MITSUBISHI MATERIALS

SPX

INDEXABLE END MILL FOR DEEP SHOULDER MILLING





TOOL NEWS **B111A**

Indexable End Mill for Deep Shoulder Milling

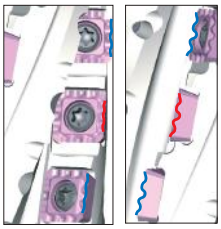
SPX

Features

Insert

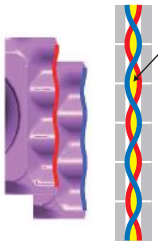
● **Wavy cutting edge type**

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.

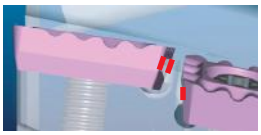
Lower cutting resistance

● **Straight cutting edge type**

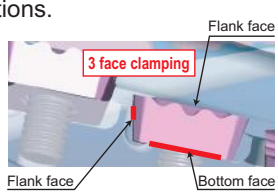
JM Breaker		
Bottom Cutting Edge A	Bottom Cutting Edge B	Peripheral Cutting Edge
		

High clamping rigidity

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



<Bottom cutting edge>



<Peripheral cutting edge>

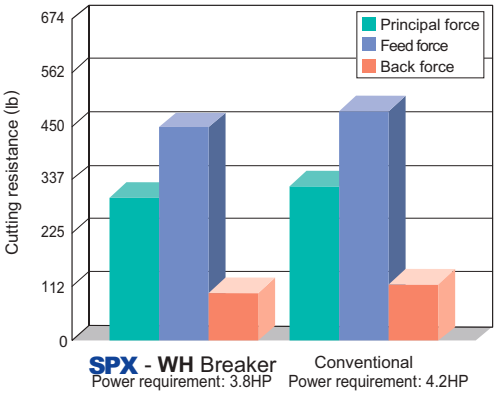
Spiral relief cut

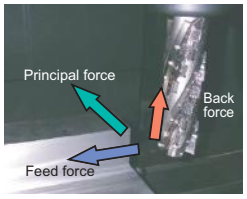
Prevents chip packing and damage to the tool body without hindering the overall tool rigidity.



Cutting performance

Low Cutting Resistance





<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	

Chip Breaking

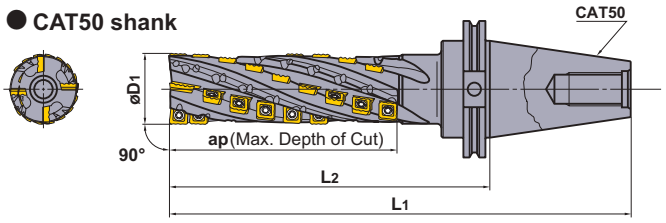
SPX - WH Breaker	Conventional
	

SPX

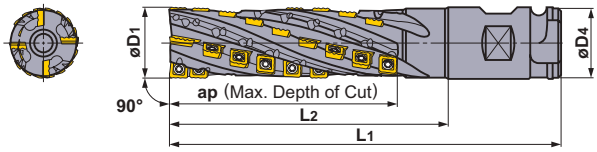
■ Shank Type



● CAT50 shank



● Straight shank (Combination type)

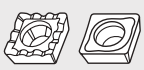


Light Alloy	Cast Iron	Carbon Steel Alloy Steel	Stainless Steel	Hardened Steel
	▬▬			

Right hand tool holder only.

Type	Order Number	Stock	Number of Flute	Number of Teeth		Dimensions (inch)					Number of Insert		
											Bottom Cutting Edge A	Bottom Cutting Edge B	Peripheral Cutting Edge
				Total	Bottom	D_1	L_1	D_4	L_2	ap	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	 *					
	Clamp Screw	Wrench	Anti-seizure Lubricant	Insert		
				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 (lbf-in) : TS55=66

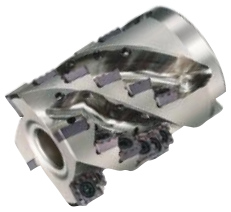
● : **USA Stock (10 inserts in one case)**

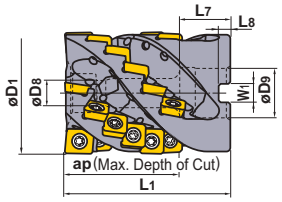
Indexable End Mill for Deep Shoulder Milling

SPX

■Shell Type

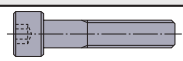
NEW





Right hand tool holder only.

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

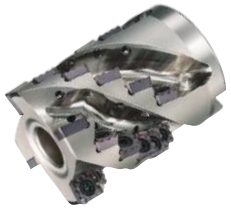
D1	Clamping Bolt Order Number	Geometry
ϕ2.500"	HSCUF50028	
ϕ3.000"	62528	

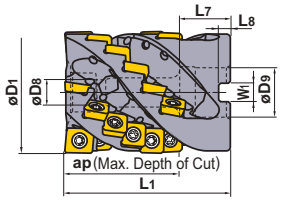
Order Number	Stock	Number of Teeth			Dimensions (inch)								Number of Insert		
													Bottom Cutting Edge A	Bottom Cutting Edge B	Peripheral Cutting Edge
	R	Flutes	Total	Bottom	D1	L1	D9	L7	D8	W1	L8	ap	JPMX 140412-○○	MPMX 120412-○○	SPMX 120408-○○
SPX4UR2524CA22A	●	4	24	4	2.500	3.500	1.000	1.339	.539	.375	.219	2.280	2	2	20
4UR0324DA22A	●	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.

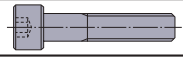
■Shell Type

NEW





Right hand tool holder only.

D1	Clamping Bolt Order Number	Geometry
ϕ63mm	HSC12070	
ϕ80mm	16065	

METRIC Standard

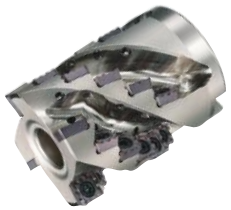
For inch arbors

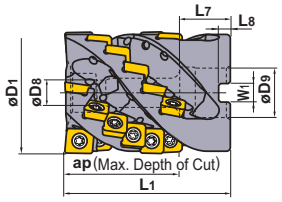
Order Number	Stock	Number of Teeth			Dimensions (mm)								Number of Insert		
													Bottom Cutting Edge A	Bottom Cutting Edge B	Peripheral Cutting Edge
	R	Flutes	Total	Bottom	D1	L1	D9	L7	D8	W1	L8	ap	JPMX 140412-○○	MPMX 120412-○○	SPMX 120408-○○
SPX4R06324CA058A	★	4	24	4	63	85	25.4(1.000″)	26	13	9.5	6	58	2	2	20
4R08024DA058A	★	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.

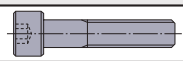
■Shell Type

NEW





Right hand tool holder only.

D1	Clamping Bolt Order Number	Geometry
ϕ63mm	HSC12070	
ϕ80mm	16065	

METRIC Standard

For metric arbors

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

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	JPMX 140412-○○	MPMX 120412-○○	SPMX 120408-○○
SPX4-063A24A058RA	★	4	24	4	63	85	27	28	13	12.4	7	58	2	2	20
-080A24A058RA	★	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.

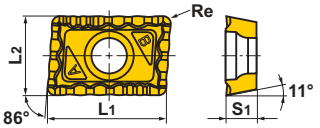
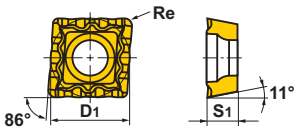
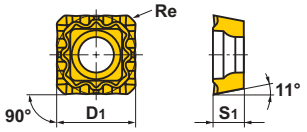
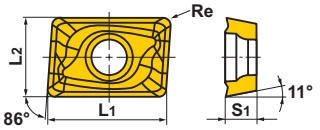
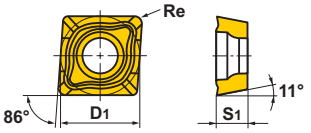
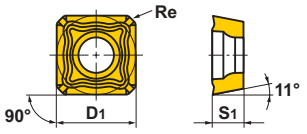
● : USA Stock ★ : Inventory maintained in Japan.

Spare Parts

Holder	 *					
	Clamp Screw	Wrench	Anti-seizure Lubricant	Insert		
				Bottom Cutting Edge A	Bottom Cutting Edge B	Peripheral Cutting Edge
SPX	TS55	TKY25D	MK1KS	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			L_1	L_2	D_1	S_1	Re	
Wavy Cutting Edge Type (WH Breaker)	Bottom Cutting Edge A		**JPMX190412-WH**	M	●	●			.750	.500	–	.187	.047	
			* **140412-WH**	M	●	●			.563	.500	–	.187	.047	
	Bottom Cutting Edge B		**MPMX120412-WH**	M	●	●			–	–	.500	.187	.047	
	Peripheral Cutting Edge		**SPMX120408-WH**	M	●	●			–	–	.500	.187	.031	
Straight Cutting Edge Type(JM Breaker)	Bottom Cutting Edge A		**JPMX190412-JM**	M	●	●			.750	.500	–	.187	.047	
			* **140412-JM**	M	●	●			.563	.500	–	.187	.047	
	Bottom Cutting Edge B		**MPMX120412-JM**	M	●	●			–	–	.500	.187	.047	
	Peripheral Cutting Edge		**SPMX120408-JM**	M	●	●			–	–	.500	.187	.031	

* Only for use with a shell type holder.

Indexable End Mill for Deep Shoulder Milling



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)
P	Mild Steel	≤180HB	**VP15TF WH**	395 (330—460)	<.394	<4D1	.006—.010
			VP15TF JM	395 (330—460)	<.394	<2D1	.006—.010
	Carbon Steel Alloy Steel	180—350HB	**VP15TF WH**	260 (230—395)	<.394	<4D1	.006—.010
			VP15TF JM	260 (230—395)	<.394	<2D1	.006—.010
	Alloy Tool Steel	≤300HB	**VP15TF WH**	260 (200—330)	<.394	<4D1	.004—.008
			VP15TF JM	260 (200—330)	<.394	<2D1	.004—.008
M	Stainless Steel	≤200HB	**VP20RT WH**	260 (230—395)	<.394	<4D1	.004—.008
			VP20RT JM	260 (230—395)	<.394	<2D1	.004—.008
K	Cast Iron	Tensile Strength ≤350MPa	**VP15TF WH**	330 (260—395)	<.394	<4D1	.006—.016
			VP15TF JM	330 (260—395)	<.394	<4D1	.004—.010
	Ductile Cast Iron	Tensile Strength ≤800MPa	**VP15TF WH**	260 (200—330)	<.394	<4D1	.006—.014
			VP15TF JM	260 (200—330)	<.394	<4D1	.004—.008
S	Titanium Alloy	≤350HB	**VP20RT WH**	130 (115—165)	<.394	<4D1	.003—.005
			VP20RT JM	130 (115—165)	<.394	<2D1	.003—.005

(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.

(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)
P	Mild Steel	≤180HB	**VP15TF WH**	200 (165—395)	D1	<.394	.004—.010
			VP15TF JM	200 (165—395)	D1	<.394	.004—.006
	Carbon Steel Alloy Steel	180—350HB	**VP15TF WH**	200 (165—330)	D1	<.394	.004—.010
			VP15TF JM	200 (165—330)	D1	<.394	.004—.006
	Alloy Tool Steel	≤300HB	**VP15TF WH**	165 (130—260)	D1	<.394	.004—.010
			VP15TF JM	165 (130—260)	D1	<.394	.004—.006
M	Stainless Steel	≤200HB	**VP20RT WH**	200 (165—395)	D1	<.394	.004—.010
			VP20RT JM	200 (165—395)	D1	<.394	.004—.006
K	Cast Iron	Tensile Strength ≤350MPa	**VP15TF WH**	165 (130—260)	D1	<1.969	.006—.010
			VP15TF JM	165 (130—260)	D1	<1.575	.004—.008
	Ductile Cast Iron	Tensile Strength ≤800MPa	**VP15TF WH**	130 (115—260)	D1	<1.575	.006—.010
			VP15TF JM	130 (115—260)	D1	<1.181	.004—.008
S	Titanium Alloy	≤350HB	**VP20RT WH**	115 (100—165)	D1	<.394	.003—.005
			VP20RT JM	115 (100—165)	D1	<.394	.003—.005

(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.



Recommended Cutting Conditions (Shell Type)

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

	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)
P	Mild Steel	≤180HB	**VP15TF JM**	395 (330—460)	<.394	<0.5D1	.006—.012
				395 (330—460)	<.394	>0.5D1	.006—.010
	Carbon Steel Alloy Steel	180—350HB	**VP15TF JM**	395 (260—425)	<.394	<0.5D1	.006—.012
				330 (260—395)	<.394	>0.5D1	.006—.010
	Alloy Tool Steel	≤300HB	**VP15TF JM**	330 (200—360)	<.394	<0.5D1	.004—.010
				260 (200—330)	<.394	>0.5D1	.004—.006
M	Stainless Steel	≤200HB	**VP20RT JM**	460 (330—490)	<.394	<0.5D1	.004—.010
				395 (330—460)	<.394	>0.5D1	.004—.008
K	Cast Iron	Tensile Strength ≤350MPa	**VP15TF WH**	395 (260—425)	<.394	<0.5D1	.010—.016
				330 (260—395)	<.394	>0.5D1	.010—.016
			VP15TF JM	395 (260—425)	<.394	<0.5D1	.006—.012
				330 (260—395)	<.394	>0.5D1	.006—.010
	Ductile Cast Iron	Tensile Strength ≤800MPa	**VP15TF WH**	330 (200—360)	<.394	<0.5D1	.008—.014
				260 (200—360)	<.394	>0.5D1	.008—.014
			VP15TF JM	330 (200—395)	<.394	<0.5D1	.006—.012
				260 (200—395)	<.394	>0.5D1	.006—.012
S	Titanium Alloy	≤350HB	**VP20RT JM**	150 (115—165)	<.394	<0.5D1	.003—.004
				150 (115—165)	<.394	>0.5D1	.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

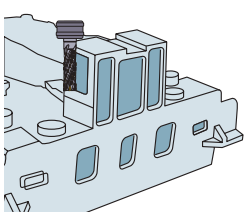
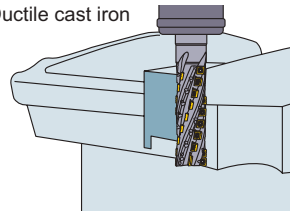
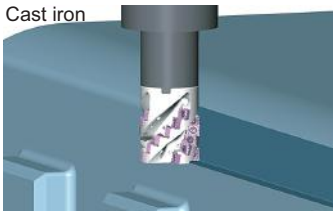
	Work Material	Hardness	Insert Grade/Breaker	Cutting Speed **vc** (SFM)	Width of Cut **ae** (inch)	Depth of Cut **ap** (inch)	Feed per Tooth **fz** (IPT)
P	Mild Steel	≤180HB	**VP15TF JM**	395 (330—460)	D1	<0.25D1	.006—.010
	Carbon Steel Alloy Steel	180—350HB	**VP15TF JM**	330 (260—395)	D1	<0.25D1	.006—.010
	Alloy Tool Steel	≤300HB	**VP15TF JM**	260 (200—330)	D1	<.394	.004—.008
M	Stainless Steel	≤200HB	**VP20RT JM**	330 (260—460)	D1	<.394	.004—.006
K	Cast Iron	Tensile Strength ≤350MPa	**VP15TF WH**	260 (200—330)	D1	<0.25D1	.004—.010
				200 (165—330)	D1	<0.6D1	.004—.008
			VP15TF JM	260 (200—330)	D1	<0.25D1	.004—.008
				200 (165—330)	D1	<0.6D1	.004—.006
	Ductile Cast Iron	Tensile Strength ≤800MPa	**VP15TF WH**	260 (200—330)	D1	<0.25D1	.004—.010
				200 (165—330)	D1	<0.5D1	.004—.008
			VP15TF JM	260 (200—330)	D1	<0.25D1	.004—.008
				200 (165—330)	D1	<0.5D1	.004—.006
S	Titanium Alloy	≤350HB	**VP20RT JM**	130 (115—165)	D1	<0.25D1	.002—.004

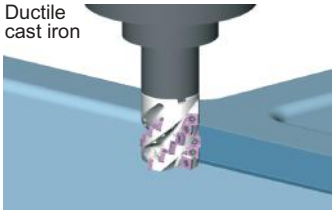
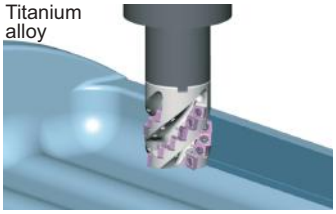
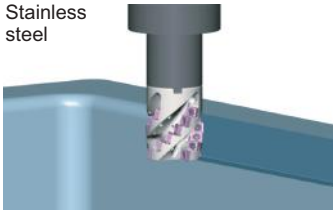
(Note 1) The above cutting conditons are determined based on high rigidity machine and workpiece, where no vibration occurred.
Please adjust processing conditions if the vibration is generated.

Indexable End Mill for Deep Shoulder Milling

SPX

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.

Memo

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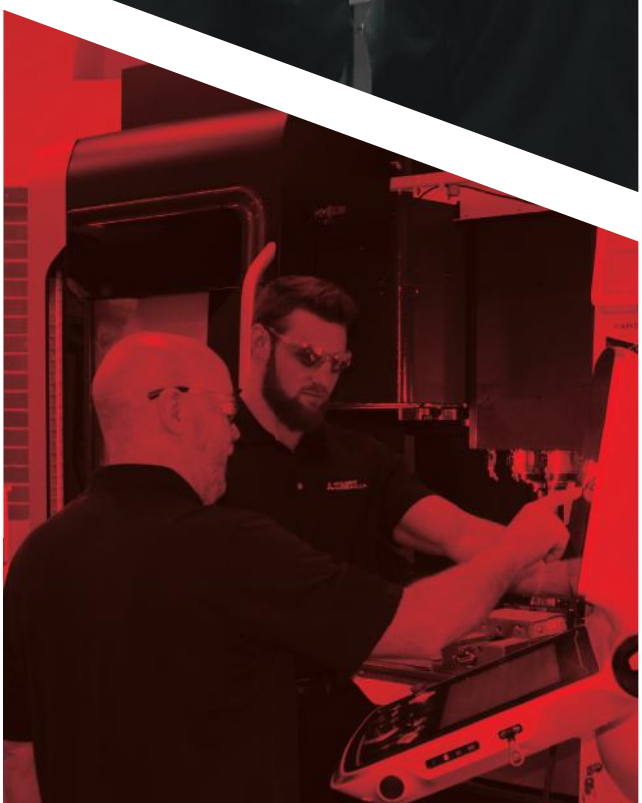
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FOR YOUR SAFETY

- 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.

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Tools specifications subject to change without notice.

B111A-US-2010.7