cut : ae=100mm
Cutting Mode : Dry Cutting
Single Insert
Center Cut

M Breaker
MC5020

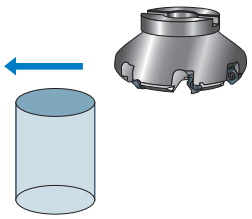
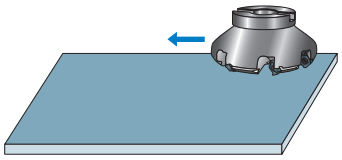


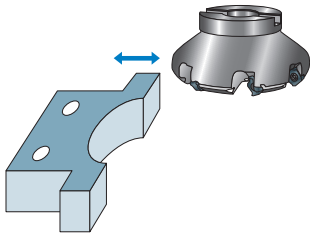
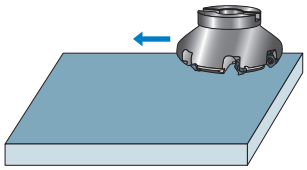
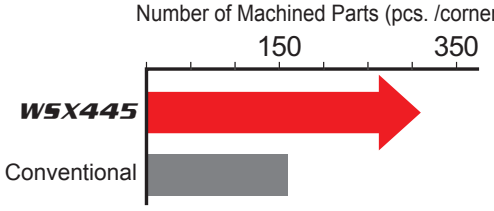
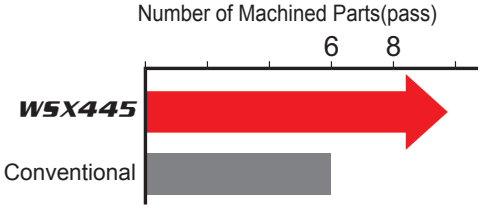
Conventional A

Conventional B



Application Examples

Cutter Body		WSX445-050A04AR	WSX445R12508EA
Insert (Grade)		SNMU140812ANER-R (MP6120)	SNGU140812ANER-M (MP6120)
Workpiece		Carbon Steel 	Carbon Steel 
Component		Round Bar	Thin Plate
Cutting Conditions	Cutting Speed (m/min)	190	216
	Feed per Tooth (mm/t.)	0.2	0.3
	Depth of Cut (mm)	ap=2.0 ae=25	ap=1.5–2.5 ae=120
Cutting Mode		Dry Cutting	Dry Cutting
Results		The low cutting resistance enabled WSX445 double sided inserts to be used with smaller BT30 arbors. Previously, only positive type single sided inserts could be used, therefore doubling the number of cutting edges available.	Spindle load could be reduced to 80% of conventional products, as WSX445 offers improved chip discharge performance resulting in smooth and silent machining.

Cutter Body		WSX445-080A08AR	WSX445R10007DA
Insert (Grade)		SNGU140812ANER-M (MP6120)	SNGU140812ANER-L (MP9120)
Workpiece		AISI 100-70-03 	15-5PH Stainless Steel 
Component		Automotive Component	Aerospace Component
Cutting Conditions	Cutting Speed (m/min)	200	45
	Feed per Tooth (mm/t.)	0.4	0.3
	Depth of Cut (mm)	ap=2.0 ae=60	ap=2.0–3.0 ae=80
Cutting Mode		Dry Cutting	Wet Cutting
Results		Number of Machined Parts (pcs. /corner)  WSX445 achieved double tool life compared to conventional products without insert fracturing in interrupted machining.	Number of Machined Parts(pass)  Number of workpieces increased by 1.5 times or more since WSX445 prevents thermal cracking.

The examples shown are actual applications and can differ from the recommended cutting conditions.

General Purpose Double Sided Insert Type Face Mill Features Low Cutting Resistance

WSX445

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

Overseas Sales Dept, Asian Region
KFC bldg., 8F, 1-6-1 Yokoami, Sumida-ku, Tokyo 130-0015, Japan
TEL +81-3-5819-8771 FAX +81-3-5819-8774

Overseas Sales Dept, European & American Region
KFC bldg., 8F, 1-6-1 Yokoami, Sumida-ku, Tokyo 130-0015, Japan
TEL +81-3-5819-8772 FAX +81-3-5819-8774

http://www.mitsubishicarbide.com/en/
(Tools specifications subject to change without notice.)

EXP-14-E005
2017.9.E(-)