MITSUBISHI MITSUBISHI MATERIALS TOOLS NEWS
2016.1 Update
B020G YOUR GLOBAL CRAFTSMAN STUDIO

Indexable Insert Ball Nose End Mill

SRM2

Series Expansion

For rough and semi-finish milling of molds.

MIRACLE SIGMA

Ball-nose End Mill for Rough to Medium Cutting

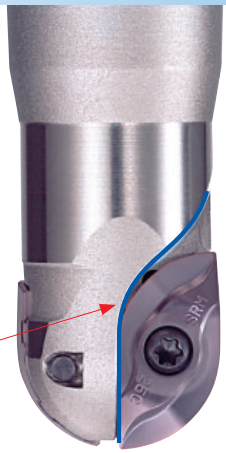
SRM2

Features

Cutting Edge Diameter	**Ø16, Ø20, Ø25, Ø30**
Application	**For roughing and semi-finishing of medium and large molds**

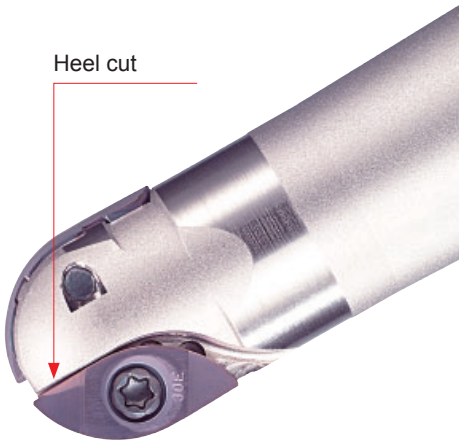
High Rigidity

Large insert thickness guards against fracture.
Thick body core resists body web fracture.



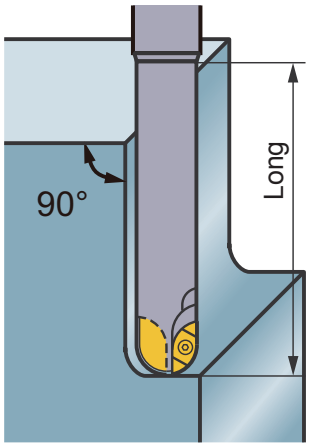
- "Streamlined pocket" optimizes a balance of chips flow and body rigidity.

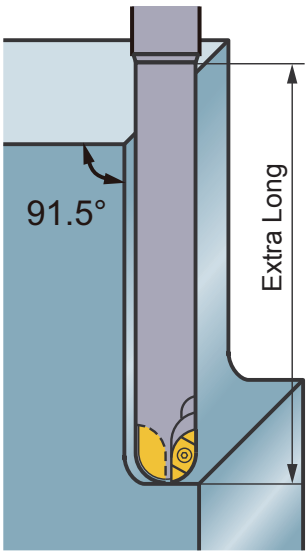
- "Heel cut" achieves high body rigidity and good chips control, avoiding damage and welding by chips to the body.

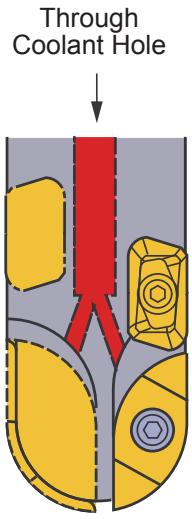


Long and Extra Long Series

- In addition to the standard lengths, the SRM series contains long neck and extra long neck types for long reach applications. Through coolant hole types are available with Ø16–Ø32 as standard.







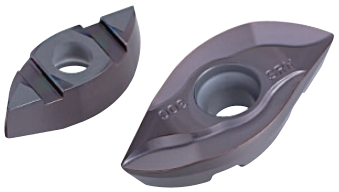
High Precision, Low Resistance Inserts

Strong Cutting Edge Type Inserts

With strong geometry and tough edge condition for reliable rough machining. Peripheral grinding improves the precision of the insert for longer tool life.

Sharp, Low-resistance Type Inserts

Top rake chip breaker type inserts for reduced cutting forces. Lower resistance results in higher quality surface finishes. Insert tolerance similar to G-class type at economical M-class prices.



Low Resistance Type Inserts for Ø40 and Ø50

Unique design, 3-dimensional cutting edge:- Variable Radial Undulation (V.R.U. Pat. pending) for efficient chip breaking to significantly lower cutting resistance and vibration.
Screw, slot and key type insert location and clamping for extra security.

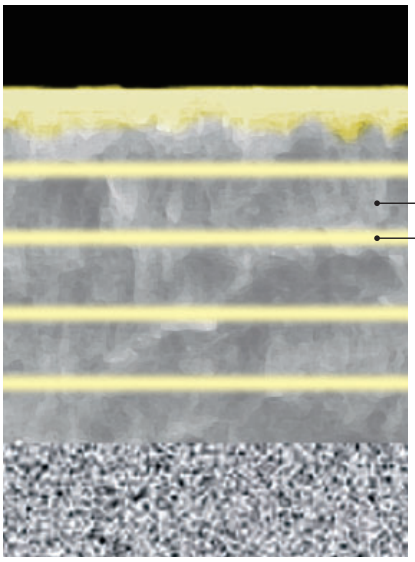
NEW

NEW INSERT GRADES -MP6100, MP9100

With accumulated Al-Ti-Cr-N based PVD coating

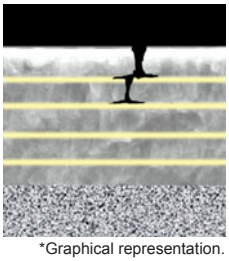
TOUGH—Σ Technology

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



*Graphical representation.

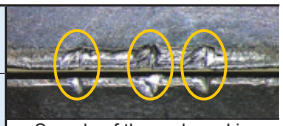
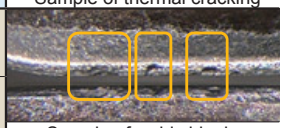
Base layer
High Al-(Al, Ti)N
The new technology Al-(Al, Ti)N coating provides stabilisation of the high hardness phase and succeeds in dramatically improving wear, crater and welding resistance.



*Graphical representation.

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

Each grade has a layer suitable for each application area

P	(Al,Cr)N	 Sample of thermal cracking
	Tough against thermal craking	
S	CrN	 Sample of weld chipping
	Tough against Chipping	

BALL NOSE END MILL

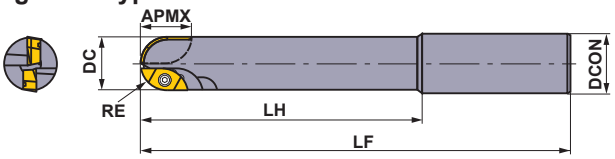
Roughing

- Suitable for roughing to semi-finishing of small and medium molds.
- High rigidity body design.
- Low resistance chipbreaker.
- Through coolant hole type.

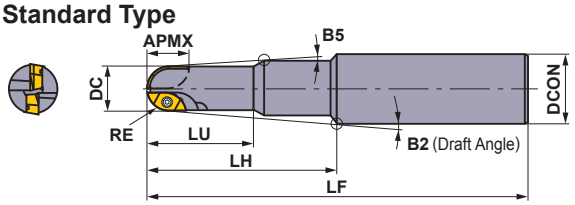
SRM2

P	M	K	N	S	H
Steel	Stainless Steel	Cast Iron			Hardened Steel

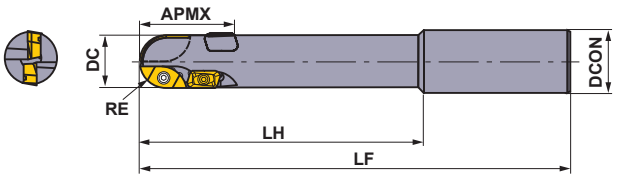
Long Neck Type



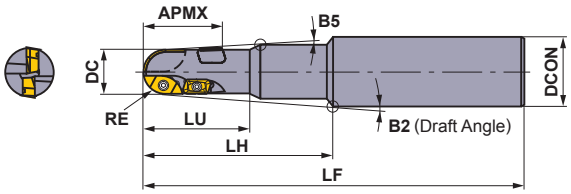
Standard Type



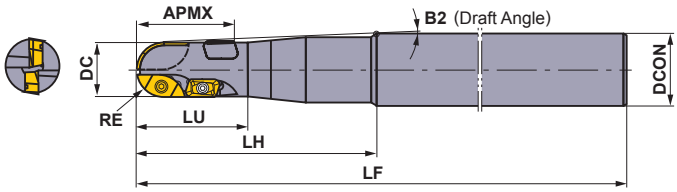
Long Neck Cutting Edge Type



Long Cutting Edge Type



Extra Long Cutting Edge Type



Right hand tool holder only.

Type	Order Number	Stock R	Coolant Hole	Number of Teeth	Dimensions (mm) RE	DC	DCON	LF	LH	LU	APMX	B2	B5	Clamp Screw Inner, Outer	Clamp Screw Peripheral	Wrench Inner, Outer	Wrench Peripheral	Insert Inner	Insert Outer	Insert Peripheral
Standard	SRM2160SNM	●	–	2	8	16	20	130	50	25	12	2°48′	1°30′	TS25H	–	①TKY08D	–	SRG16C SRM16C-M	SRG16E SRM16E-M	–
	SRM2160SAM	●	○	2	8	16	20	130	50	25	12	2°48′	1°30′	TS25H	–	①TKY08D	–	SRG16C SRM16C-M	SRG16E SRM16E-M	–
	SRM2200SNM	●	–	2	10	20	25	150	70	35	14	2°27′	1°30′	TS32	–	①TKY08D	–	SRG20C SRM20C-M	SRG20E SRM20E-M	–
	SRM2200SAM	●	○	2	10	20	25	150	70	35	14	2°27′	1°30′	TS32	–	①TKY08D	–	SRG20C SRM20C-M	SRG20E SRM20E-M	–
	SRM2250SNM	●	–	2	12.5	25	32	180	80	40	19	3°13′	1°30′	TS43	–	②TKY15T	–	SRG25C SRM25C-M	SRG25E SRM25E-M	–
	SRM2250SAM	●	○	2	12.5	25	32	180	80	40	19	3°13′	1°30′	TS43	–	②TKY15T	–	SRG25C SRM25C-M	SRG25E SRM25E-M	–
	SRM2300SNM	●	–	2	15	30	32	200	100	50	24	0°44′	0°30′	TS55	–	②TKY25T	–	SRG30C SRM30C-M	SRG30E SRM30E-M	–
	SRM2300SAM	●	○	2	15	30	32	200	100	50	24	0°44′	0°30′	TS55	–	②TKY25T	–	SRG30C SRM30C-M	SRG30E SRM30E-M	–
Long Cutting Edge	SRM2200SNL	●	–	4	10	20	25	150	70	35	30	2°27′	1°30′	TS32	TS25	①TKY08D	①TKY08D	SRG20C SRM20C-M	SRG20E SRM20E-M	APMT1135 PDER-○2
	SRM2200SAL	●	○	4	10	20	25	150	70	35	30	2°27′	1°30′	TS32	TS25	①TKY08D	①TKY08D	SRG20C SRM20C-M	SRG20E SRM20E-M	APMT1135 PDER-○2
	SRM2250SNL	●	–	4	12.5	25	32	180	80	40	37	3°13′	1°30′	TS43	TS25	②TKY15T	③TKY08F	SRG25C SRM25C-M	SRG25E SRM25E-M	APMT1135 PDER-○2
	SRM2250SAL	●	○	4	12.5	25	32	180	80	40	37	3°13′	1°30′	TS43	TS25	②TKY15T	③TKY08F	SRG25C SRM25C-M	SRG25E SRM25E-M	APMT1135 PDER-○2
	SRM2300SNL	●	–	4	15	30	32	200	100	50	44	0°44′	0°30′	TS55	TS43	②TKY25T	③TKY15F	SRG30C SRM30C-M	SRG30E SRM30E-M	APMT1604 PDER-○2
	SRM2300SAL	●	○	4	15	30	32	200	100	50	44	0°44′	0°30′	TS55	TS43	②TKY25T	③TKY15F	SRG30C SRM30C-M	SRG30E SRM30E-M	APMT1604 PDER-○2
Long Neck	SRM2160SNF	●	–	2	8	16	16	150	70	–	12	–	–	TS25H	–	①TKY08D	–	SRG16C SRM16C-M	SRG16E SRM16E-M	–
	SRM2160SAF	●	○	2	8	16	16	150	70	–	12	–	–	TS25H	–	①TKY08D	–	SRG16C SRM16C-M	SRG16E SRM16E-M	–
	SRM2200SNF	●	–	2	10	20	20	180	100	–	14	–	–	TS32	–	①TKY08D	–	SRG20C SRM20C-M	SRG20E SRM20E-M	–
	SRM2200SAF	●	○	2	10	20	20	180	100	–	14	–	–	TS32	–	①TKY08D	–	SRG20C SRM20C-M	SRG20E SRM20E-M	–
	SRM2250SNF	●	–	2	12.5	25	25	200	120	–	19	–	–	TS43	–	②TKY15T	–	SRG25C SRM25C-M	SRG25E SRM25E-M	–
	SRM2250SAF	●	○	2	12.5	25	25	200	120	–	19	–	–	TS43	–	②TKY15T	–	SRG25C SRM25C-M	SRG25E SRM25E-M	–
	SRM2300SNF	●	–	2	15	30	32	230	150	–	24	–	–	TS55	–	②TKY25T	–	SRG30C SRM30C-M	SRG30E SRM30E-M	–
	SRM2300SAF	●	○	2	15	30	32	230	150	–	24	–	–	TS55	–	②TKY25T	–	SRG30C SRM30C-M	SRG30E SRM30E-M	–

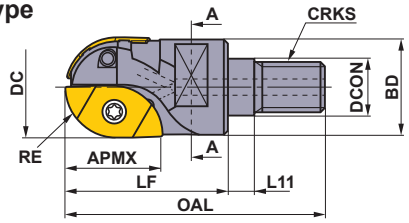
∗ Clamp Torque (N • m) : TS25H=1.0, TS25=1.0, TS32=1.0, TS43=3.5, TS55=7.5

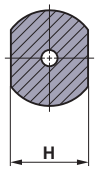
● : Inventory maintained in Japan. (10 inserts in one case)

Type	Order Number	Stock R	Coolant Hole	Number of Teeth	Dimensions (mm) RE	DC	DCON	LF	LH	LU	APMX	B2	B5	Inner, Outer Clamp Screw	Peripheral Clamp Screw	Inner, Outer Wrench	Peripheral Wrench	Inner Insert	Outer Insert	Peripheral Insert
Long Neck Cutting Edge	**SRM2200SNLF**	●	–	4	10	20	20	180	100	–	30	–	–	TS32	TS25	①TKY08D	①TKY08D	SRG20C SRM20C-M	SRG20E SRM20E-M	APMT1135 PDER-□2
	SRM**2200SALF**	●	○	4	10	20	20	180	100	–	30	–	–	TS32	TS25	①TKY08D	①TKY08D	SRG20C SRM20C-M	SRG20E SRM20E-M	APMT1135 PDER-□2
	SRM**2250SNLF**	●	–	4	12.5	25	25	200	120	–	37	–	–	TS43	TS25	②TKY15T	③TKY08F	SRG25C SRM25C-M	SRG25E SRM25E-M	APMT1135 PDER-□2
	SRM**2250SALF**	●	○	4	12.5	25	25	200	120	–	37	–	–	TS43	TS25	②TKY15T	③TKY08F	SRG25C SRM25C-M	SRG25E SRM25E-M	APMT1135 PDER-□2
	SRM**2300SNLF**	●	–	4	15	30	32	230	150	–	44	–	–	TS55	TS43	②TKY25T	③TKY15F	SRG30C SRM30C-M	SRG30E SRM30E-M	APMT1604 PDER-□2
	SRM**2300SALF**	●	○	4	15	30	32	230	150	–	44	–	–	TS55	TS43	②TKY25T	③TKY15F	SRG30C SRM30C-M	SRG30E SRM30E-M	APMT1604 PDER-□2
Extra Long Cutting Edge	**SRM2200SNLL**	●	–	4	10	20	25	250	120	35	30	1°30′	–	TS32	TS25	①TKY08D	①TKY08D	SRG20C SRM20C-M	SRG20E SRM20E-M	APMT1135 PDER-□2
	SRM**2200SALL**	●	○	4	10	20	25	250	120	35	30	1°30′	–	TS32	TS25	①TKY08D	①TKY08D	SRG20C SRM20C-M	SRG20E SRM20E-M	APMT1135 PDER-□2
	SRM**2250SNLL**	●	–	4	12.5	25	32	300	170	37	37	1°30′	–	TS43	TS25	②TKY15T	③TKY08F	SRG25C SRM25C-M	SRG25E SRM25E-M	APMT1135 PDER-□2
	SRM**2250SALL**	●	○	4	12.5	25	32	300	170	37	37	1°30′	–	TS43	TS25	②TKY15T	③TKY08F	SRG25C SRM25C-M	SRG25E SRM25E-M	APMT1135 PDER-□2
	SRM**2300SNLL**	●	–	4	15	30	32	350	100	50	44	1°30′	–	TS55	TS43	③TKY25T	③TKY15F	SRG30C SRM30C-M	SRG30E SRM30E-M	APMT1604 PDER-□2
	SRM**2300SALL**	●	○	4	15	30	32	350	100	50	44	1°30′	–	TS55	TS43	③TKY25T	③TKY15F	SRG30C SRM30C-M	SRG30E SRM30E-M	APMT1604 PDER-□2

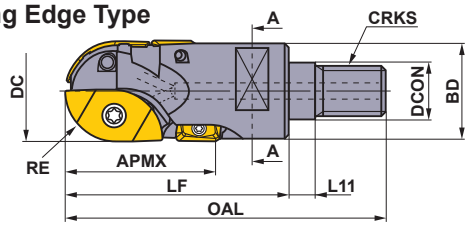
∗ Clamp Torque (N • m) : TS25H=1.0, TS25=1.0, TS32=1.0, TS43=3.5, TS55=7.5

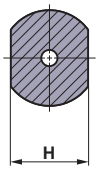
Standard Type





Long Cutting Edge Type





SCREW-IN TYPE

Right hand tool holder only.

Type	Order Number	Stock R	Coolant Hole	Dimensions (mm) RE	DC	DCON	BD	OAL	LF	L11	H	CRKS	APMX	∗2 WT (kg)	∗1 Inner, Outer Clamp Screw	∗1 Peripheral Clamp Screw	Wrench	Inner Insert	Outer Insert	Peripheral Insert
Standard	**SRM2160AM08S30**	●	○	8	16	8.5	14.6	48	30	6	10	M8	12	0.1	TS25H	–	①TKY08D	SRG16C SRM16C-M	SRG16E SRM16E-M	–
	SRM**2200AM10S35**	●	○	10	20	10.5	18.6	54	35	6	14	M10	14	0.1	TS32	–	①TKY08D	SRG20C SRM20C-M	SRG20E SRM20E-M	–
	SRM**2250AM12S40**	●	○	12.5	25	12.5	23.5	62	40	6	19	M12	19	0.2	TS43	–	②TKY15T	SRG25C SRM25C-M	SRG25E SRM25E-M	–
	SRM**2300AM16S45**	●	○	15	30	17	28.3	68	45	6	24	M16	24	0.2	TS55	–	②TKY25T	SRG30C SRM30C-M	SRG30E SRM30E-M	–
	SRM**2320AM16S45**	●	○	16	32	17	30.0	68	45	6	24	M16	28	0.2	TS55	–	②TKY25T	SRG32C SRM32C-M	SRG32E SRM32E-M	–
Long Cutting Edge	**SRM2200AM10L45**	●	○	10	20	10.5	18.6	64	45	6	14	M10	30	0.2	TS32	TS25	①TKY08D	SRG20C SRM20C-M	SRG20E SRM20E-M	APMT1135 PDER-□2
	SRM**2250AM12L55**	●	○	12.5	25	12.5	23.5	77	55	6	19	M12	37	0.3	TS43	TS25	②TKY15T ③TKY08F	SRG25C SRM25C-M	SRG25E SRM25E-M	APMT1135 PDER-□2
	SRM**2300AM16L60**	●	○	15	30	17	28.3	83	60	6	24	M16	44	0.3	TS55	TS43	②TKY25T ③TKY15F	SRG30C SRM30C-M	SRG30E SRM30E-M	APMT1604 PDER-□2
	SRM**2320AM16L60**	●	○	16	32	17	29.0	83	60	6	24	M16	44	0.3	TS55	TS43	②TKY25T ③TKY15F	SRG32C SRM32C-M	SRG32E SRM32E-M	APMT1604 PDER-□2

∗1 Clamp Torque (N • m) : TS25H=1.0, TS25=1.0, TS32=1.0, TS43=3.5, TS55=7.5
∗2 WT : Tool Weight

BALL NOSE END MILL

Roughing

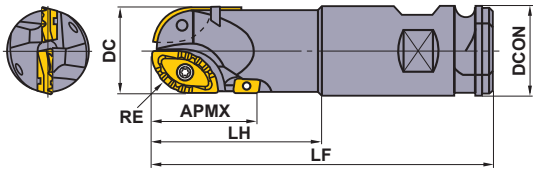
- Best for roughing of molds.
- Low resistance chipbreaker.
- Highly rigid body.

SRM2 ø40 ø50

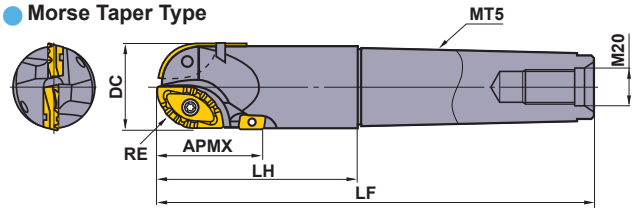
P Steel

K Cast Iron

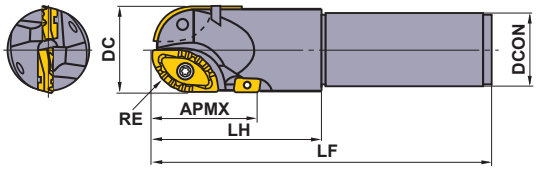
Combination Type



Morse Taper Type



Straight Type



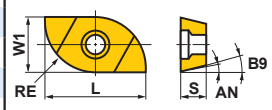
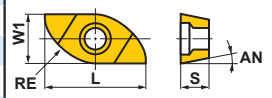
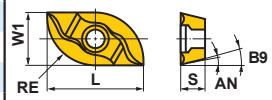
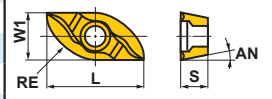
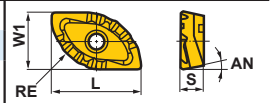
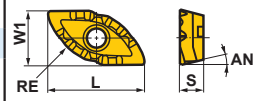
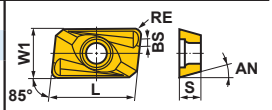
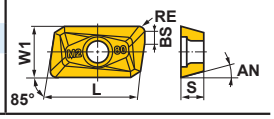
Right hand tool holder only.

Type		Order Number	Stock R	Number of Flutes	Dimensions (mm) RE	DC	DCON	LF	LH	APMX	Inner, Outer Clamp Screw *	Peripheral Clamp Screw *	Inner, Outer Wrench	Peripheral Wrench	Inner Insert	Outer Insert	Peripheral Insert
Combination	Standard	SRM2400WNLS	●	2	20	40	50.8	200	120	54	TS6S	TS43	TKY30T	TKY15F	SRG40C	SRG40E	APMT1604 PDER-□2
		SRM2500WNLS	●	2	25	50	50.8	200	120	63	TS6	TS43	TKY30T	TKY15F	SRG50C	SRG50E	APMT1604 PDER-□2
	Long	SRM2400WNLM	●	2	20	40	50.8	250	170	54	TS6S	TS43	TKY30T	TKY15F	SRG40C	SRG40E	APMT1604 PDER-□2
		SRM2500WNLM	●	2	25	50	50.8	250	170	63	TS6	TS43	TKY30T	TKY15F	SRG50C	SRG50E	APMT1604 PDER-□2
	Extra Long	SRM2500WNLL	●	2	25	50	50.8	300	220	63	TS6	TS43	TKY30T	TKY15F	SRG50C	SRG50E	APMT1604 PDER-□2
		SRM2500WNLX	●	2	25	50	50.8	350	270	63	TS6	TS43	TKY30T	TKY15F	SRG50C	SRG50E	APMT1604 PDER-□2
Straight	Standard	SRM2400SNLS	●	2	20	40	42	200	100	54	TS6S	TS43	TKY30T	TKY15F	SRG40C	SRG40E	APMT1604 PDER-□2
		SRM2500SNLS	●	2	25	50	42	200	100	63	TS6	TS43	TKY30T	TKY15F	SRG50C	SRG50E	APMT1604 PDER-□2
	Long	SRM2400SNLM	●	2	20	40	42	250	150	54	TS6S	TS43	TKY30T	TKY15F	SRG40C	SRG40E	APMT1604 PDER-□2
		SRM2500SNLM	●	2	25	50	42	250	100	63	TS6	TS43	TKY30T	TKY15F	SRG50C	SRG50E	APMT1604 PDER-□2
Morse Taper	Standard	SRM2500MNLS	●	2	25	50	—	256	120	63	TS6	TS43	TKY30T	TKY15F	SRG50C	SRG50E	APMT1604 PDER-□2
	Long	SRM2500MNLM	●	2	25	50	—	286	150	63	TS6	TS43	TKY30T	TKY15F	SRG50C	SRG50E	APMT1604 PDER-□2

* Clamp Torque (N • m) : TS43=3.5, TS6=10.0, TS6S=10.0

● : Inventory maintained in Japan. (10 inserts in one case)(Inserts with asterisk (*) are available in 2 piece in one case)

INSERTS

Type	Shape	Order Number	Class	Coated						Dimensions (mm)							Geometry
				F7030	MP6120 NEW	MP9120 NEW	VP15TF	VP20RT	VP30RT	RE	L	W1	S	BS	AN	B9	
Inner	Strong Cutting Edge Type	SRG16C	G		●	●	●			8	16	8.2	3.5	—	11°	—	
		SRG20C	G		●	●	●			10	19	10.2	4.6	—	10°	18°	
		SRG25C	G		●	●	●			12.5	24	12.8	5.5	—	10°	18°	
		SRG30C	G		●	●	●			15	28	15.3	7	—	10°	18°	
		SRG32C	G		●	●	●			16	28	16.3	7	—	10°	18°	
Outer	Strong Cutting Edge Type	SRG16E	G		●	●	●			8	13.5	6.7	3.5	—	11°	—	
		SRG20E	G		●	●	●			10	15.5	8.5	4.6	—	9°	—	
		SRG25E	G		●	●	●			12.5	20.5	10.2	5.5	—	9°	—	
		SRG30E	G		●	●	●			15	25.2	12.2	7	—	9°	—	
		SRG32E	G		●	●	●			16	26.1	13.1	7	—	9°	—	
Inner	Low Resistance Type	SRM16C-M	M		●	●	●			8	16	8.2	3.5	—	11°	—	
		SRM20C-M	M		●	●	●			10	19	10.2	4.6	—	10°	18°	
		SRM25C-M	M		●	●	●			12.5	24	12.8	5.5	—	10°	18°	
		SRM30C-M	M		●	●	●			15	28	15.3	7	—	10°	18°	
		SRM32C-M	M		●	●	●			16	28	16.3	7	—	10°	18°	
Outer	Low Resistance Type	SRM16E-M	M		●	●	●			8	13.5	6.7	3.5	—	11°	—	
		SRM20E-M	M		●	●	●			10	15.5	8.5	4.6	—	9°	—	
		SRM25E-M	M		●	●	●			12.5	20.5	10.2	5.5	—	9°	—	
		SRM30E-M	M		●	●	●			15	25.2	12.2	7	—	9°	—	
		SRM32E-M	M		●	●	●			16	26.1	13.1	7	—	9°	—	
Inner		∗2SRG40C	G				●	●	●	20	36	20.5	8.0	—	11°	—	
		∗2SRG50C	G				●	●	●	25	40	26	8.5	—	11°	—	
Outer		∗2SRG40E	G				●	●	●	20	32	16.6	8.0	—	11°	—	
		∗2SRG50E	G				●	●	●	25	35.8	20	8.5	—	11°	—	
∗1 Peripheral	Strong Cutting Edge Type	APMT1135PDER-H2	M	●			●			0.8	11	6.35	3.5	1.2	11°	—	
		APMT1604PDER-H2	M	●			●			0.8	16.5	9.525	4.76	1.4	11°	—	
	Low Resistance Type	APMT1135PDER-M2	M	●			●			0.8	11	6.35	3.5	1.2	11°	—	
		APMT1604PDER-M2	M	●			●			0.8	16.5	9.525	4.76	1.4	11°	—	

(Low-resistance inner or outer inserts are precision M class type.)

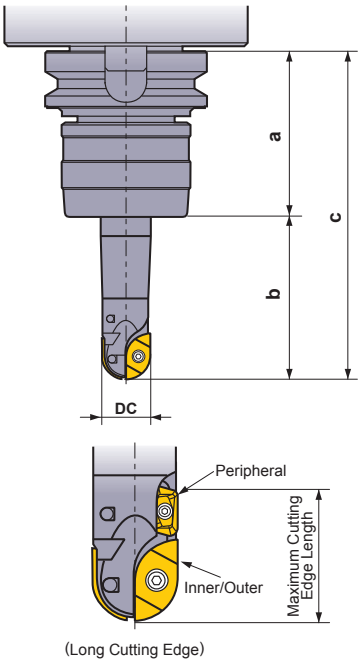
∗1 Selection guide for peripheral cutting edges : The first recommendation is the super sharp M breaker (APMT....PDER-M2).
When cutting edge strength is particularly important, use the H breaker (APMT....PDER-H2).

∗2 2 inserts supplied per case.

■ = MIRACLE SIGMA

RECOMMENDED CUTTING CONDITIONS

SRM2 Ø16—Ø32



(Long Cutting Edge)

Tool Overhang

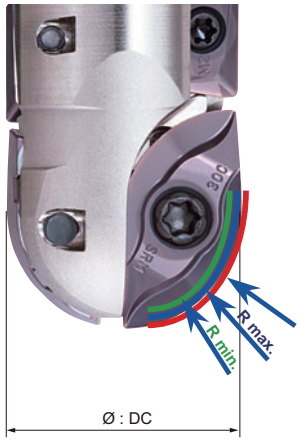
The recommended cutting conditions are chosen based on deflection, vibration and surface finish when using a BT50 arbor under the conditions below -**"a"**, a length from a gauge line to the arbor end face and **"b"**, neck length (tool overhang from the arbor).

Cutting Edge Diameter:DC	Type	a	b	c
16	Standard	105	50	155
	Long Neck		70	175
	Extra Long		—	—
20	Standard		70	175
	Long Neck		100	205
	Extra Long		150	255
25	Standard		80	185
	Long Neck		120	225
	Extra Long		200	305
30	Standard		100	205
	Long Neck		150	255
	Extra Long		250	355

Recommended Depth of Cut for Long Cutting Edge Type

The maximum cutting edge length of the long cutting edge type with a peripheral insert is 1.4-1.5DC. The peripheral insert's main purpose is to remove the small un-machined portions of the pre-machined surface above the main cutting edge. Recommended depth of cut: **Maximum ap** is 0.5DC or below.

Radius tolerance and other dimensions with an insert mounted in the body



Radial tolerance

	Nominal R	Tolerance	R min.	R max.
16	8	G	7.925	7.975
		M	7.910	7.970
20	10	G	9.925	9.975
		M	9.910	9.970
25	12.5	G	12.425	12.475
		M	12.410	12.470
30	15	G	14.925	14.975
		M	14.910	14.970

Dimensions with an insert mounted in the body

	Tolerance	DC min.	DC max.
16	G	15.800	16.000
	M	15.770	15.990
20	G	19.800	20.000
	M	19.770	19.990
25	G	24.800	25.000
	M	24.770	24.990
30	G	29.800	30.000
	M	29.770	29.990

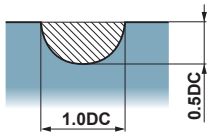
*M : Precision M class

SRM2 Ø40 Ø50

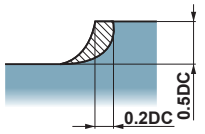
	Work Material	Hardness	Grade	Cutting Speed (m/min)	Feed per Tooth (mm/t.)	Cutting Mode
P	Alloy Tool Steel	≤250HB	VP20RT VP30RT	160 (120—200)	0.12 (0.08—0.2)	A
					0.2 (0.1—0.4)	B
					0.15 (0.1—0.3)	C
		≤250HB	VP20RT VP30RT	200 (160—250)	0.2 (0.1—0.3)	A
					0.3 (0.1—0.4)	B
					0.2 (0.1—0.4)	C
	Cast Tool Steel	≤235HB	VP20RT	200 (160—250)	0.2 (0.1—0.3)	A
					0.3 (0.1—0.4)	B
					0.2 (0.1—0.4)	C
		≤230HB	VP15TF VP20RT	200 (160—300)	0.2 (0.1—0.3)	A
					0.3 (0.1—0.45)	B
					0.2 (0.1—0.4)	C
K	Ductile Cast Iron	Tensile Strength ≤540MPa	VP15TF VP20RT	200 (160—300)	0.25 (0.1—0.4)	A
					0.35 (0.1—0.45)	B
					0.25 (0.1—0.45)	C
	Cast Iron	Tensile Strength ≤350MPa	VP15TF VP20RT	200 (160—300)	0.25 (0.1—0.4)	A
					0.35 (0.1—0.45)	B
					0.25 (0.1—0.4)	C

Cutting Mode

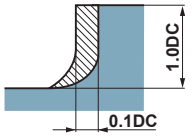
A : Slot Milling



B : Shoulder Milling (Standard Type)

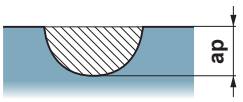


C : Shoulder Milling (Long Cutting Edge Type)



SLOT MILLING

Cutting Mode



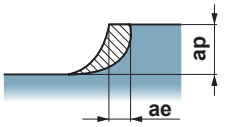
N : Revolution (min^{-1})
F : Table Feed (mm/min)

	Work Material	Hardness	Cutting Speed (m/min)	Insert Grade, Type	Holder Type	ϕ16			ϕ20			ϕ25			ϕ30		
						N	F	ap	N	F	ap	N	F	ap	N	F	ap
P	Carbon Steel Alloy Steel	180–280HB	160 (120–200)	**MP6120 VP15TF** Low Resistance Type	Standard	3183	382	6	2546	306	8	2037	489	12.5	1698	407	15
					Long Neck	3183	382	4	2546	306	4	2037	489	6	1698	407	7.5
					Extra Long	–	–	–	2546	306	2	2037	489	4	1698	407	3
		280–350HB	140 (120–160)	**MP6120 VP15TF** Low Resistance Type	Standard	2785	334	6	2228	267	8	1783	428	12.5	1485	357	15
					Long Neck	2785	334	4	2228	267	4	1783	428	6	1485	357	7.5
					Extra Long	–	–	–	2228	267	2	1783	428	4	1485	357	3
	Pre-Hardened Steel	35–45HRC	120 (100–160)	**MP6120 VP15TF** Low Resistance Type	Standard	2387	286	6	1910	229	8	1528	367	12.5	1273	306	15
					Long Neck	2387	286	4	1910	229	4	1528	367	6	1273	306	7.5
					Extra Long	–	–	–	1910	229	2	1528	367	4	1273	306	3
	Alloy Tool Steel	≤350HB	140 (120–160)	**MP6120 VP15TF** Low Resistance Type	Standard	2785	334	6	2228	267	8	1783	535	10	1485	594	12
					Long Neck	2785	334	4	2228	267	4	1783	535	5	1485	594	4.5
					Extra Long	–	–	–	2228	267	2	1783	535	2.5	1485	594	1.5
M	Stainless Steel	≤270HB	200 (100–250)	**VP15TF** Low Resistance Type	Standard	3979	477	4	3183	382	5	2546	764	6	2122	849	7.5
					Long Neck	3979	477	3	3183	382	3	2546	611	4	2122	637	4.5
					Extra Long	–	–	–	3183	382	1.5	2546	509	1.5	2122	509	1.5
K	Gray Cast Iron	≤350MPa	200 (150–300)	**VP15TF** Low Resistance Type	Standard	3979	796	6	3183	637	8	2546	1019	12.5	2122	849	15
					Long Neck	3979	796	4	3183	637	4	2546	1019	7.5	2122	849	4.5
					Extra Long	–	–	–	3183	637	2	2546	1019	4	2122	849	3
	Ductile Cast Iron	≤500MPa	180 (150–240)	**VP15TF** Low Resistance Type	Standard	3581	716	6	2865	573	8	2292	917	12.5	1910	764	15
					Long Neck	3581	716	4	2865	573	4	2292	917	7.5	1910	764	4.5
					Extra Long	–	–	–	2865	573	2	2292	917	4	1910	764	1.5
	Ductile Cast Iron	≤800MPa	160 (150–250)	**VP15TF** Low Resistance Type	Standard	3183	637	6	2546	509	8	2037	815	12.5	1698	679	15
					Long Neck	3183	637	4	2546	509	4	2037	815	7.5	1698	679	4.5
					Extra Long	–	–	–	2546	509	2	2037	815	4	1698	679	1.5
H	Hardened Steel	45–50HRC	100 (60–120)	**VP15TF** Strong Cutting Edge Type	Standard	1989	239	4	1591	191	4	1273	255	6	1061	212	7.5
					Long Neck	1989	239	2	1591	191	2	1273	255	4	1061	212	3
					Extra Long	–	–	–	1591	191	1	1273	255	2.5	1061	212	1.5
	Hardened Steel	50–60HRC	60 (40–100)	**VP15TF** Strong Cutting Edge Type	Standard	1194	143	4	955	115	4	764	153	6	637	127	7.5
					Long Neck	1194	143	2	955	115	2	764	153	4	637	127	3
					Extra Long	–	–	–	955	115	1	764	153	2.5	637	127	1.5
S	Titanium Alloy	≤350HB	50 (30-60)	**MP9120**	Standard	995	100	4	796	80	4	637	64	6	531	53	7.5
					Long Neck	995	100	2	796	80	2	637	64	4	531	53	3
					Extra Long	–	–	–	796	80	1	637	64	2.5	531	53	1.5
	Heat-resistant Alloy	–	50 (30-60)	**MP9120**	Standard	995	100	4	796	80	4	637	64	6	531	53	7.5
					Long Neck	995	100	2	796	80	2	637	64	4	531	53	3
					Extra Long	–	–	–	796	80	1	637	64	2.5	531	53	1.5

RECOMMENDED CUTTING CONDITIONS

SHOULDER MILLING (Cutting Depth : Small)

Cutting Mode

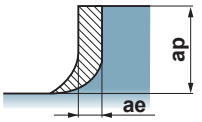


N : Revolution (min^{-1})
F : Table Feed (mm/min)

	Work Material	Hardness	Cutting Speed (m/min)	Insert Grade, Type	Holder Type	ϕ16				ϕ20				ϕ25				ϕ30			
						N	F	ap	ae	N	F	ap	ae	N	F	ap	ae	N	F	ap	ae
P	Carbon Steel Alloy Steel	180–280HB	200 (160–250)	**MP6120 VP15TF** Low Resistance Type	Standard	3979	796	4	6	3183	955	5	8	2546	1273	6	10	2122	1273	7.5	10
					Long Neck	3979	637	4	4	3183	637	5	6	2546	1273	6	7.5	2122	1273	7.5	7.5
					Extra Long	—	—	—	—	3183	382	5	4	2546	1019	6	5	2122	637	7.5	3
		280–350HB	160 (120–200)	**MP6120 VP15TF** Low Resistance Type	Standard	3183	509	4	6	2546	509	5	8	2037	815	6	10	1698	849	7.5	10
					Long Neck	3183	382	4	4	2546	407	5	6	2037	611	6	7.5	1698	509	7.5	7.5
					Extra Long	—	—	—	—	2546	306	5	4	2037	489	6	5	1698	407	7.5	3
	Pre-Hardened Steel	35–45HRC	160 (120–200)	**MP6120 VP15TF** Low Resistance Type	Standard	3183	509	4	6	2546	509	5	8	2037	815	6	10	1698	849	7.5	10
					Long Neck	3183	382	4	4	2546	407	5	6	2037	611	6	7.5	1698	679	7.5	7.5
					Extra Long	—	—	—	—	2546	306	5	4	2037	489	6	5	1698	509	7.5	3
	Alloy Tool Steel	≤350HB	160 (120–200)	**MP6120 VP15TF** Low Resistance Type	Standard	3183	509	4	6	2546	509	5	8	2037	815	6	10	1698	849	7.5	10
					Long Neck	3183	382	4	4	2546	407	5	6	2037	611	6	7.5	1698	509	7.5	7.5
					Extra Long	—	—	—	—	2546	306	5	4	2037	489	6	2.5	1698	407	7.5	1.5
M	Stainless Steel	≤270HB	200 (100–250)	**VP15TF** Low Resistance Type	Standard	3979	477	4	6	3183	509	5	8	2546	764	6	10	2122	849	7.5	10
					Long Neck	3979	477	4	4	3183	382	5	6	2546	611	6	7.5	2122	849	7.5	7.5
					Extra Long	—	—	—	—	3183	382	5	4	2546	509	6	5	2122	424	7.5	1.5
K	Gray Cast Iron	≤350MPa	200 (150–300)	**VP15TF** Low Resistance Type	Standard	3979	1592	4	8	3183	1592	5	10	2546	1528	6	10	2122	1485	7.5	10
					Long Neck	3979	1194	4	6	3183	1273	5	8	2546	1528	6	10	2122	1485	7.5	6
					Extra Long	—	—	—	—	3183	955	5	6	2546	1273	6	7.5	2122	1061	7.5	3
	Ductile Cast Iron	≤500MPa	200 (150–280)	**VP15TF** Low Resistance Type	Standard	3979	1592	4	8	3183	1592	5	10	2546	1528	6	10	2122	1273	7.5	10
					Long Neck	3979	1194	4	6	3183	1273	5	8	2546	1528	6	10	2122	1273	7.5	6
					Extra Long	—	—	—	—	3183	955	5	6	2546	1273	6	7.5	2122	1061	7.5	3
	Ductile Cast Iron	≤800MPa	180 (150–250)	**VP15TF** Low Resistance Type	Standard	3581	1432	4	8	2865	1433	5	10	2292	1375	6	10	1910	1146	7.5	10
					Long Neck	3581	1074	4	6	2865	1146	5	8	2292	1375	6	10	1910	1146	7.5	6
					Extra Long	—	—	—	—	2865	860	5	6	2292	1146	6	7.5	1910	955	7.5	3
H	Hardened Steel	45–50HRC	100 (60–120)	**VP15TF** Strong Cutting Edge Type	Standard	1989	239	4	4	1591	191	5	5	1273	255	6	7.5	1061	212	7.5	3
					Long Neck	1989	239	4	2	1591	191	5	3	1273	255	6	4	1061	212	7.5	1.5
					Extra Long	—	—	—	—	1591	191	5	2	1273	204	6	1.5	1061	170	7.5	1
	Hardened Steel	50–60HRC	60 (40–100)	**VP15TF** Strong Cutting Edge Type	Standard	1194	143	4	4	955	115	5	5	764	153	6	7.5	637	127	7.5	3
					Long Neck	1194	143	4	2	955	115	5	3	764	153	6	4	637	127	7.5	1.5
					Extra Long	—	—	—	—	955	115	5	2	764	122	6	1.5	637	102	7.5	1
S	Titanium Alloy	≤350HB	50 (30-60)	**MP9120**	Standard	995	299	4	4	796	239	4	5	637	191	6	7.5	531	159	7.5	3
					Long Neck	995	299	2	2	796	239	2	3	637	191	4	4	531	159	3	1.5
					Extra Long	—	—	—	—	796	239	1	2	637	191	2.5	1.5	531	159	1.5	1
	Heat-resistant Alloy	—	50 (30-60)	**MP9120**	Standard	995	299	4	4	796	239	4	5	637	191	6	7.5	531	159	7.5	3
					Long Neck	995	299	2	2	796	239	2	3	637	191	4	4	531	159	3	1.5
					Extra Long	—	—	—	—	796	239	1	2	637	191	2.5	1.5	531	159	1.5	1

SHOULDER MILLING (Cutting Depth : Large)

Cutting Mode



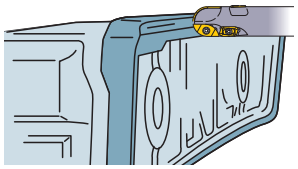
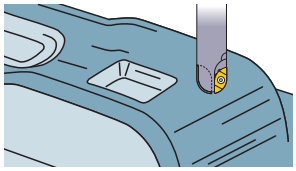
N : Revolution (min^{-1})
F : Table Feed (mm/min)

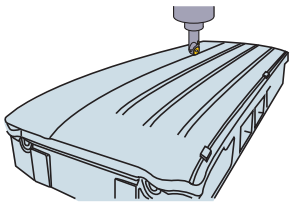
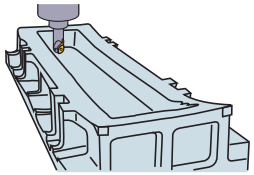
(Note) Machining Stainless Steels

When up-cut milling stainless steels at large depths and widths of cut, the machined surface is liable to burrs and welding due to chip jamming. For stainless steels, down-cutting (climb milling) is recommended.

	Work Material	Hardness	Cutting Speed (m/min)	Insert Grade, Type	Holder Type	ϕ16				ϕ20				ϕ25				ϕ30			
						N	F	ap	ae	N	F	ap	ae	N	F	ap	ae	N	F	ap	ae
P	Carbon Steel Alloy Steel	180–280HB	200 (160–250)	**MP6120 VP15TF** Low Resistance Type	Standard	3979	637	8	4	3183	764	10	4	2546	1273	12.5	5	2122	1273	15	4.5
					Long Neck	3979	477	8	3	3183	509	10	3	2546	1019	12.5	4	2122	849	15	3
					Extra Long	—	—	—	—	3183	382	10	2	2546	764	12.5	2.5	2122	849	15	1.5
		280–350HB	160 (120–200)	**MP6120 VP15TF** Low Resistance Type	Standard	3183	382	8	4	2546	509	10	4	2037	815	12.5	5	1698	849	15	4.5
					Long Neck	3183	382	8	3	2546	306	10	3	2037	611	12.5	4	1698	509	15	3
					Extra Long	—	—	—	—	2546	306	10	2	2037	489	12.5	2.5	1698	407	15	1.5
	Pre-Hardened Steel	35–45HRC	160 (120–200)	**MP6120 VP15TF** Low Resistance Type	Standard	3183	382	8	4	2546	509	10	4	2037	815	12.5	5	1698	849	15	4.5
					Long Neck	3183	382	8	3	2546	306	10	3	2037	611	12.5	4	1698	509	15	3
					Extra Long	—	—	—	—	2546	306	10	2	2037	489	12.5	2.5	1698	407	15	1.5
	Alloy Tool Steel	≤350HB	160 (120–200)	**MP6120 VP15TF** Low Resistance Type	Standard	3183	382	8	4	2546	509	10	4	2037	815	12.5	5	1698	849	15	4.5
					Long Neck	3183	382	8	3	2546	306	10	3	2037	611	12.5	2.5	1698	509	15	3
					Extra Long	—	—	—	—	2546	306	10	2	2037	489	12.5	1.5	1698	407	15	1.5
M	Stainless Steel	≤270HB	200 (100–250)	**VP15TF** Low Resistance Type	Standard	3979	477	8	4	3183	509	10	4	2546	764	12.5	10	2122	849	15	10
					Long Neck	3979	477	8	3	3183	382	10	3	2546	611	12.5	4	2122	509	15	4.5
					Extra Long	—	—	—	—	3183	382	10	2	2546	489	12.5	1.5	2122	340	15	1.5
K	Gray Cast Iron	≤350MPa	200 (150–300)	**VP15TF** Low Resistance Type	Standard	3979	1194	8	8	3183	1273	10	8	2546	1273	12.5	10	2122	1485	15	10
					Long Neck	3979	955	8	5	3183	955	10	4	2546	1273	12.5	7.5	2122	1061	15	4.5
					Extra Long	—	—	—	—	3183	764	10	2	2546	1019	12.5	1.5	2122	849	15	3
	Ductile Cast Iron	≤500MPa	200 (150–280)	**VP15TF** Low Resistance Type	Standard	3979	1194	8	8	3183	1273	10	8	2546	1273	12.5	10	2122	1273	15	10
					Long Neck	3979	955	8	5	3183	955	10	4	2546	1273	12.5	7.5	2122	849	15	4.5
					Extra Long	—	—	—	—	3183	764	10	2	2546	1019	12.5	5	2122	849	15	1.5
	Ductile Cast Iron	≤800MPa	180 (150–250)	**VP15TF** Low Resistance Type	Standard	3581	1074	8	8	2865	1146	10	8	2292	1146	12.5	10	1910	1146	15	10
					Long Neck	3581	859	8	5	2865	860	10	4	2292	1146	12.5	7.5	1910	764	15	4.5
					Extra Long	—	—	—	—	2865	688	10	2	2292	917	12.5	5	1910	764	15	1.5
H	Hardened Steel	45–50HRC	100 (60–120)	**VP15TF** Strong Cutting Edge Type	Standard	1989	239	8	2	1591	191	10	3	1273	255	12.5	4	1061	212	15	3
					Long Neck	1989	239	8	1	1591	191	10	2	1273	204	12.5	1.5	1061	106	15	1.5
					Extra Long	—	—	—	—	1591	191	10	1	—	—	—	—	—	—	—	—
	Hardened Steel	50–60HRC	60 (40–100)	**VP15TF** Strong Cutting Edge Type	Standard	1194	143	8	2	955	115	10	3	764	153	12.5	4	637	127	15	3
					Long Neck	1194	143	8	1	955	115	10	2	764	122	12.5	1.5	637	64	15	1.5
					Extra Long	—	—	—	—	955	115	10	1	—	—	—	—	—	—	—	—
S	Titanium Alloy	≤350HB	50 (30-60)	**MP9120**	Standard	995	199	4	2	796	159	4	3	637	127	6	4	531	106	7.5	3
					Long Neck	995	199	2	1	796	159	2	2	637	127	4	1.5	531	106	3	1.5
					Extra Long	—	—	—	—	796	159	1	1	637	127	2.5	—	531	106	1.5	—
	Heat-resistant Alloy	—	50 (30-60)	**MP9120**	Standard	995	199	4	2	796	159	4	3	637	127	6	4	531	106	7.5	3
					Long Neck	995	199	2	1	796	159	2	2	637	127	4	1.5	531	106	3	1.5
					Extra Long	—	—	—	—	796	159	1	1	637	127	2.5	—	531	106	1.5	—

APPLICATION EXAMPLES

Tool			SRM2300SAL	SRM2250SNF
Grade			VP15TF	VP15TF
Workpiece			FC250 	S55C(230HB) 
Component			Press mold	Plastic mold
Cutting Conditions	Revolution	(min^{-1})	141	200
	Feed rate	(mm/min)	0.23	0.118
	Depth of cut **ap**	(mm)	5 - 8	1.0 - 2.5
	Pick Feed **pf**	(mm)	5	3
Cutting mode			Air blow	Air blow
Results			Compared to a conventional ball nose end mill, the SRM2 has offered better cutting performance, made smaller cutting noise and lengthen tool life 1.5 fold.	Compared to a conventional ball nose end mill, the SRM2 has achieved better surface finish and about 2 times longer tool life.

Tool			SRM2500WNLM	SRM2500WNLM
Grade			VP15TF	VP20RT
Workpiece				
Component			Press mold	Press mold
Cutting Conditions	Revolution	(min^{-1})	1200	1200
	Feed rate	(mm/min)	600 - 1200	600 - 1300
	Depth of cut **ap**	(mm)	10 - 15	5 - 20
	Pick Feed **pf**	(mm)	7	8
Cutting mode			Dry	Dry
Results			Excellent chip disposal allows unmanned machining.	Longer tool life, reduced cutting noise and improved surface finish.

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.)

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