TOOLS NEWS

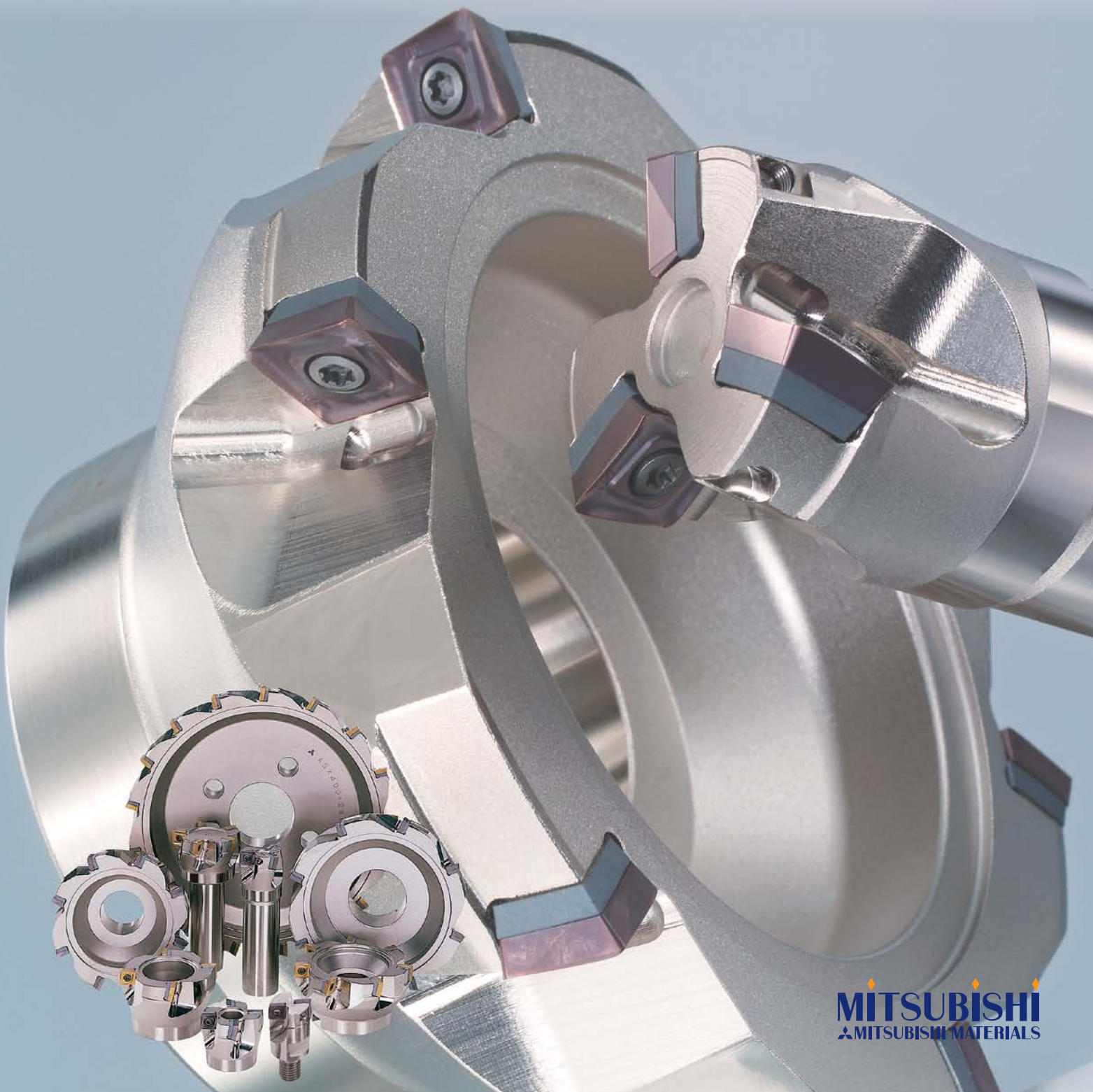
2014.01 Update B023E

Screw-on Insert type Shoulder Milling Cutter

ASX400

For stable shoulder milling even under heavy loads.

New coated grades now included



MITSUBISHI
MITSUBISHI MATERIALS

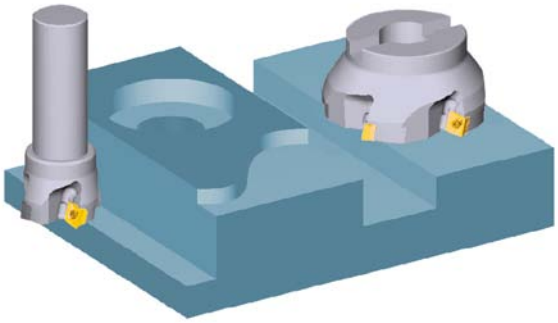
Screw-on Insert type Shoulder Milling Cutter

ASX400

Features

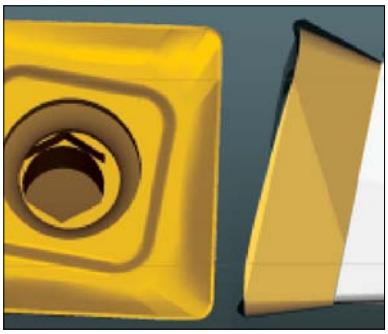
ECONOMICAL

ASX400 is economical due to the 4 cutting edge inserts. Additionally with one tool, it is possible to carry out face milling, shoulder milling and slotting operations.



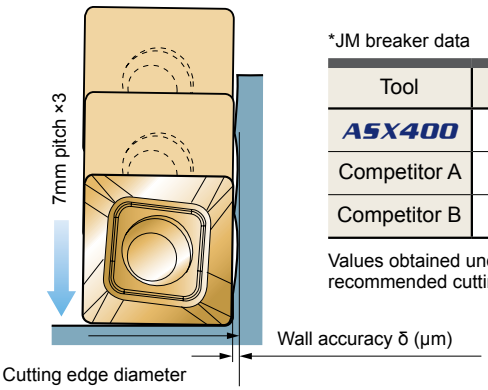
LOW RESISTANCE

Due to the 3D design of the cutting edge and a large rake angle, high cutting edge sharpness has been achieved with reduced cutting resistance.



HIGH ACCURACY

Due to the curved edge and high accuracy body and insert, accurate surface finishes on walls and good surface finishes on faces can be achieved.



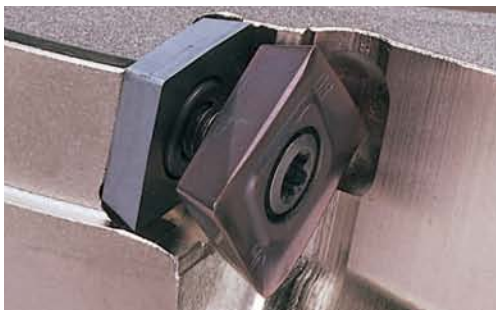
*JM breaker data

Tool	δ
ASX400	30
Competitor A	100
Competitor B	122

Values obtained under the recommended cutting conditions.

EASY TO USE

Employs a screw on type mechanism, therefore inserts can easily be loaded.Additionally when indexing the insert, it is not necessary to remove the screw completely.

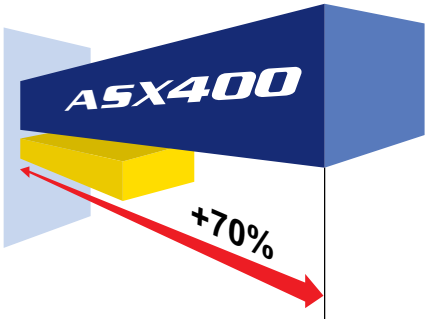


HIGH RELIABILITY

Uses a carbide shim and Mitsubishi's proprietary Anti-Fly-Insert (A.F.I) to prevent the inserts from moving when machining. Additionally the clamp screw uses TORXPLUS®, for high clamping force ensuring high reliability.

HIGH HEAT-RESISTANT BODY

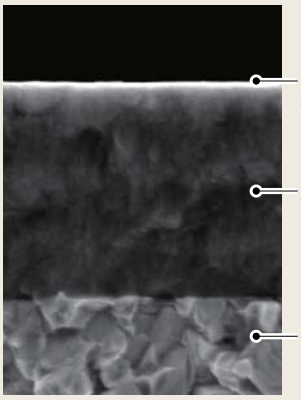
The cutter body is made from a special alloy that provides high strength at high temperatures. A special surface treatment improves the corrosion and friction resistance. ASX400 can be used for long processes even under harsh conditions.



INSERT GRADES FOR A WIDE RANGE OF MATERIALS

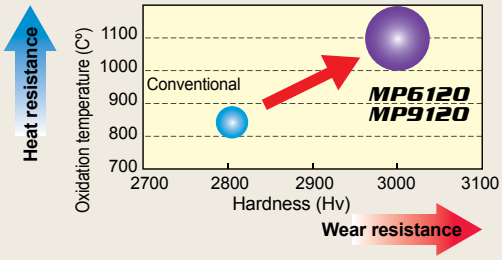
NEW MP6120 / MP9120- with accumulated Al-Ti-Cr-N based PVD coating

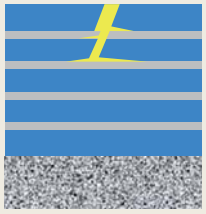
PVD coatings have properties such as toughness, low coefficient of friction and excellent welding, wear and heat resistance. This results in tough, precision grades such as MP6120 and MP9120.



TOUGH-Σ Technology

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

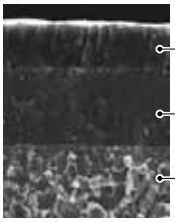




Multi-layering of the coating prevents any cracks penetrating through to the substrate.

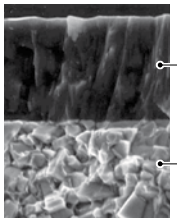
	Work Material	Grade	Friction coefficient S55C Measured at 600 °C	Friction coefficient Ti-6Al-4V Measured at 600 °C
P	Carbon Steel, Alloy Steel	MP6120	0.4	
S	Titanium Alloy, Heat Resistant Alloy	MP9120		0.3
	Conventional		0.7	0.7

MC5020



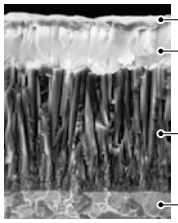
With high wear resistance and outstanding fracture resistance, MC5020 is ideal for milling cast iron.

MIRACLE® VP15TF



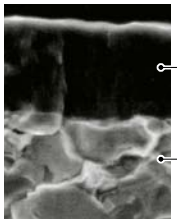
Miracle coated VP15TF displays high welding resistance therefore it can be used for machining a wide range of workpiece materials such as mild, carbon, alloy and stainless steels.

F7030



The combination of a tough cemented carbide, highly resistant to thermal cracking and fracturing, together with a CVD coating that boasts superior wear resistance, enables high performance machining of both steel and stainless steels in both dry and wet cutting.

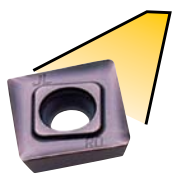
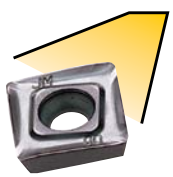
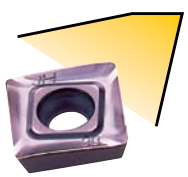
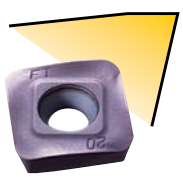
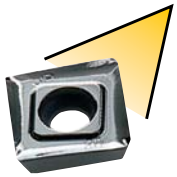
MIRACLE® VP30RT



The combination of a tough special cemented carbide substrate and MIRACLE coating provides excellent fracture resistance. Ideal for heavy interrupted cutting of stainless and general steels.

Wide Insert Variety

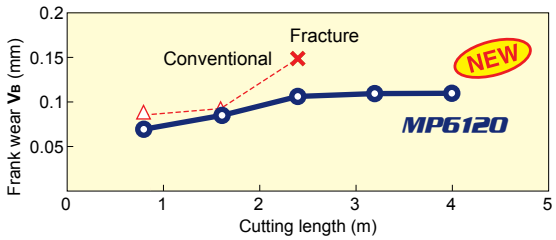
CHIPBREAKERS FOR A WIDE RANGE OF APPLICATIONS

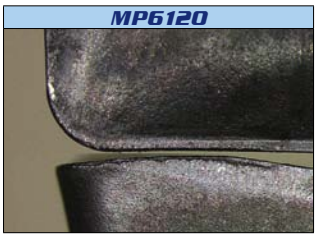
JL For finish to light cutting	JM For light to semi heavy cutting	JH For medium to heavy cutting	FT For heavy and interrupted cutting	JP For aluminium alloys
				
High accuracy insert with ground-finished periphery. Large rake angle for low cutting resistance.	High accuracy M class insert. For a wide range of workpiece materials and cutting conditions.	High accuracy M class insert. Strong cutting edge for high fracture resistance.	High accuracy M-class insert. Nose radius of 2.0mm has improved fracture resistance. Strong main cutting edge allows heavy cutting and heavy interrupted cutting. Stable cutting performance.	High accuracy insert with ground-finished periphery. Large rake angle and mirror-finished rake face for sharp cutting performance and high welding resistance.

Cutting Performance

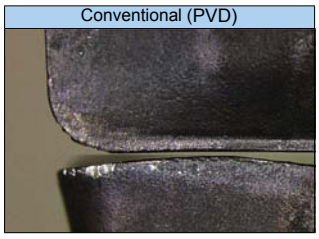
Alloy Steel

Wear Resistance





Cutting length 4.0m



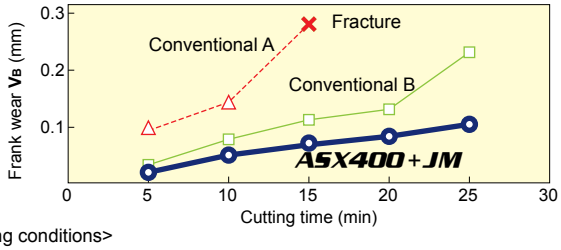
Cutting length 2.4m

<Cutting conditions>

Workpiece : SCM440
Tool : ASX400-063A05R
Insert : SOET12T308PEER-JM
Cutting speed : 200m/min
Feed per tooth : 0.15mm/tooth
Axial depth of cut : 3mm
Radial depth of cut : 50mm
Dry cutting

General Steel

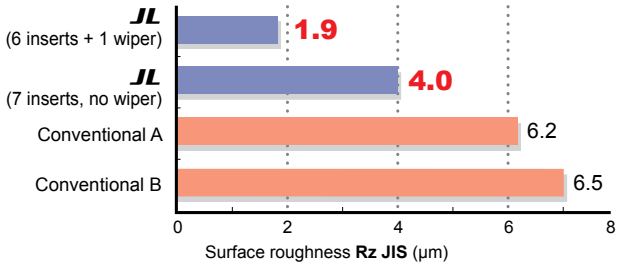
Wear Resistance



<Cutting conditions>

Workpiece : S55C
Tool : ASX400R12506E
Insert : SOMT12T308PEER-JM
Grade : VP15TF
Cutting speed : 200m/min
Feed per tooth : 0.2mm/tooth
Axial depth of cut : 3mm
Radial depth of cut : 50mm
Down cut, Dry cutting, 1 insert

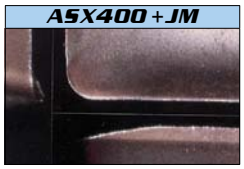
Surface Roughness



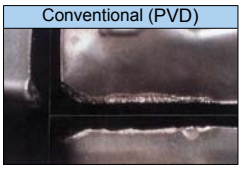
<Cutting conditions>

Workpiece : S55C
Tool : ASX400R10007D
Insert : SOET12T308PEER-JL
: WOEW12T308PETR8C
Grade : NX4545 / NX2525
Cutting speed : 150m/min
Feed per tooth : 0.1mm/tooth
Axial depth of cut : 1mm
Radial depth of cut : 50mm
Down cut, Dry cutting, All inserts

Heat Treated Steel



Cutting length 1.7m

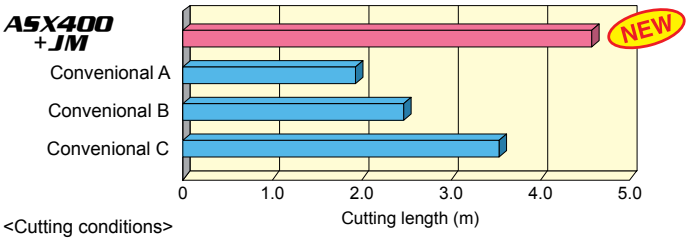


Cutting length 0.15m

<Cutting conditions>

Workpiece : SKD61(53HRC)
Tool : ASX400R503S32
Insert : SOMT12T308PEER-JM
Grade : VP15TF
Cutting speed : 75m/min
Feed per tooth : 0.15mm/tooth
Axial depth of cut : 5mm
Radial depth of cut : 10mm
Down cut, Dry cutting, 1 insert

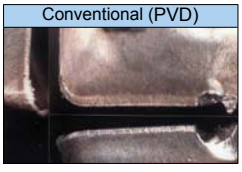
Heat Resistant Alloy



<Cutting conditions>

Workpiece : Ti-6Al-4V
Tool : ASX400-063A04R
Insert : SOMT12T308PEER-JM
Grade : MP9120
Cutting speed : 60m/min
Feed per tooth : 0.1mm/tooth
Axial depth of cut : 8mm
Radial depth of cut : 6mm
Wet cutting

Stainless Steel



<Cutting conditions>

Workpiece : SUS304
Tool : ASX400R1005D
Insert : SOMT12T308PEER-JM
Grade : VP30RT
Cutting speed : 150m/min
Feed per tooth : 0.15mm/tooth
Axial depth of cut : 5mm
Radial depth of cut : 20mm
Down cut, Dry cutting, 1 insert
Cutting time : 25min

Aluminium Alloy

Tool	Wall accuracy (μm)	Base surface finish RzJIS (μm)	Results
ASX400	15	3	Stable machining. Low cutting power.
Conventional A	40	12	Large welding and unstable machining.
Conventional B	51	9	Large cutting power and vibration.

<Cutting conditions>

Workpiece : A6061
Tool : ASX400R404S32
nsert : SOGT12T308PEFR-JP
Grade : HTi10
Cutting speed : 750m/min
Feed per tooth : 0.1mm/tooth
Axial depth of cut : 7mmx3times
Radial depth of cut : 3mm
Down cut, Wet cutting, All inserts

RECOMMENDED CUTTING CONDITIONS

Work Material		Hardness	Grade	Cutting Speed (m/min)	Finish—Light Cutting		Light—Semi-Heavy Cutting		Medium—Heavy Cutting	
					Feed per Tooth (mm/tooth)	Breaker	Feed per Tooth (mm/tooth)	Breaker	Feed per Tooth (mm/tooth)	Breaker
P	Mild Steel	≤180HB	**F7030**	280 (210—350)	0.18 (0.08—0.28)	**JL**	0.2 (0.1—0.3)	**JM**	0.25 (0.1—0.35)	**JH**
			MP6120	250 (200—300)	—	—	0.2 (0.1—0.3)	**JM**	—	—
			VP15TF	250 (200—300)	0.18 (0.08—0.28)	**JL**	0.2 (0.1—0.3)	**JM**	0.25 (0.1—0.35)	**JH FT**
			VP30RT	230 (180—280)	0.18 (0.08—0.28)	**JL**	0.2 (0.1—0.3)	**JM**	0.25 (0.1—0.35)	**JH**
			NX4545	180 (130—230)	0.15 (0.07—0.23)	**JL**	0.18 (0.1—0.28)	**JM**	—	—
	Carbon Steel Alloy Steel	180—280HB	**F7030**	250 (200—300)	0.15 (0.07—0.23)	**JL**	0.18 (0.1—0.28)	**JM**	0.2 (0.1—0.3)	**JH**
			MP6120	220 (170—270)	—	—	0.18 (0.1—0.28)	**JM**		—
			VP15TF	220 (170—270)	0.15 (0.07—0.23)	**JL**	0.18 (0.1—0.28)	**JM**	0.2 (0.1—0.3)	**JH FT**
			VP30RT	200 (150—250)	0.15 (0.07—0.23)	**JL**	0.18 (0.1—0.28)	**JM**	0.2 (0.1—0.3)	**JH**
			NX4545	150 (120—180)	0.13 (0.06—0.2)	**JL**	0.15 (0.1—0.25)	**JM**	—	—
		280—350HB	**F7030**	180 (130—230)	0.13 (0.06—0.2)	**JL**	0.15 (0.1—0.25)	**JM**	0.18 (0.1—0.28)	**JH**
			MP6120	140 (100—180)	—	—	0.15 (0.1—0.25)	**JM**	—	—
			VP15TF	140 (100—180)	0.13 (0.06—0.2)	**JL**	0.15 (0.1—0.25)	**JM**	0.18 (0.1—0.28)	**JH FT**
			VP30RT	120 (80—160)	0.13 (0.06—0.2)	**JL**	0.15 (0.1—0.25)	**JM**	0.18 (0.1—0.28)	**JH**
			NX4545	100 (80—120)	0.1 (0.05—0.15)	**JL**	0.13 (0.1—0.2)	**JM**	—	—
M	Stainless Steel	≤270HB	**VP15TF**	220 (170—270)	0.15 (0.07—0.23)	**JL**	0.18 (0.1—0.28)	**JM**	0.2 (0.1—0.3)	**JH FT**
			VP30RT	200 (150—250)	0.15 (0.07—0.23)	**JL**	0.18 (0.1—0.28)	**JM**	0.2 (0.1—0.3)	**JH**
			NX4545	150 (120—180)	0.15 (0.07—0.23)	**JL**	0.18 (0.1—0.28)	**JM**	—	—
K	Cast Iron Ductile Cast Iron	Tensile Strength ≤450MPa	**MC5020**	200 (150—250)	—	—	0.2 (0.1—0.3)	**JM**	0.25 (0.1—0.35)	**JH FT**
			VP15TF	180 (130—230)	0.18 (0.1—0.28)	**JL**	0.2 (0.1—0.3)	**JM**	0.25 (0.1—0.35)	**JH FT**
N	Aluminium Alloy	—	**HTi10**	300—	0.15 (0.1—0.2)	**JP**	0.2 (0.1—0.3)	**JP**	0.3 (0.2—0.4)	**JP**
S	Titanium Alloy	—	**MP9120**	50 (40—60)	—	—	0.15 (0.05—0.2)	**JM**	—	—
			VP15TF	50 (40—60)	0.1 (0.05—0.2)	**JL**	0.15 (0.05—0.2)	**JM**	—	—
	Heat Resistant Alloy	—	**MP9120**	40 (20—50)	—	—	0.15 (0.05—0.2)	**JM**	—	—
			VP15TF	40 (20—50)	0.1 (0.05—0.2)	**JL**	0.15 (0.05—0.2)	**JM**	—	—
H	Hardened Steel	40—55HRC	**VP15TF**	80 (60—100)	0.08 (0.04—0.13)	**JL**	0.1 (0.05—0.15)	**JM**	0.12 (0.07—0.17)	**JH FT**

●Revolution (min^{-1})=(1000 x Cutting Speed)÷(3.14 x ϕD_1) ●Table Feed (mm/min)=Feed per Tooth x Number of Teeth x Cutter Revolution

INSTRUCTIONS FOR USING INSERTS

Instructions for use of the JP breaker

- The JP breaker has sharp cutting edges. Wear gloves when handling.
- When machining aluminium alloy, welding to the cutting edge tends to occur, often leading to insert failure. To prevent this, wet cutting is recommended.

Instructions for use of wiper inserts

- Wiper inserts for the ASX400 are single-cornered.
- When installing the wiper insert, place the insert so that the small chamfer is located as shown.
- The peripheral cutting edge of the wiper insert does not protrude as far as standard inserts. This may cause extra wear on the insert behind the wiper.

SHOULDER MILLING
<GENERAL CUTTING>

0° | Finishing | Roughing

ASX400

Light Alloy	Cast Iron	Carbon Steel, Alloy Steel	Stainless Steel	Hardened Steel

Fig.1

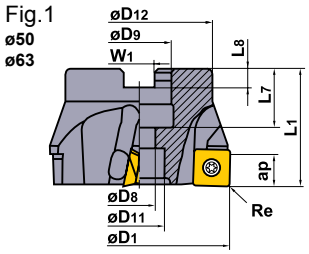
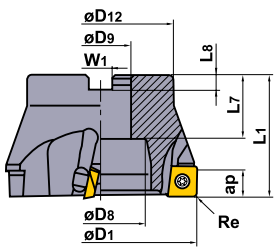
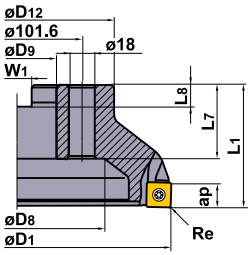


Fig.2



High tolerance M-class inserts.
Economical 4 cutting edge inserts.
Curved cutting edge and high rigidity holder.
Screw-on type.

Fig.3



Right hand tool holder only.

C H :0°
A.R :+11° T :-9°—-11°
R.R :-9°—-11° I :+11°

ARBOR TYPE

Type	Order Number	Stock R	Teeth	Dimensions(mm) D1	L1	D9	L7	D8	D12	W1	L8	D11	Tool Weight (kg)	Max. Depth of Cut ap (mm)	Type (Fig.)
Coarse Pitch	**ASX400-050A03R**	●	3	50	40	22	20	11	41	10.4	6.3	17	0.3	10	1
	-063A04R	●	4	63	40	22	20	11	50	10.4	6.3	17	0.5	10	1
	R08004C	★	4	80	50	25.4	26	38	60	9.5	6	—	1.0	10	2
	R10005D	★	5	100	50	31.75	32	45	70	12.7	8	—	1.5	10	2
	R12506E	★	6	125	63	38.1	35	60	80	15.9	10	—	2.5	10	2
	R16008F	★	8	160	63	50.8	38	90	100	19.1	11	—	4.0	10	2
	R20010K	★	10	200	63	47.625	35	135	160	25.4	14.22	—	7.0	10	3
	R25012K	★	12	250	63	47.625	35	180	210	25.4	14.22	—	12.0	10	3
Fine Pitch	**ASX400-050A04R**	●	4	50	40	22	20	11	41	10.4	6.3	17	0.3	10	1
	-063A05R	●	5	63	40	22	20	11	50	10.4	6.3	17	0.5	10	1
	R08006C	★	6	80	50	25.4	26	38	60	9.5	6	—	1.0	10	2
	R10007D	★	7	100	50	31.75	32	45	70	12.7	8	—	1.5	10	2
	R12508E	★	8	125	63	38.1	35	60	80	15.9	10	—	2.5	10	2
	R16012F	★	12	160	63	50.8	38	90	100	19.1	11	—	4.0	10	2
	R20016K	★	16	200	63	47.625	35	135	160	25.4	14.22	—	7.0	10	3
	R25018K	★	18	250	63	47.625	35	180	210	25.4	14.22	—	12.0	10	3

SPARE PARTS

Tool Holder Number	Shim	Shim Screw *	Clamp Screw *	Wrench (Insert)	Wrench (Shim)
ASX400	STASX400N	WCS503507H	TPS35	TIP15T	HKY35R

* Clamp Torque (N • m) : WCS503507H=5.0, TPS35=3.5

● : **Inventory maintained in Japan.**

Fig.1

ø50
ø63

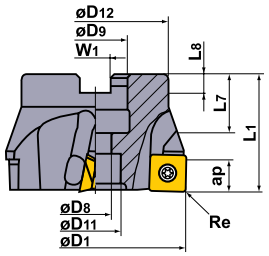


Fig.2

ø80
ø100
ø125

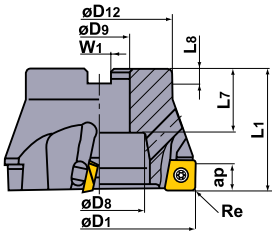


Fig.3

ø160

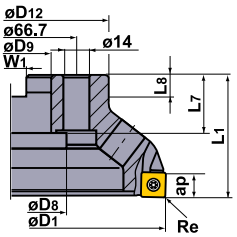
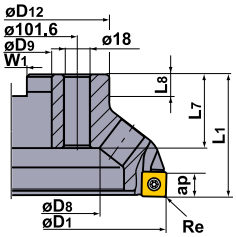


Fig.4

ø200
ø250



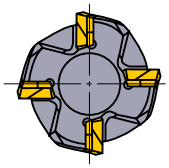
For metric arbor

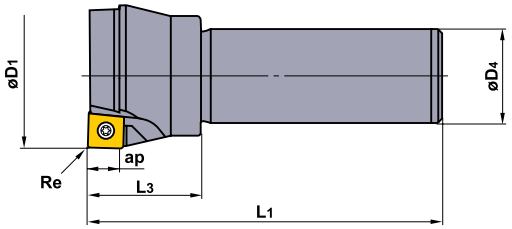
C H :0°
A.R :+11° T :-9°—-11°
R.R :-9°—-11° I :+11°

ARBOR TYPE

Right hand tool holder only.

Type	Order Number	Stock	Teeth	Dimensions(mm)									Tool Weight (kg)	Max. Depth of Cut **ap** (mm)	Type (Fig.)
		R		D_1	L_1	D_9	L_7	D_8	D_{12}	W_1	L_8	D_{11}			
Coarse Pitch	**ASX400-050A03R**	●	3	50	40	22	20	11	41	10.4	6.3	17	0.3	10	1
	-063A04R	●	4	63	40	22	20	11	50	10.4	6.3	17	0.5	10	1
	-080B04R	●	4	80	50	27	29	38	60	12.4	7	—	0.9	10	2
	-100B05R	●	5	100	50	32	32	45	70	14.4	8	—	1.4	10	2
	-125B06R	●	6	125	63	40	32	60	80	16.4	9	—	2.3	10	2
	-160C08R	●	8	160	63	40	29	56	100	16.4	9	—	3.6	10	3
	-200C10R	●	10	200	63	60	32	135	160	25.7	14.22	—	6.3	10	4
	-250C12R	●	12	250	63	60	32	180	210	25.7	14.22	—	10.8	10	4
Fine Pitch	**ASX400-050A04R**	●	4	50	40	22	20	11	41	10.4	6.3	17	0.3	10	1
	-063A05R	●	5	63	40	22	20	11	50	10.4	6.3	17	0.5	10	1
	-080B06R	●	6	80	50	27	29	38	60	12.4	7	—	0.9	10	2
	-100B07R	●	7	100	50	32	32	45	70	14.4	8	—	1.4	10	2
	-125B08R	●	8	125	63	40	32	60	80	16.4	9	—	2.2	10	2
	-160C12R	●	12	160	63	40	29	56	100	16.4	9	—	3.5	10	3
	-200C16R	●	16	200	63	60	32	135	160	25.7	14.22	—	6.2	10	4
	-250C18R	●	18	250	63	60	32	180	210	25.7	14.22	—	10.7	10	4
Extra fine Pitch	**ASX400-050A05R**	●	5	50	40	22	20	11	41	10.4	6.3	17	0.3	10	1
	-063A06R	●	6	63	40	22	20	11	50	10.4	6.3	17	0.5	10	1
	-080B08R	●	8	80	50	27	29	38	60	12.4	7	—	0.9	10	2
	-100B10R	●	10	100	50	32	32	45	70	14.4	8	—	1.4	10	2
	-125B12R	●	12	125	63	40	32	60	80	16.4	9	—	2.1	10	2
	-160C15R	●	15	160	63	40	29	56	100	16.4	9	—	3.4	10	3
	-200C19R	★	19	200	63	60	32	135	160	25.7	14.22	—	6.2	10	4
	-250C22R	★	22	250	63	60	32	180	210	25.7	14.22	—	10.5	10	4





SHANK TYPE

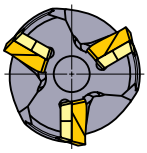
Right hand tool holder only.

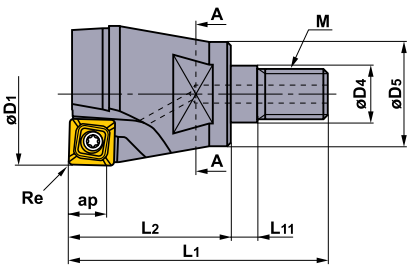
Type	Order Number	Stock	Number of Teeth	Dimensions(mm)				
		R		D1	L1	D4	L3	ap
Coarse Pitch	**ASX400R403S32**	★	3	40	125	32	40	10
	503S32	★	3	50	125	32	40	10
	634S32	★	4	63	125	32	40	10
	804S32	★	4	80	125	32	40	10
Fine Pitch	**504S32**	★	4	50	125	32	40	10
	635S32	★	5	63	125	32	40	10
	806S32	★	6	80	125	32	40	10

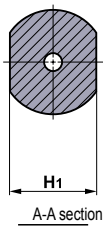
SPARE PARTS

Tool Holder Number		 *	 *		
	Shim	Shim Screw	Clamp Screw	Wrench (Insert)	Wrench (Shim)
ASX400	STASX400N	WCS503507H	TPS35	TIP15T	HKY35R

* Clamp Torque (N • m) : WCS503507H=5.0, TPS35=3.5







SCREW-IN TYPE

Right hand tool holder only.

Order Number	Stock	Coolant holes	Teeth	Dimensions (mm)									Weight					
	R			D1	D4	D5	L1	L2	L11	H1	M	ap	(kg)	Shim	Shim Screw	Clamp Screw	Wrench (Insert)	Wrench (Shim)
ASX400R322M16	●	○	2	32	17	29	65	42	4	22	M16	10	0.3	—	WCS503507H	TPS35	TIP15T	HKY35R
403M16	●	○	3	40	17	29	70	47	4	22	M16	10	0.3	STASX400N	WCS503507H	TPS35	TIP15T	HKY35R

* Clamp Torque (N • m) : WCS503507H=5.0, TPS35=3.5

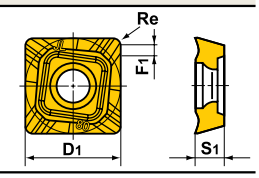
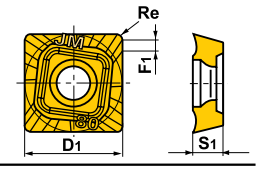
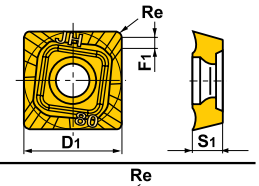
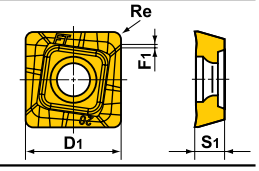
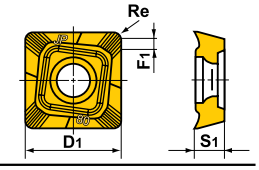
● : Inventory maintained in Japan. (10 inserts in one case)

INSERTS

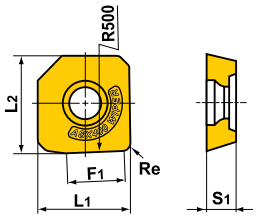
Work Material		
P	Steel	
M	Stainless Steel	
K	Cast Iron	
N	Non-ferrous Metal	
S	Heat-resistant Alloy, Titanium Alloy	
H	Hardened Steel	

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✤ : Unstable Cutting

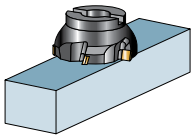
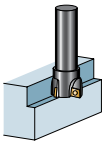
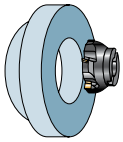
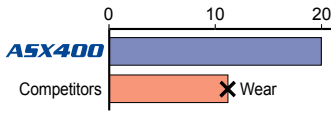
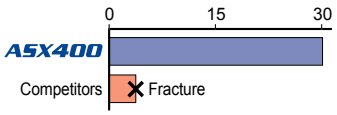
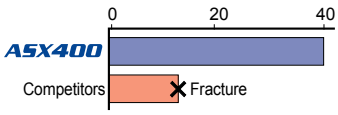
Honing :
E : Round
F : Sharp
T : Chamfer
S : Chamfer + Hone

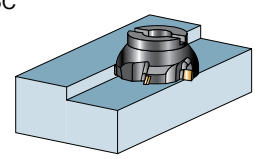
Application	Shape	Order Number	Class	Honing	Coated										Cermet		Carbide		Dimensions (mm)				Geometry
					F7030	MC5020	MP6120 NEW	MP6130 NEW	MP7130 NEW	MP7140 NEW	MP9120 NEW	MP9130 NEW	VP15TF	VP30RT	NX4545		HTi10		D1	S1	F1	Re	
Finish—Light Cutting	JL	**SOET12T308PEER-JL**	E	E	●		●	●	●	●	●	●	●	●	●				12.7	3.97	1.4	0.8	
Light—Semi-Heavy Cutting	JM	**SOMT12T308PEER-JM**	M	E	●	●	●	●	●	●	●	●	●	●	●				12.7	3.97	1.4	0.8	
Medium—Heavy Cutting	JH	**SOMT12T308PEER-JH**	M	E	●	●	●	●	●	●	●	●	●	●					12.7	3.97	1.4	0.8	
Heavy Interrupted Cutting	FT	**SOMT12T320PEER-FT**	M	E		●	●				●	●	●						12.7	3.97	0.5	2.0	
For Aluminium Alloy	JP	**SOGT12T308PEFR-JP**	G	F													●		12.7	3.97	1.4	0.8	

WIPER INSERTS

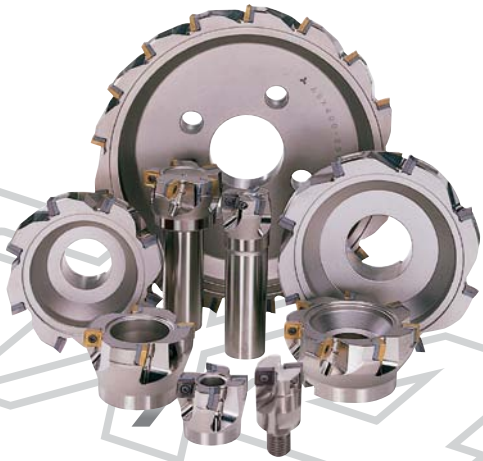
Shape	Order Number	Class	Honing	Cermet		Carbide		Dimensions (mm)					Geometry
				NX2525		HTi05T		L1	L2	S1	F1	Re	
	**WOEW12T308PEER8C**	E	E			●		12.5	13.2	3.97	8	0.8	
	12T308PETR8C	E	T	●				12.5	13.2	3.97	8	0.8	

APPLICATION EXAMPLES

Cutter Body		**ASX400R16012F**	**ASX400R635S32**	**ASX400R10005D**
Insert (Grade)		**SOMT12T308PEER-JM (F7030)**	**SOMT12T308PEER-JM (VP15TF)**	**SOMT12T308PEER-JM (VP30RT)**
Workpiece		SCM440 	SKD61 (52HRC) 	SUS316L 
Component		Machine parts	Mold material	Valve parts
Cutting Conditions	Cutting Speed (m/min)	250	100	150
	Feed (mm/tooth)	0.15	0.1	0.15
	Axial depth of cut (mm)	3	4 x 4pass	4
	Radial depth of cut (mm)	120	20	40—100
Coolant		Dry cutting	Dry cutting	Dry cutting
Results		Workpieces machined (pieces/edge) 	Cutting time (min/corner) 	Workpieces machined (pieces/edge) 

Cutter Body		**ASX400-050A04R**
Insert (Grade)		**SOMT12T308PEER-JM (MP6120)**
Workpiece		S45C 
Component		Machine parts
Cutting Conditions	Cutting Speed (m/min)	152
	Feed (mm/tooth)	0.15
	Axial depth of cut (mm)	3.8
	Radial depth of cut (mm)	6.2
Coolant		Dry cutting
Results		Tool life was tripled compared to conventional products.

Memo



Screw-on Insert type Shoulder Milling Cutter

ASX400

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