

Indexable End Mill for Deep Shoulder Milling

# SPX

Shell type  
addition!

## 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  
a smooth surface  
finish.



NEW


# Indexable End Mill for Deep Shoulder Milling

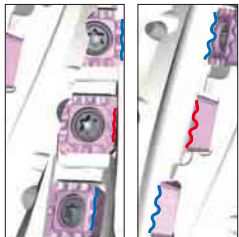
# SPX

## Features

### Insert

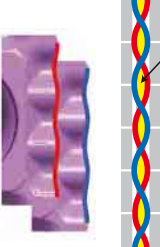
#### ● Wavy cutting edge type

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.

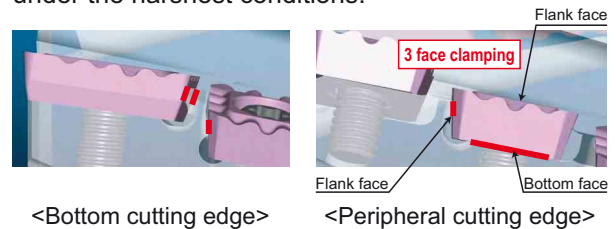
**Lower cutting resistance**

#### ● 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.



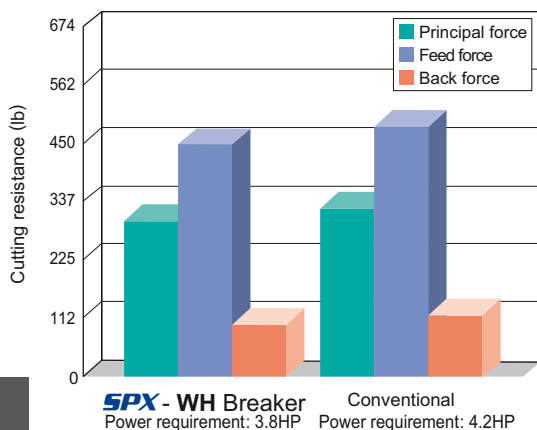
### Spiral relief cut

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

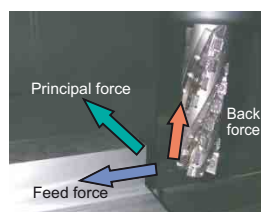


## Cutting performance

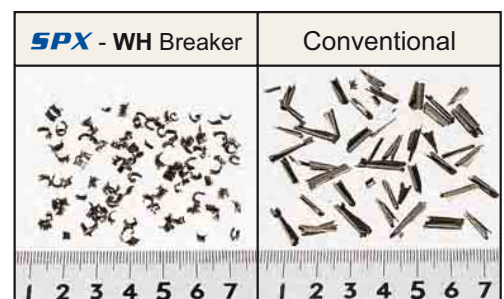
### Low Cutting Resistance



### Chip Breaking



<Cutting conditions>  
 Workpiece : Ductile cast iron  
 Cutting speed : 330 SFM  
 Feed per tooth : .008 IPT  
 Depth of cut : 1.969 inch  
 Width of cut : .197 inch  
 Dry cutting



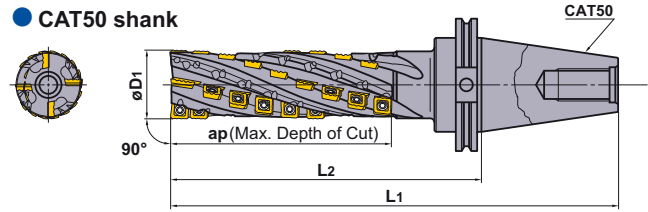
# Indexable End Mill for Deep Shoulder Milling

# SPX

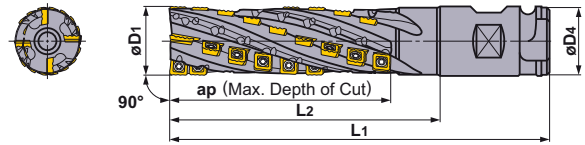
## Shank Type



### CAT50 shank



### Straight shank (Combination type)



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

Right hand tool holder only.

Type	Order Number	Stock	Number of Flute	Number of Teeth		Dimensions (inch)					Number of Insert		
						D1	L1	D4	L2	ap	Number of Insert		
											Bottom Cutting Edge A	Bottom Cutting Edge B	Peripheral Cutting Edge
Total	Bottom					JPMX 190412-○○	MPMX 120412-○○	SPMX 120408-○○					
CAT50 Shank	SPX4R3224CAT50NS	●	2	24	4	2.000	11.000	—	7.000	4.300	2	2	20
	4R3234CAT50NM	●	2	34	4	2.000	13.000	—	9.000	6.200	2	2	30
	4R3244CAT50NL	●	2	44	4	2.000	15.000	—	11.000	8.100	2	2	40
Straight Shank (Combination)	SPX4R05016WNES	●	2	16	4	1.969	7.091	2.000	3.937	2.835	2	2	12
	4R05024WNS	●	2	24	4	1.969	8.661	2.000	5.512	4.331	2	2	20
	4R05034WNM	●	2	34	4	1.969	10.630	2.000	7.480	6.181	2	2	30
	4R05044WNL	●	2	44	4	1.969	12.598	2.000	9.449	8.071	2	2	40

## Spare Parts

Holder						
	SPX	TS55	TKY25D	MK1KS	JPMX190412-WH JPMX190412-JM	MPMX120412-WH MPMX120412-JM

\* Clamp Torque (lbf-in) : TS55=66

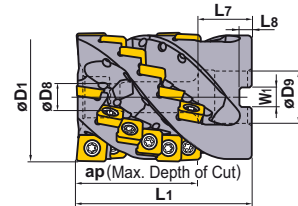
● : Inventory maintained. (10 inserts in one case)

# Indexable End Mill for Deep Shoulder Milling

# SPX

## Shell Type

**NEW**



Right hand tool holder only.

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

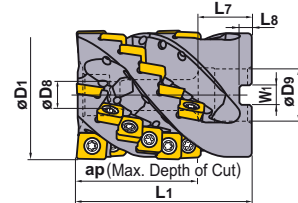
D1	Clamping Bolt Order Number	Geometry
φ2.500"	HSCUF50028	
φ3.000"	62528	

Order Number	Stock	Number of Teeth		Dimensions (inch)									Number of Insert		
													Bottom Cutting Edge A	Bottom Cutting Edge B	Peripheral Cutting Edge
				R	Flutes	Total	Bottom	D1	L1	D9	L7	D8	W1	L8	ap
<b>SPX4UR2524CA22A</b>	●	4	24	4	2.500	3.500	1.000	1.339	.539	.375	.219	2.280	2	2	20
<b>4UR0324DA22A</b>	●	4	24	4	3.000	3.500	1.250	1.654	.669	.500	.281	2.280	2	2	20

(Note) In case of internal coolant supply, please use a face mill arbor with through coolant channels. Regular center-thru or side-thru arbors can't be used.

## Shell Type

**NEW**



Right hand tool holder only.

### METRIC Standard

For inch arbors

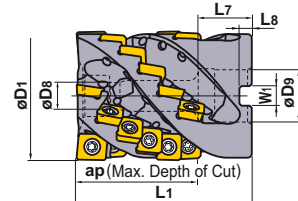
D1	Clamping Bolt Order Number	Geometry
φ63mm	HSC12070	
φ80mm	16065	

Order Number	Stock	Number of Teeth		Dimensions (mm)									Number of Insert		
													Bottom Cutting Edge A	Bottom Cutting Edge B	Peripheral Cutting Edge
				R	Flutes	Total	Bottom	D1	L1	D9	L7	D8	W1	L8	ap
<b>SPX4R06324CA058A</b>	★	4	24	4	63	85	25.4(1.000")	26	13	9.5	6	58	2	2	20
<b>4R08024DA058A</b>	★	4	24	4	80	85	31.75(1.250")	38	17	12.7	8	58	2	2	20

(Note) In case of internal coolant supply, please use a face mill arbor with through coolant channels. Regular center-thru or side-thru arbors can't be used.

## Shell Type

**NEW**



Right hand tool holder only.

### METRIC Standard

For metric arbors

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










D1	Clamping Bolt Order Number	Geometry
φ63mm	HSC12070	
φ80mm	16065	

Order Number	Stock	Number of Teeth		Dimensions (mm)									Number of Insert		
													Bottom Cutting Edge A	Bottom Cutting Edge B	Peripheral Cutting Edge
				R	Flutes	Total	Bottom	D1	L1	D9	L7	D8	W1	L8	ap
<b>SPX4-063A24A058RA</b>	★	4	24	4	63	85	27	28	13	12.4	7	58	2	2	20
<b>-080A24A058RA</b>	★	4	24	4	80	85	32	40	17	14.4	8	58	2	2	20

(Note) In case of internal coolant supply, please use a face mill arbor with through coolant channels. Regular center-thru or side-thru arbors can't be used.


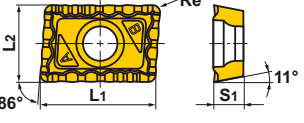

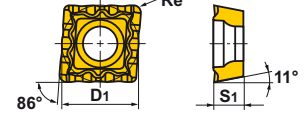

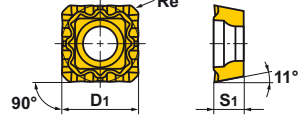

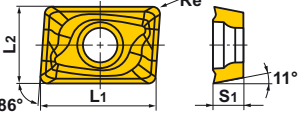

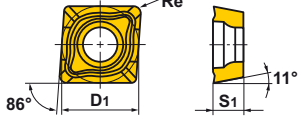

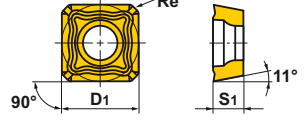


## Spare Parts

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.

## 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	 <b>JPMX190412-WH</b> *	M	●	●		.750	.500	—	.187	.047	
		<b>140412-WH</b>	M	●	●		.563	.500	—	.187	.047	
	Bottom Cutting Edge B	 <b>MPMX120412-WH</b>	M	●	●		—	—	.500	.187	.047	
Peripheral Cutting Edge	 <b>SPMX120408-WH</b>	M	●	●		—	—	.500	.187	.031		
Straight Cutting Edge Type (JM Breaker)	Bottom Cutting Edge A	 <b>JPMX190412-JM</b> *	M	●	●		.750	.500	—	.187	.047	
		<b>140412-JM</b>	M	●	●		.563	.500	—	.187	.047	
	Bottom Cutting Edge B	 <b>MPMX120412-JM</b>	M	●	●		—	—	.500	.187	.047	
Peripheral Cutting Edge	 <b>SPMX120408-JM</b>	M	●	●		—	—	.500	.187	.031		

\* Only for use with a shell type holder.



## Recommended Cutting Conditions ( Shank Type)

### Cutting Conditions for Shoulder Milling (Number of effective flutes is 2.)

Work Material	Hardness	Insert Grade/Breaker	Cutting Speed vc (SFM)	Width of Cut ae (inch)	Depth of Cut ap (inch)	Feed per Tooth fz (IPT)	
<b>P</b> Mild Steel	≤180HB	VP15TF WH	395 (330-460)	<.394	<4D <sub>1</sub>	.006-.010	
		VP15TF JM	395 (330-460)	<.394	<2D <sub>1</sub>	.006-.010	
	Carbon Steel Alloy Steel	180-350HB	VP15TF WH	260 (230-395)	<.394	<4D <sub>1</sub>	.006-.010
			VP15TF JM	260 (230-395)	<.394	<2D <sub>1</sub>	.006-.010
	Alloy Tool Steel	≤300HB	VP15TF WH	260 (200-330)	<.394	<4D <sub>1</sub>	.004-.008
			VP15TF JM	260 (200-330)	<.394	<2D <sub>1</sub>	.004-.008
<b>M</b> Stainless Steel	≤200HB	VP20RT WH	260 (230-395)	<.394	<4D <sub>1</sub>	.004-.008	
		VP20RT JM	260 (230-395)	<.394	<2D <sub>1</sub>	.004-.008	
		VP15TF WH	330 (260-395)	<.394	<4D <sub>1</sub>	.006-.016	
<b>K</b> Cast Iron	Tensile Strength ≤350MPa	VP15TF JM	330 (260-395)	<.394	<4D <sub>1</sub>	.004-.010	
		VP15TF WH	260 (200-330)	<.394	<4D <sub>1</sub>	.006-.014	
Ductile Cast Iron	Tensile Strength ≤800MPa	VP15TF JM	260 (200-330)	<.394	<4D <sub>1</sub>	.004-.008	
		VP20RT WH	130 (115-165)	<.394	<4D <sub>1</sub>	.003-.005	
<b>S</b> Titanium Alloy	≤350HB	VP20RT JM	130 (115-165)	<.394	<2D <sub>1</sub>	.003-.005	

(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 tools with a cutting edge length of 7.87" or more, please reduce the cutting speed and table feed by 10-20% and the width of cut 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 ae 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 vc (SFM)	Width of Cut ae (inch)	Depth of Cut ap (inch)	Feed per Tooth fz (IPT)	
<b>P</b> Mild Steel	≤180HB	VP15TF WH	200 (165-395)	D <sub>1</sub>	<.394	.004-.010	
		VP15TF JM	200 (165-395)	D <sub>1</sub>	<.394	.004-.006	
	Carbon Steel Alloy Steel	180-350HB	VP15TF WH	200 (165-330)	D <sub>1</sub>	<.394	.004-.010
			VP15TF JM	200 (165-330)	D <sub>1</sub>	<.394	.004-.006
	Alloy Tool Steel	≤300HB	VP15TF WH	165 (130-260)	D <sub>1</sub>	<.394	.004-.010
			VP15TF JM	165 (130-260)	D <sub>1</sub>	<.394	.004-.006
<b>M</b> Stainless Steel	≤200HB	VP20RT WH	200 (165-395)	D <sub>1</sub>	<.394	.004-.010	
		VP20RT JM	200 (165-395)	D <sub>1</sub>	<.394	.004-.006	
		VP15TF WH	165 (130-260)	D <sub>1</sub>	<1.969	.006-.010	
<b>K</b> Cast Iron	Tensile Strength ≤350MPa	VP15TF JM	165 (130-260)	D <sub>1</sub>	<1.575	.004-.008	
		VP15TF WH	130 (115-260)	D <sub>1</sub>	<1.575	.006-.010	
Ductile Cast Iron	Tensile Strength ≤800MPa	VP15TF JM	130 (115-260)	D <sub>1</sub>	<1.181	.004-.008	
		VP20RT WH	115 (100-165)	D <sub>1</sub>	<.394	.003-.005	
<b>S</b> Titanium Alloy	≤350HB	VP20RT JM	115 (100-165)	D <sub>1</sub>	<.394	.003-.005	

(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.



## Recommended Cutting Conditions ( Shell Type)

### Cutting Conditions for Shoulder Milling (Number of effective flutes is 4.)

Work Material	Hardness	Insert Grade/Breaker	Cutting Speed $v_c$ (SFM)	Width of Cut $a_e$ (inch)	Depth of Cut $a_p$ (inch)	Feed per Tooth $f_z$ (IPT)
<b>P</b>	Mild Steel	VP15TF JM	395 (330-460)	<.394	<0.5D <sub>1</sub>	.006-.012
			395 (330-460)	<.394	>0.5D <sub>1</sub>	.006-.010
	Carbon Steel Alloy Steel	VP15TF JM	395 (260-425)	<.394	<0.5D <sub>1</sub>	.006-.012
			330 (260-395)	<.394	>0.5D <sub>1</sub>	.006-.010
	Alloy Tool Steel	VP15TF JM	330 (200-360)	<.394	<0.5D <sub>1</sub>	.004-.010
			260 (200-330)	<.394	>0.5D <sub>1</sub>	.004-.006
<b>M</b>	Stainless Steel	VP20RT JM	460 (330-490)	<.394	<0.5D <sub>1</sub>	.004-.010
			395 (330-460)	<.394	>0.5D <sub>1</sub>	.004-.008
<b>K</b>	Cast Iron	VP15TF WH	395 (260-425)	<.394	<0.5D <sub>1</sub>	.010-.016
			330 (260-395)	<.394	>0.5D <sub>1</sub>	.010-.016
		VP15TF JM	395 (260-425)	<.394	<0.5D <sub>1</sub>	.006-.012
			330 (260-395)	<.394	>0.5D <sub>1</sub>	.006-.010
	Ductile Cast Iron	VP15TF WH	330 (200-360)	<.394	<0.5D <sub>1</sub>	.008-.014
			260 (200-360)	<.394	>0.5D <sub>1</sub>	.008-.014
VP15TF JM	330 (200-395)	<.394	<0.5D <sub>1</sub>	.006-.012		
	260 (200-395)	<.394	>0.5D <sub>1</sub>	.006-.012		
<b>S</b>	Titanium Alloy	VP20RT JM	150 (115-165)	<.394	<0.5D <sub>1</sub>	.003-.004
			150 (115-165)	<.394	>0.5D <sub>1</sub>	.003-.004

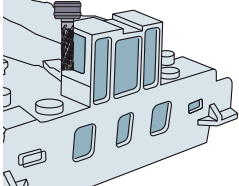
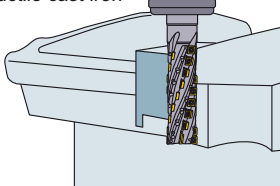
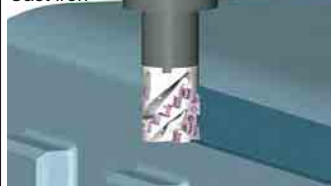
(Note 1) The above cutting conditons are determined based on high rigidity machine and workpiece, where no vibration occurred.  
Please adjust processing conditions if the vibration is generated.

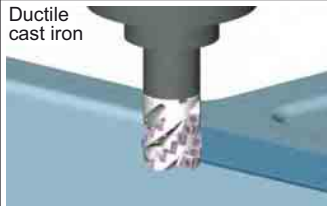
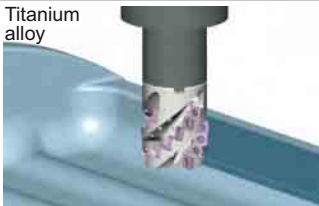
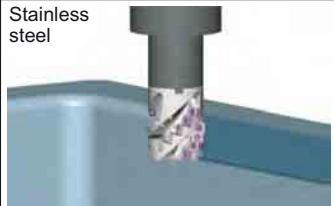
### Cutting Conditions for Slot Milling

Work Material	Hardness	Insert Grade/Breaker	Cutting Speed $v_c$ (SFM)	Width of Cut $a_e$ (inch)	Depth of Cut $a_p$ (inch)	Feed per Tooth $f_z$ (IPT)
<b>P</b>	Mild Steel	VP15TF JM	395 (330-460)	D <sub>1</sub>	<0.25D <sub>1</sub>	.006-.010
	Carbon Steel Alloy Steel	VP15TF JM	330 (260-395)	D <sub>1</sub>	<0.25D <sub>1</sub>	.006-.010
	Alloy Tool Steel	VP15TF JM	260 (200-330)	D <sub>1</sub>	<.394	.004-.008
<b>M</b>	Stainless Steel	VP20RT JM	330 (260-460)	D <sub>1</sub>	<.394	.004-.006
<b>K</b>	Cast Iron	VP15TF WH	260 (200-330)	D <sub>1</sub>	<0.25D <sub>1</sub>	.004-.010
			200 (165-330)	D <sub>1</sub>	<0.6D <sub>1</sub>	.004-.008
		VP15TF JM	260 (200-330)	D <sub>1</sub>	<0.25D <sub>1</sub>	.004-.008
			200 (165-330)	D <sub>1</sub>	<0.6D <sub>1</sub>	.004-.006
	Ductile Cast Iron	VP15TF WH	260 (200-330)	D <sub>1</sub>	<0.25D <sub>1</sub>	.004-.010
			200 (165-330)	D <sub>1</sub>	<0.5D <sub>1</sub>	.004-.008
VP15TF JM	260 (200-330)	D <sub>1</sub>	<0.25D <sub>1</sub>	.004-.008		
	200 (165-330)	D <sub>1</sub>	<0.5D <sub>1</sub>	.004-.006		
<b>S</b>	Titanium Alloy	VP20RT JM	130 (115-165)	D <sub>1</sub>	<0.25D <sub>1</sub>	.002-.004

(Note 1) The above cutting conditons 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	SPX4UR2524CA22A
Grade / Breaker		VP15TF / WH breaker	VP20RT / WH breaker	VP15TF / WH breaker
Workpiece		Cast iron 	Ductile cast iron 	Cast iron 
Component		Press molds (Base)	Press molds (Trim)	Press molds
Cutting Conditions	Cutting Speed (SFM)	330	330	410
	Table Feed (IPM)	20.04	17.52	29.84
	Feed per Tooth (IPT)	.016	.014	.012
	Depth of Cut (inch)	4.921	1.969–3.937	2.165
	Width of Cut (inch)	.315–.394	.197–.315	.394–.591
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%.	In comparison to conventional product, SPX provided low cutting resistance and 3x higher productivity. This allowed for a reduction in processing time.

Tool		SPX4UR2524CA22A	SPX4UR2524CA22A	SPX4UR2524CA22A
Grade / Breaker		VP15TF / WH breaker	VP20RT / JM breaker	VP20RT / JM breaker
Workpiece		Ductile cast iron 	Titanium alloy 	Stainless steel 
Component		Machine parts	Aerospace parts	Machine parts
Cutting Conditions	Cutting Speed (SFM)	395	150	395
	Table Feed (IPM)	19.09	3.58	9.52
	Feed per Tooth (IPT)	.008	.004	.004
	Depth of Cut (inch)	1.969	1.772	1.772
	Width of Cut (inch)	.197–.591	.394–.984	.394
Coolant		Dry	Wet	Wet
Results		In comparison to conventional product, SPX provided low cutting resistance and 3x higher productivity. This allowed for a reduction in processing time.	In comparison to a conventional product, SPX provided 1.5x better tool life. This allowed for a reduction in tool cost.	In comparison to conventional product, SPX provided low cutting resistance and 4.8x higher productivity. This allowed for a reduction 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 U.S.A. CORPORATION

11250 Slater Avenue, Fountain Valley, CA 92708, U.S.A  
TEL. 714-352-6100 FAX. 714-668-1320

Customer Service: (800)523-0800 Technical Support: (800)486-2341

Chicago Branch Office: 1314B N.Plum Grove Rd., Schaumburg, Illinois 60173, U.S.A  
TEL. 847-252-6300 FAX. 847-519-1732

Toronto Branch Office: 6535 Millcreek Drive, Unit 63 & 64, Mississauga, Ontario, Canada L5N 2M2  
TEL. 905-814-0240 FAX. 905-814-0245

### MMC METAL DE MEXICO S.A. DE C.V.

Av. La Cañada No.16, Parque Industrial Bernardo Quintana, El Marques, Queretaro, CP 76246 Mexico  
TEL. +52-442-221-6136/+52-442-221-6137/+52-442-221-6150 FAX. +52-442-221-6134