

Indexable End Mill for Deep Shoulder Milling

Shell type
addition!

SPX

Offers low cutting resistance for heavy machining & deep shoulder milling

- Wavy cutting edge geometry
WH breaker breaks the chips
into fine pieces.
- The straight edge type
JM breaker produces
excellent surface
finishes.






Indexable End Mill for Deep Shoulder Milling

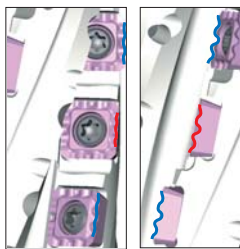
SPX

Features

Insert

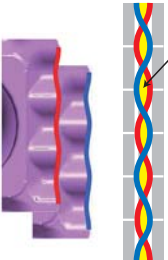
Wavy cutting edge type

WH Breaker		
Bottom Cutting Edge A	Bottom Cutting Edge B	Peripheral Cutting Edge
		



The wavy cutting edge gradually engages the workpiece.

Reduced impact when entering the workpiece.






Chip cross section

Uses the same cutting edge theory as a solid type roughing end mill.

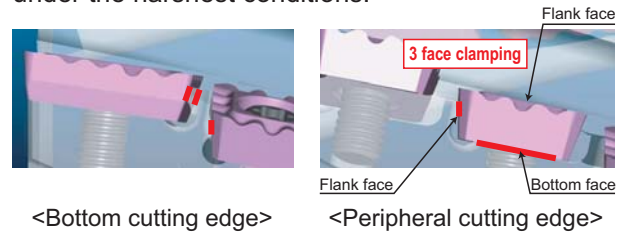
Lower cutting resistance

Straight cutting edge type

JM Breaker		
Bottom Cutting Edge A	Bottom Cutting Edge B	Peripheral Cutting Edge
		

High clamping rigidity

The high clamping and positional rigidity of the inserts prevents damage to the cutting edge even under the harshest conditions.



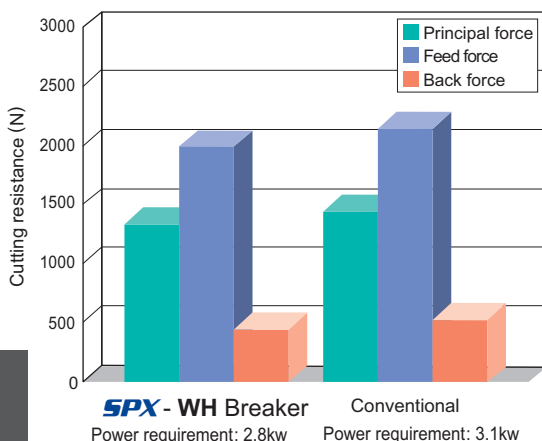
Spiral relief cut

Prevents chip packing and damage to the tool body without hindering the overall tool rigidity.

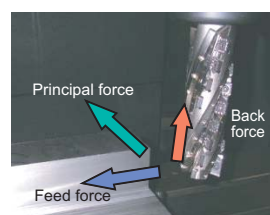


Cutting performance

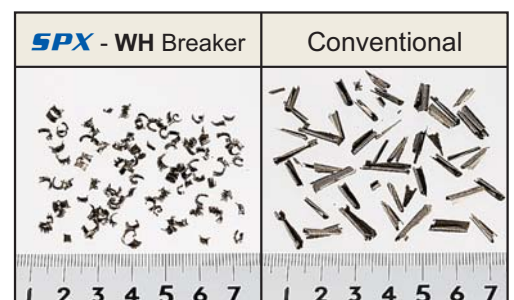
Low Cutting Resistance



Chip Breaking



<Cutting conditions>
 Workpiece : JIS FCD450
 Cutting speed : 100m/min
 Feed per tooth : 0.20mm/tooth
 Depth of cut : 50m
 Width of cut : 5mm
 Dry cutting

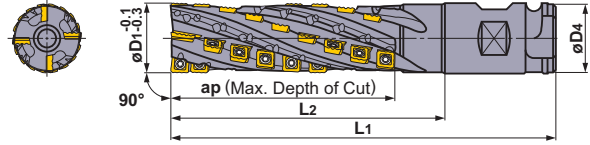




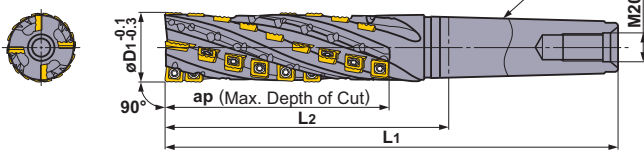
Holder



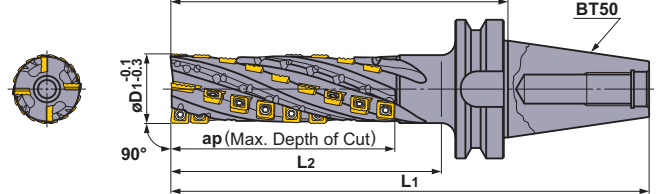
● Straight shank type (Combination type)



● MT5 shank type



● BT50 shank type



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

Type	Order Number	Stock	Number of Teeth			Dimensions (mm)						Number of Insert		
			Flutes	Total	Bottom	D1	L1	D4	L2	L10	ap	Bottom Cutting Edge A JPMX 190412-○○	Bottom Cutting Edge B MPMX 120412-○○	Peripheral Cutting Edge SPMX 120408-○○
Straight Shank (Combination)	Short	●	2	16	4	50	180	50.8	100	—	72	2	2	12
	Standard	●	2	24	4	50	220	50.8	140	—	110	2	2	20
		●	2	34	4	50	270	50.8	190	—	157	2	2	30
		●	2	44	4	50	320	50.8	240	—	205	2	2	40
BT50 Shank	Short	●	2	16	4	50	249.8	—	100	148	72	2	2	12
	Standard	●	2	24	4	50	289.8	—	140	188	110	2	2	20
		●	2	34	4	50	339.8	—	190	238	157	2	2	30
		●	2	44	4	50	389.8	—	240	288	205	2	2	40
		●	2	24	4	63	289.8	—	140	188	110	2	2	20
		●	2	34	4	63	339.8	—	190	238	157	2	2	30
		●	2	44	4	63	389.8	—	240	288	205	2	2	40
		●	2	56	4	63	439.8	—	290	338	261	2	2	52
MT5 Shank	●	2	24	4	50	279.5	—	150	—	110	2	2	20	
	●	2	34	4	50	329.5	—	200	—	157	2	2	30	
	●	2	44	4	50	379.5	—	250	—	205	2	2	40	

Spare Parts

Holder						
	Clamp Screw	Wrench	Anti-seizure Lubricant	Bottom Cutting Edge A	Bottom Cutting Edge B	Peripheral Cutting Edge
SPX	TS55	TKY25D	MK1KS	JPMX190412-WH	MPMX120412-WH	SPMX120408-WH
				JPMX190412-JM	MPMX120412-JM	SPMX120408-JM

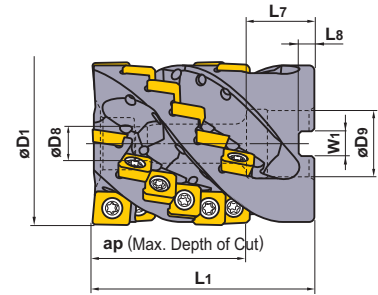
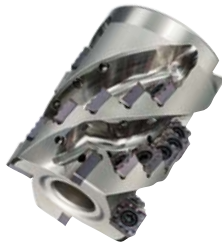
* Clamp Torque (N · m) : TS55=7.5

● : Inventory maintained.

Indexable End Mill for Deep Shoulder Milling

SPX

Shell Type



Right hand tool holder only.

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

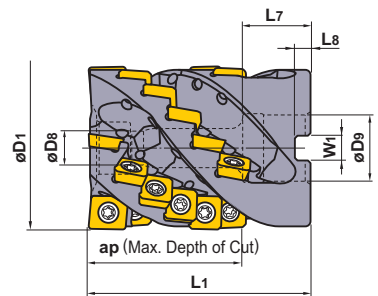
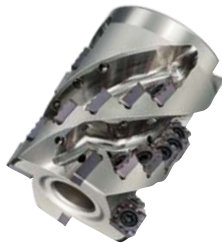
D1	Clamping Bolt Order Number	Geometry
φ63	HSC12070	
φ80	16065	

Order Number	Stock R	Number of Teeth		Dimensions (mm)									Number of Insert		
													Bottom Cutting Edge A	Bottom Cutting Edge B	Peripheral Cutting Edge
													JPMX 140412-○○	MPMX 120412-○○	SPMX 120408-○○
SPX4R06324CA058A	●	4	24	4	D1	L1	D9	L7	D8	W1	L8	ap	2	2	20
4R08024DA058A	●	4	24	4	80	85	31.75	38	17	12.7	8	58	2	2	20

(Note) The coolant supply from the inside is also possible by the combination with the arbor for an internal refueling.

Shell Type

NEW



Right hand tool holder only.

For metric arbors

The bore diameter (D9) is equivalent to a metric size.

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

D1	Clamping Bolt Order Number	Geometry
φ63	HSC12070	
φ80	16065	

Order Number	Stock R	Number of Teeth		Dimensions (mm)									Number of Insert		
													Bottom Cutting Edge A	Bottom Cutting Edge B	Peripheral Cutting Edge
													JPMX 140412-○○	MPMX 120412-○○	SPMX 120408-○○
SPX4-063A24A058RA	●	4	24	4	D1	L1	D9	L7	D8	W1	L8	ap	2	2	20
-080A24A058RA	●	4	24	4	80	85	32	40	17	14.4	8	58	2	2	20

(Note) The coolant supply from the inside is also possible by the combination with the arbor for an internal refueling.

Spare Parts

Holder						
	Clamp Screw	Wrench	Anti-seizure Lubricant	Insert		
SPX	TS55	TKY25D	MK1KS	Bottom Cutting Edge A	Bottom Cutting Edge B	Peripheral Cutting Edge
				JPMX140412-WH	MPMX120412-WH	SPMX120408-WH
				JPMX140412-JM	MPMX120412-JM	SPMX120408-JM

* Clamp Torque (N · m) : TS55=7.5

● : Inventory maintained.(10 inserts in a case)

Inserts

Type	Shape	Order Number	Class	Coated			Dimensions (mm)					Geometry
				VP15TF	VP20RT		L1	L2	D1	S1	Re	
Wavy Cutting Edge Type (WH Breaker)	Bottom Cutting Edge A	JPMX190412-WH	M	●	●		19.05	12.7	—	4.76	1.2	
		* 140412-WH	M	●	●		14.3	12.7	—	4.76	1.2	
	Bottom Cutting Edge B	M	●	●		—	—	12.7	4.76	1.2		
Peripheral Cutting Edge	M	●	●		—	—	12.7	4.76	0.8			
Straight Cutting Edge Type (JM Breaker)	Bottom Cutting Edge A	JPMX190412-JM	M	●	●		19.05	12.7	—	4.76	1.2	
		* 140412-JM	M	●	●		14.3	12.7	—	4.76	1.2	
	Bottom Cutting Edge B	M	●	●		—	—	12.7	4.76	1.2		
Peripheral Cutting Edge	M	●	●		—	—	12.7	4.76	0.8			

* Only for use with a shell type holder.

Recommended Cutting Conditions (Shank Type)

Cutting Conditions for Shoulder Milling

Work Material	Hardness	Insert Grade/Breaker	Cutting Speed v_c (m/min)	Depth of Cut a_p (mm)	Width of Cut a_e (mm)	Feed per Tooth f_z (mm/tooth)
P	Mild Steel	VP15TF WH	120 (100-140)	-4D1	-10	0.15-0.25
		VP15TF JM	120 (100-140)	-2D1	-10	0.15-0.25
	Carbon Steel Alloy Steel	VP15TF WH	80 (70-120)	-4D1	-10	0.15-0.25
		VP15TF JM	80 (70-120)	-2D1	-10	0.15-0.25
	Alloy Tool Steel	VP15TF WH	80 (60-100)	-4D1	-10	0.10-0.20
		VP15TF JM	80 (60-100)	-2D1	-10	0.10-0.20
M	Stainless Steel	VP20RT WH	80 (70-120)	-4D1	-10	0.10-0.20
		VP20RT JM	80 (70-120)	-2D1	-10	0.10-0.20
K	Cast Iron	VP15TF WH	100 (80-120)	-4D1	-10	0.15-0.40
		VP15TF JM	100 (80-120)	-4D1	-10	0.10-0.25
	Ductile Cast Iron	VP15TF WH	80 (60-100)	-4D1	-10	0.15-0.35
		VP15TF JM	80 (60-100)	-4D1	-10	0.10-0.20
S	Ti Alloy	VP20RT WH	40 (35-50)	-4D1	-10	0.08-0.12
		VP20RT JM	40 (35-50)	-2D1	-10	0.08-0.12

(Note 1) The above cutting conditions are determined based on high rigidity machine and workpiece, where no vibration occurred. Please adjust processing conditions if the vibration is generated.

(Note 2) For the tools of cutting edge length is 200mm or more, please reduce the cutting speed and table feed by 10-20% and the cutting width by 50%.

(Note 3) If the cutting angle between the tool and workpiece exceeds 90° when machining corners, Reduce the cutting speed and table feed by 10-20% and a_e by 50%. Also if possible, set a radius cutting path for corners.

Cutting Conditions for Slot Milling

Work Material	Hardness	Insert Grade/Breaker	Cutting Speed v_c (m/min)	Depth of Cut a_p (mm)	Width of Cut a_e (mm)	Feed per Tooth f_z (mm/tooth)
P	Mild Steel	VP15TF WH	60 (50-120)	-10	D1	0.10-0.25
		VP15TF JM	60 (50-120)	-10	D1	0.10-0.15
	Carbon Steel Alloy Steel	VP15TF WH	60 (50-100)	-10	D1	0.10-0.25
		VP15TF JM	60 (50-100)	-10	D1	0.10-0.15
	Alloy Tool Steel	VP15TF WH	50 (40-80)	-10	D1	0.10-0.25
		VP15TF JM	50 (40-80)	-10	D1	0.10-0.15
M	Stainless Steel	VP20RT WH	60 (50-120)	-10	D1	0.10-0.25
		VP20RT JM	60 (50-120)	-10	D1	0.10-0.15
K	Cast Iron	VP15TF WH	50 (40-80)	-50	D1	0.15-0.25
		VP15TF JM	50 (40-80)	-40	D1	0.10-0.20
	Ductile Cast Iron	VP15TF WH	40 (35-80)	-40	D1	0.15-0.25
		VP15TF JM	40 (35-80)	-30	D1	0.10-0.20
S	Ti Alloy	VP20RT WH	35 (30-50)	-10	D1	0.08-0.12
		VP20RT JM	35 (30-50)	-10	D1	0.08-0.12

(Note 1) The above cutting conditions are determined based on high rigidity machine and workpiece, where no vibration occurred. Please adjust processing conditions if the vibration is generated.

(Note 2) For slotting, please use high rigidity tools such as SPX4R05016WNES/BT50NES.

Recommended Cutting Conditions (Shell Type)

Cutting Conditions for Shoulder Milling

	Work Material	Hardness	Insert Grade/Breaker	Cutting Speed v_c (m/min)	Depth of Cut a_p (mm)	Width of Cut a_e (mm)	Feed per Tooth f_z (mm/tooth)
P	Mild Steel	$\leq 180\text{HB}$	VP15TF JM	120 (100-140)	-0.5D ₁	-10	0.15-0.30
				120 (100-140)	0.5D ₁ -	-10	0.15-0.25
	Carbon Steel Alloy Steel	180-350HB	VP15TF JM	120 (80-130)	-0.5D ₁	-10	0.15-0.30
				100 (80-120)	0.5D ₁ -	-10	0.15-0.25
	Alloy Tool Steel	$\leq 300\text{HB}$	VP15TF JM	100 (60-110)	-0.5D ₁	-10	0.10-0.20
				80 (60-100)	0.5D ₁ -	-10	0.10-0.15
M	Stainless Steel	$\leq 200\text{HB}$	VP20RT JM	140 (100-150)	-0.5D ₁	-10	0.10-0.25
				120 (100-140)	0.5D ₁ -	-10	0.10-0.20
K	Cast Iron	Tensile Strength $\leq 350\text{MPa}$	VP15TF WH	120 (80-130)	-0.5D ₁	-10	0.25-0.40
				100 (80-120)	0.5D ₁ -	-10	0.25-0.40
			VP15TF JM	120 (80-130)	-0.5D ₁	-10	0.15-0.30
				100 (80-120)	0.5D ₁ -	-10	0.15-0.25
	Ductile Cast Iron	Tensile Strength $\leq 800\text{MPa}$	VP15TF WH	100 (60-110)	-0.5D ₁	-10	0.20-0.35
				80 (60-110)	0.5D ₁ -	-10	0.20-0.35
VP15TF JM	100 (60-120)	-0.5D ₁	-10	0.15-0.30			
	80 (60-120)	0.5D ₁ -	-10	0.15-0.30			
S	Ti Alloy	$\leq 350\text{HB}$	VP20RT JM	45 (35-50)	-0.5D ₁	-10	0.08-0.10
				40 (35-50)	0.5D ₁ -	-10	0.08-0.10

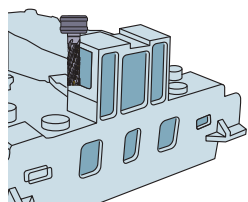
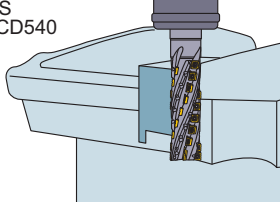
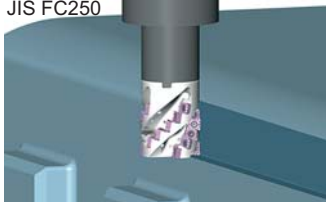
(Note 1) The above cutting conditions are determined based on high rigidity machine and workpiece, where no vibration occurred.
Please adjust processing conditions if the vibration is generated.

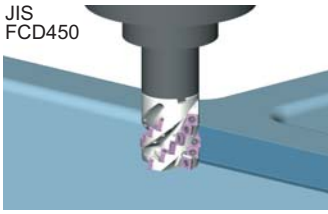
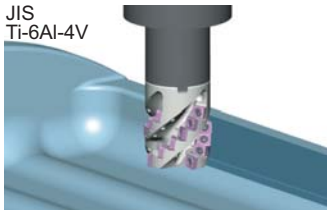
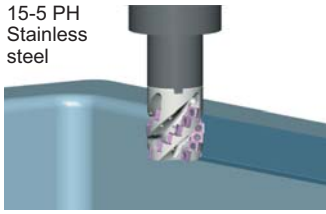
Cutting Conditions for Slot Milling

	Work Material	Hardness	Insert Grade/Breaker	Cutting Speed v_c (m/min)	Depth of Cut a_p (mm)	Width of Cut a_e (mm)	Feed per Tooth f_z (mm/tooth)
P	Mild Steel	$\leq 180\text{HB}$	VP15TF JM	120 (100-140)	-10	D ₁	0.15-0.25
	Carbon Steel Alloy Steel	180-350HB	VP15TF JM	100 (80-120)	-0.25D ₁	D ₁	0.15-0.25
	Alloy Tool Steel	$\leq 300\text{HB}$	VP15TF JM	80 (60-100)	-10	D ₁	0.10-0.20
M	Stainless Steel	$\leq 200\text{HB}$	VP20RT JM	100 (80-140)	-10	D ₁	0.10-0.15
K	Cast Iron	Tensile Strength $\leq 350\text{MPa}$	VP15TF WH	80 (60-100)	-0.25D ₁	D ₁	0.10-0.25
				60 (50-100)	-0.6D ₁	D ₁	0.10-0.20
			VP15TF JM	80 (60-100)	-0.25D ₁	D ₁	0.10-0.20
				60 (50-100)	-0.6D ₁	D ₁	0.10-0.15
	Ductile Cast Iron	Tensile Strength $\leq 800\text{MPa}$	VP15TF WH	80 (60-100)	-0.25D ₁	D ₁	0.10-0.25
				60 (50-100)	-0.5D ₁	D ₁	0.10-0.20
VP15TF JM	80 (60-100)	-0.25D ₁	D ₁	0.10-0.20			
	60 (50-100)	-0.5D ₁	D ₁	0.10-0.15			
S	Ti Alloy	$\leq 350\text{HB}$	VP20RT JM	40 (35-50)	-0.25D ₁	D ₁	0.06-0.10

(Note 1) The above cutting conditions are determined based on high rigidity machine and workpiece, where no vibration occurred.
Please adjust processing conditions if the vibration is generated.

Application Examples

Tool		SPX4R05034WNM	SPX4R05034WNM	SPX4R06324CA058A
Grade / Breaker		VP15TF / WH breaker	VP20RT / WH breaker	VP15TF / WH breaker
Workpiece		JIS FC250 	JIS FCD540 	JIS FC250 
Component		Press moulds (Base)	Press moulds (Trim)	Press moulds
Cutting Conditions	Cutting Speed (m/min)	100	100	125
	Table Feed (mm/min)	509	445	758
	Feed per Tooth (mm/tooth)	0.4	0.35	0.3
	Depth of Cut (mm)	125	50-100	55
	Width of Cut (mm)	8-10	5-8	10-15
Coolant		Dry	Dry	Dry
Results		In comparison with the conventional product overall machining efficiency was doubled. Stable tool life due to effective chip control and low cutting resistance was also achieved.	In comparison with the conventional product overall machining efficiency was increased by 70%.	Low cutting resistance compared to a conventional tool in the 3 times higher cutting condition. It largely enabled shortening in processing time.

Tool		SPX4R06324CA058A	SPX4R06324CA058A	SPX4R06324CA058A
Grade / Breaker		VP15TF / WH breaker	VP20RT / JM breaker	VP20RT / JM breaker
Workpiece		JIS FCD450 	JIS Ti-6Al-4V 	15-5 PH Stainless steel 
Component		Machine parts	Aerospace parts	Machine parts
Cutting Conditions	Cutting Speed (m/min)	120	45	120
	Table Feed (mm/min)	485	91	242
	Feed per Tooth (mm/tooth)	0.2	0.1	0.1
	Depth of Cut (mm)	50	45	40
	Width of Cut (mm)	5-15	10-25	10
Coolant		Dry	Wet	Wet
Results		Low cutting resistance compared to a conventional tool in the 3 times higher cutting condition. It largely enabled shortening in processing time.	1.5 times tool life compared to a conventional tool. It got a serious tool cost reduction.	Low cutting resistance compared to a conventional tool in the 4.8 times higher cutting condition. It largely enabled shortening in processing time.

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 spanner.
- 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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