

Series  
Expansion

Indexable Insert Ball-nose End Mill  
for Finishing

Indexable Insert Radius End Mill  
for Finishing

# SRF SUF

## High accuracy indexable end mill **Optimum tool for finish machining**

- High accuracy insert locationing and high rigidity clamping.
- Significant reduction in tool costs in finishing.
- Indexable corner radius end mill for finish cutting "SUF" debut.
- The new PVD coated carbide grade "MP8010" insert is added to the indexable ball end mill for finish cutting "SRF". It demonstrates the excellent cutting performance in the machining for hardened steel and cast iron.
- The screw-in head type is added to SRF.



# Indexable Insert Ball-nose End Mill for Finishing

# SRF

<b>Applications</b>	Finishing moulds, copying curved surfaces
<b>Cutting edge radii</b>	R5, R6, R8, R10, R12.5, R15, R16

## Features

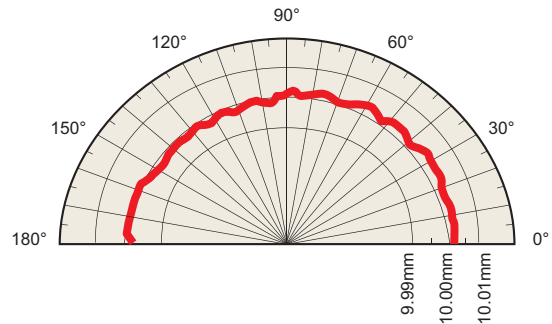
### S-shaped end profile

The S-shaped end profile allows for an edge sharpness similar to solid ball nose end mills.



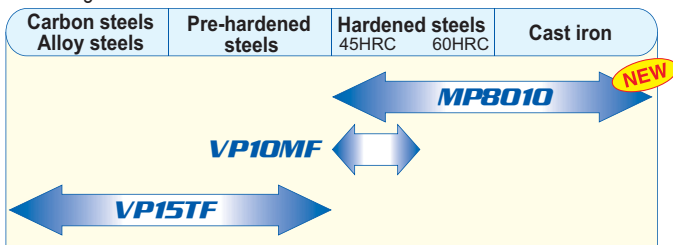
### Accurate radial tolerance

Radius tolerance of  $\pm 6\mu\text{m}$  for high accuracy finish machining comparable to solid ball nose end mills.



### Insert grades

It is possible to correspond to the machining of various work materials by the lineup of the insert grade with VP15TF that is excellent in versatility and MP8010 that demonstrates an overwhelming cutting performance in the machining of hardened steel and cast iron.



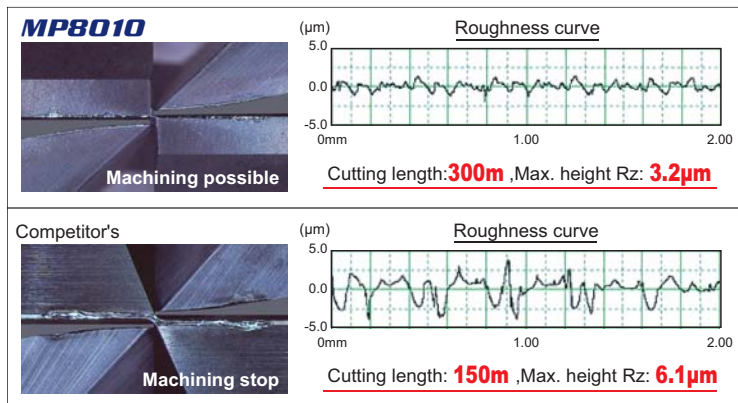
### Wide selection

It can be used properly by choosing the shank from three types as steel, carbide and screw-in shank. It is possible to use together with various tools by exchanging screw-in head.



## Cutting Performance

MP8010 gave double tool life and excellent machining surface compared to conventional tool.

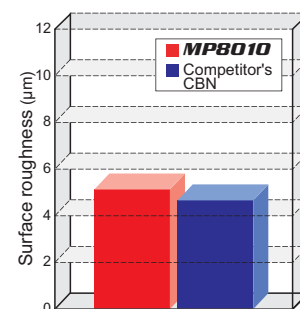
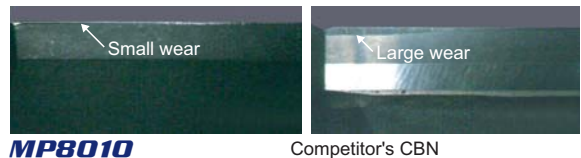


<Cutting conditions>

Work material : JIS SKD11(60HRC)  
 Tool : SRFH20S25M  
 Revolution : 5220min<sup>-1</sup>  
 Cutting speed : 80m/min

Feed per tooth : 0.2mm/tooth  
 Depth of cut : 0.2mm  
 Pick feed : 0.2mm  
 Dry cutting

MP8010 showed the performance that equaled CBN under the high-speed cutting condition of the cast iron.



<Cutting conditions>

Work material : JIS FC300  
 Tool : SRFH30S32LW  
 Revolution : 10000min<sup>-1</sup>  
 Cutting speed : 150-940m/min  
 Feed per tooth : 0.3mm/tooth  
 Depth of cut : 0.2mm  
 Pick feed : 0.5mm  
 Dry cutting

**NEW**

# Indexable Insert Radius End Mill for Finishing

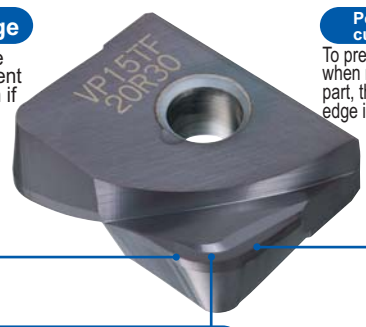
# SUF

<b>Applications</b>	Finishing moulds
<b>Corner R</b>	R0.5 , R1 , R2 , R3

## Features

### Insert

**Finishing edge**  
With finishing edge that obtains excellent surface finish even if feed per rotate is increased.

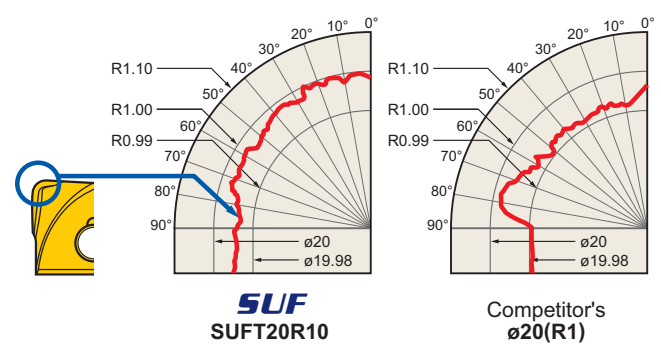


**Peripheral cutting edge**  
To prevent the vibration when machining at wall part, the peripheral cutting edge is designed shorter.

**Seamless Gash**  
Achieved the excellent balance of sharpness and cutting edge strength by the smooth twist edge. And highly accurate grinding for geometry of the peripheral cutting edge, corner radial edge and finishing edge is achieved.

### Accurate tolerance

Corner R tolerance :  $\pm 0.010\text{mm}$  Cutting edge diameter tolerance :  $0 - -0.020\text{mm}$



### Insert grades

MIRACLE coated **VP15TF** that has a good balance of wear and fracture resistance is suitable for various work materials.



### Compatibility

SUF insert can be installed the tool body of SRF type and utilise abundant holder developments of SRF.



## Cutting Performance

Cutting data of the high accuracy and high efficiency face milling

**SUF can achieve to obtain the excellent surface finish even if the feed per tooth is increased.**

<p><b>fz=0.2mm/tooth</b></p> <p><b>SUF</b></p> <p><b>SUFT20R10</b></p> <p><b>VP15TF</b></p>		<p>Roughness curve</p> <p>Max. height Rz : <b>1.75µm</b></p>
<p><b>fz=0.3mm/tooth</b></p> <p><b>SUF</b></p> <p><b>SUFT20R10</b></p> <p><b>VP15TF</b></p>		<p>Roughness curve</p> <p>Max. height Rz : <b>1.63µm</b></p>
<p><b>fz=0.2mm/tooth</b></p> <p>Competitor's</p> <p>ø20(R1)</p>		<p>Roughness curve</p> <p>Max. height Rz : <b>3.81µm</b></p>



<Cutting conditions>  
 Work material : JIS S55C  
 Tool : SRFH20S25M  
 Revolution : 3180min<sup>-1</sup>  
 Cutting speed : 200m/min  
 Feed per tooth : 0.2, 0.3mm/tooth  
 Depth of cut : 0.3mm  
 Pick feed : 14mm  
 Dry cutting

## Steel Shank



Fig. 1

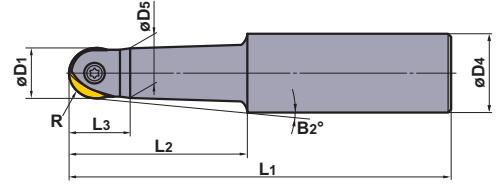


Fig. 2

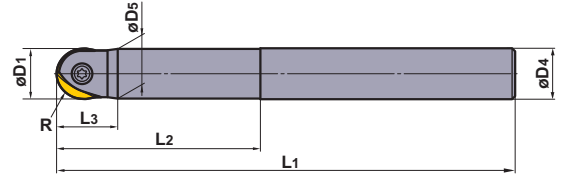
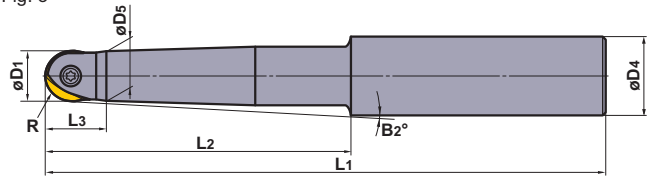


Fig. 3



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

Right hand tool holder only.

Type	Order Number	Stock	Number of Teeth	Dimensions (mm)								Fig.			
				R	D1	D4	L1	D5	L2	L3	B2°		Clamp Screw	Wrench	Inserts
Standard	SRFH10S12M	●	1	5	10	12	110	9.5	40	13	1°30'	1	RS3008T	①TKY08D	SRFT10
	12S16M	●	1	6	12	16	120	11.5	50	15	1°30'	1	RS3510T	①TKY10D	SRFT12
	16S20M	●	1	8	16	20	130	15.5	50	20	1°30'	1	RS4015T	②TKY15T	SRFT16
	20S25M	●	1	10	20	25	150	19.5	70	24	1°30'	1	RS5020T	②TKY20T	SRFT20
	25S32M	●	1	12.5	25	32	180	24.5	80	30	1°30'	1	RS6025T	②TKY25T	SRFT25
	30S32M	●	1	15	30	32	200	29.5	100	35	—	2	RS8030T	②TKY30T	SRFT30
	32S32M	●	1	16	32	32	200	31.5	100	35	—	2	RS8030T	②TKY30T	SRFT32
Semi Long	SRFH10S12L	●	1	5	10	12	150	9.5	60	13	1°30'	1	RS3008T	①TKY08D	SRFT10
	12S16L	●	1	6	12	16	160	11.5	70	15	1°30'	1	RS3510T	①TKY10D	SRFT12
	16S20L	●	1	8	16	20	160	15.5	70	20	1°30'	1	RS4015T	②TKY15T	SRFT16
	20S25L	●	1	10	20	25	180	19.5	80	24	1°30'	1	RS5020T	②TKY20T	SRFT20
	20S20L80	●	1	10	20	20	180	19.5	80	24	—	2	RS5020T	②TKY20T	SRFT20
	25S32L	●	1	12.5	25	32	200	24.5	100	30	1°30'	1	RS6025T	②TKY25T	SRFT25
	25S25L100	●	1	12.5	25	25	200	24.5	100	30	—	2	RS6025T	②TKY25T	SRFT25
30S32L	●	1	15	30	32	230	29.5	130	35	—	2	RS8030T	②TKY30T	SRFT30	
Long	SRFH20S25E	●	1	10	20	25	220	19.5	120	24	1°30'	3	RS5020T	②TKY20T	SRFT20
	20S20E120	●	1	10	20	20	220	19.5	120	24	—	2	RS5020T	②TKY20T	SRFT20
	25S32E	●	1	12.5	25	32	250	24.5	150	30	1°30'	3	RS6025T	②TKY25T	SRFT25
	25S25E150	●	1	12.5	25	25	250	24.5	150	30	—	2	RS6025T	②TKY25T	SRFT25
	30S32E	●	1	15	30	32	300	29.5	200	35	—	2	RS8030T	②TKY30T	SRFT30
Extra Long	SRFH20S25X	●	1	10	20	25	250	19.5	150	24	1°30'	3	RS5020T	②TKY20T	SRFT20
	25S32X	●	1	12.5	25	32	300	24.5	200	30	1°30'	3	RS6025T	②TKY25T	SRFT25
	30S32X	●	1	15	30	32	350	29.5	250	35	—	2	RS8030T	②TKY30T	SRFT30
	32S32X	●	1	16	32	32	350	31.5	250	35	—	2	RS8030T	②TKY30T	SRFT32

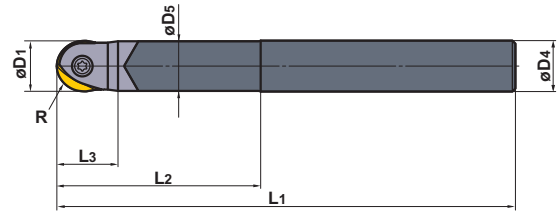
(Note) Fit inserts in the right direction. (See page 6)

\* Clamp Torque (N · m) : RS3008T=1.5, RS3510T=2.5, RS4015T=3.3, RS5020T=5.0, RS6025T=7.5, RS8030T=10.0

## Carbide Shank



Fig. 1



Right hand tool holder only.

Type	Order Number	Stock	Number of Teeth	Dimensions (mm)							Fig.			
				R	D1	D4	L1	D5	L2	L3		Clamp Screw	Wrench	Inserts
Standard	SRFH10S10MW	●	1	5	10	10	110	9.5	40	13	1	RS3008T	①TKY08D	SRFT10
	12S12MW	●	1	6	12	12	120	11.5	50	15	1	RS3510T	①TKY10D	SRFT12
	16S16MW	●	1	8	16	16	130	15.5	50	20	1	RS4015T	②TKY15T	SRFT16
	20S20MW	●	1	10	20	20	180	19.5	80	24	1	RS5020T	②TKY20T	SRFT20
	25S25MW	●	1	12.5	25	25	200	24.5	100	30	1	RS6025T	②TKY25T	SRFT25
	30S32MW	●	1	15	30	32	230	29.5	130	35	1	RS8030T	②TKY30T	SRFT30
			16	32	32	231	29.5	131	36	SRFT32				
Long	SRFH10S10LW	●	1	5	10	10	150	9.5	60	13	1	RS3008T	①TKY08D	SRFT10
	12S12LW	●	1	6	12	12	160	11.5	70	15	1	RS3510T	①TKY10D	SRFT12
	16S16LW	●	1	8	16	16	160	15.5	70	20	1	RS4015T	②TKY15T	SRFT16
	16S16EW	●	1	8	16	16	200	15.5	110	20	1	RS4015T	②TKY15T	SRFT16
	20S20LW	●	1	10	20	20	250	19.5	150	24	1	RS5020T	②TKY20T	SRFT20
	25S25LW	●	1	12.5	25	25	300	24.5	200	30	1	RS6025T	②TKY25T	SRFT25
	30S32LW	●	1	15	30	32	350	29.5	250	35	1	RS8030T	②TKY30T	SRFT30
			16	32	32	351	29.5	251	36	SRFT32				

(Note 1) SRFH30S32MW and SRFH30S32LW of the tool body can install the both inserts SRFT30 and SRFT32.

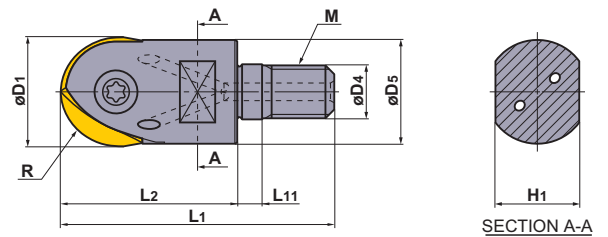
However, the overall length size L1 is different respectively.

(Note 2) Fit inserts in the right direction. (See page 6)

\* Clamp Torque (N · m) : RS3008T=1.5, RS3510T=2.5, RS4015T=3.3, RS5020T=5.0, RS6025T=7.5, RS8030T=10.0

## Screw-in Type

NEW



Right hand tool holder only.

Order Number	Stock	Coolant Hole	Number of Teeth	Dimensions (mm)										Mass (kg)			
				R	D1	D4	D5	L1	L2	L11	H1	M	Clamp Screw		Wrench	Insert	
SRFH16AM0830	○	○	1	8	16	8.5	14.9	48	30	6	10	8	0.1	RS4015T	TKY15T	SRFT16	
20AM1035	○	○	1	10	20	10.5	18.4	54	35	6	14	10	0.1	RS5020T	TKY20T	SRFT20	
25AM1240	○	○	1	12.5	25	12.5	23.5	62	40	6	19	12	0.1	RS6025T	TKY25T	SRFT25	
30AM1645	○	○	1	15	30	17	28.1	68	45	6	24	16	0.2	RS8030T	TKY30T	SRFT30	
				16	32	17	28.1	69	46	6	24	16	0.2			SRFT32	


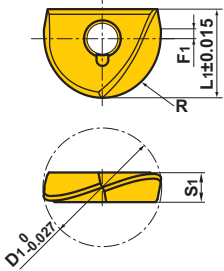
(Note 1) SRFH30S32MW and SRFH30S32LW of the tool body can install the both inserts SRFT30 and SRFT32.

However, the overall length size L1 is different respectively.

(Note 2) For screw-in type arbors, refer to page 10.

\* Clamp Torque (N · m) : RS4015T=3.3, RS5020T=5.0, RS6025T=7.5, RS8030T=10.0

## Inserts

Shape	Order Number	Coated			Dimensions (mm)					Geometry
		MP8010	VP10MF	VP15TF	D1	R	L1	F1	S1	
	<b>SRFT10</b>	●	●	●	10	5	8.5	0.5	2.6	
	12	●	●	●	12	6	10	0.5	3	
	16	●	●	●	16	8	12	1	4	
	20	●	●	●	20	10	15	1	5	
	25	●	●	●	25	12.5	18.5	1	6	
	30	●	●	●	30	15	22.5	1	7	
	32	●	●	●	32	16	23.5	1	7	

## Recommended Cutting Conditions

	Work Material	Hardness	Insert Grades	Cutting Speed vc (m/min)	Feed per Tooth fz (mm/tooth)	Depth of Cut ap (mm)
P	Carbon Steel Alloy Steel	180–280HB	VP15TF	200 (80–300)	0.2 (0.1–0.3)	≤ 0.05D1
	Pre-hardened steels	≤ 45HRC	VP15TF	150 (80–200)	0.2 (0.1–0.3)	≤ 0.05D1
	Alloy Tool Steel	180–380HB	VP15TF	150 (80–200)	0.2 (0.1–0.3)	≤ 0.05D1
K	Cast Iron	Tensile Strength ≤ 350MPa	MP8010	250 (180–450)	0.2 (0.1–0.3)	≤ 0.05D1
	Ductile Cast Iron	Tensile Strength ≤ 800MPa	MP8010	200 (80–300)	0.2 (0.1–0.3)	≤ 0.05D1
H	Hardened Steel	45–55HRC	MP8010	100 (60–120)	0.2 (0.1–0.3)	≤ 0.05D1
		55HRC≤	MP8010	80 (60–120)	0.2 (0.1–0.3)	≤ 0.01D1

(Note 1) The values above are for average machining conditions. The optimum values can change slightly according to the condition and rigidity of the machine and work holding. Adjust the values accordingly.

(Note 2) For end mills with a carbide shank, up to 20 percent higher cutting conditions are possible.

(Note 3) Please note the follows when machining the hardened steel by using MP8010.

- Please shorten the overhang length as much as possible.
- Use with carbide shank recommended.
- Please note the setting of the depth of cut especially to prevent the fracture.

## Calculating Actual Cutting Speed

- Using  $\theta^\circ$   $\Rightarrow$  Calculate cutting speed at point P.  
(Cutting speed at the depth of cut line in machining an inclination.)

$$\text{Formula: Actual cutting speed} = \frac{\pi \cdot D_1 \cdot \sin\theta \cdot n}{1000} \text{ (m/min)}$$

$$\theta^\circ = \cos^{-1} \left( \frac{D_1 - 2ap}{D_1} \right) + 90 - \alpha$$

n : Revolution (min<sup>-1</sup>)

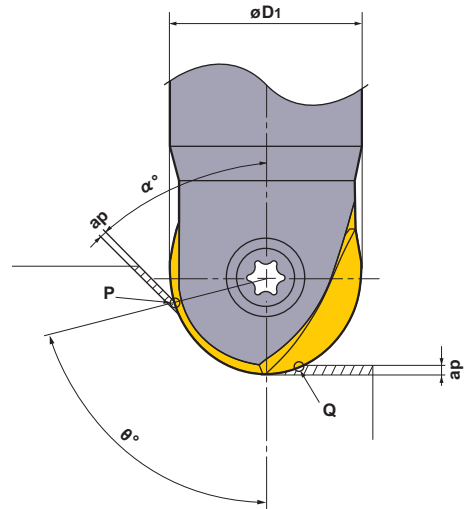
- Using ap  $\Rightarrow$  Calculate cutting speed at point Q.  
(Cutting speed at the depth of cut line.)

$$\text{Formula: Actual cutting speed} = \frac{2\pi n \sqrt{ap(D_1 - ap)}}{1000} \text{ (m/min)}$$

n : Revolution (min<sup>-1</sup>)

D<sub>1</sub> : Tool diameter (mm)

ap : Depth of Cut (mm)



## Insert Installation

### 1. Clean the insert and seat

Thoroughly clean the insert and seat in the holder body.

### 2. Fitting the insert

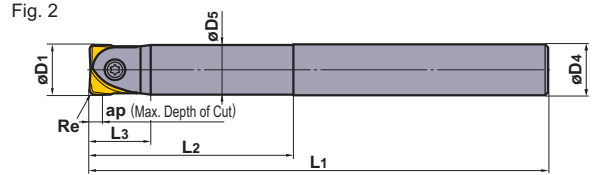
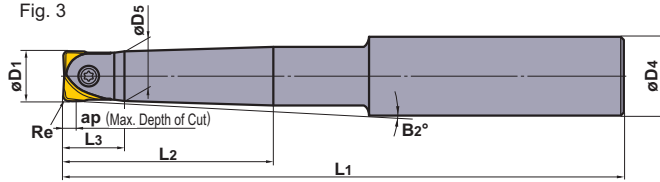
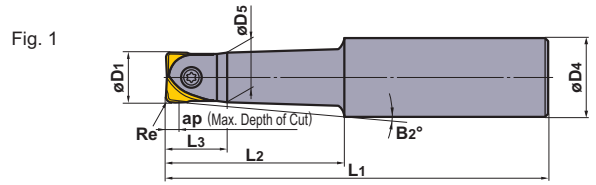
Place the concave mark on the insert uppermost as shown with the clamp screw inserted from above. Fasten the clamp screw while firmly pressing the insert against the insert seat wall. Use of a special anti seize lubricant MK1KS is recommended. Tighten within the recommended torque range.



# Indexable Insert Radius End Mill for Finishing

# SUF

## Steel Shank



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

Right hand tool holder only.

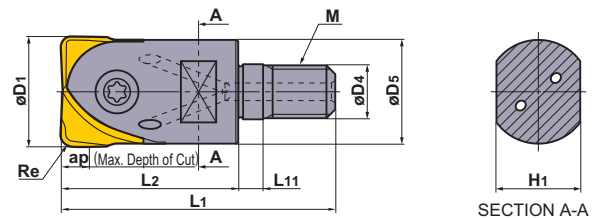
Type	Order Number	Stock	Number of Teeth	Dimensions (mm)							Fig.	*		
				D1	D4	L1	D5	L2	L3	B2°		Clamp Screw	Wrench	Inserts
Standard	SRFH20S25M	●	1	20	25	150	19.5	70	24	1°30'	1	RS5020T	TKY20T	SUFT20R
	25S32M	●	1	25	32	180	24.5	80	30	1°30'	1	RS6025T	TKY25T	SUFT25R
	30S32M	●	1	30	32	200	29.5	100	35	—	2	RS8030T	TKY30T	SUFT30R
Semi Long	SRFH20S25L	●	1	20	25	180	19.5	80	24	1°30'	1	RS5020T	TKY20T	SUFT20R
	20S20L80	●	1	20	20	180	19.5	80	24	—	2	RS5020T	TKY20T	SUFT20R
	25S32L	●	1	25	32	200	24.5	100	30	1°30'	1	RS6025T	TKY25T	SUFT25R
	25S25L100	●	1	25	25	200	24.5	100	30	—	2	RS6025T	TKY25T	SUFT25R
	30S32L	●	1	30	32	230	29.5	130	35	—	2	RS8030T	TKY30T	SUFT30R
Long	SRFH20S25E	●	1	20	25	220	19.5	120	24	1°30'	3	RS5020T	TKY20T	SUFT20R
	20S20E120	●	1	20	20	220	19.5	120	24	—	2	RS5020T	TKY20T	SUFT20R
	25S32E	●	1	25	32	250	24.5	150	30	1°30'	3	RS6025T	TKY25T	SUFT25R
	25S25E150	●	1	25	25	250	24.5	150	30	—	2	RS6025T	TKY25T	SUFT25R
	30S32E	●	1	30	32	300	29.5	200	35	—	2	RS8030T	TKY30T	SUFT30R
Extra Long	SRFH20S25X	●	1	20	25	250	19.5	150	24	1°30'	3	RS5020T	TKY20T	SUFT20R
	25S32X	●	1	25	32	300	24.5	200	30	1°30'	3	RS6025T	TKY25T	SUFT25R
	30S32X	●	1	30	32	350	29.5	250	35	—	2	RS8030T	TKY30T	SUFT30R

(Note) Fit inserts in the right direction. (See page 6)

\* Clamp Torque (N · m) : RS5020T=5.0, RS6025T=7.5, RS8030T=10.0

## Screw-in Type

NEW



Right hand tool holder only.

Order Number	Stock	Coolant Hole	Number of Teeth	Dimensions (mm)								Mass (kg)	*		
				D1	D4	D5	L1	L2	L11	H1	M		Clamp Screw	Wrench	Insert
SRFH20AM1035	○	○	1	20	10.5	18.4	54	35	6	14	10	0.1	RS5020T	TKY20T	SUFT20R
25AM1240	○	○	1	25	12.5	23.5	62	40	6	19	12	0.1	RS6025T	TKY25T	SUFT25R
30AM1645	○	○	1	30	17	28.1	68	45	6	24	16	0.2	RS8030T	TKY30T	SUFT30R

(Note) For screw-in type arbors, refer to page 10.

\* Clamp Torque (N · m) : RS5020T=5.0, RS6025T=7.5, RS8030T=10.0

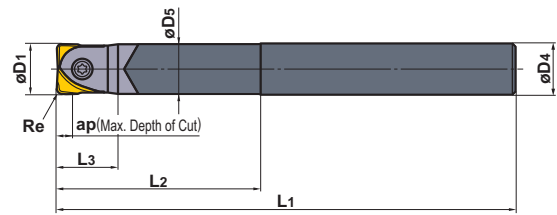
● : Inventory maintained.(2 inserts in a case) ○ : Inventory maintained.(Available Spring 2010)



## Carbide Shank



Fig. 1



Right hand tool holder only.

Type	Order Number	Stock	Number of Teeth	Dimensions (mm)						Fig.	*		
				D1	D4	L1	D5	L2	L3		Clamp Screw	Wrench	Inserts
Standard	<b>SRFH20S20MW</b>	●	1	20	20	180	19.5	80	32	1	RS5020T	TKY20T	SUFT20R
	<b>25S25MW</b>	●	1	25	25	200	24.5	100	38	1	RS6025T	TKY25T	SUFT25R
	<b>30S32MW</b>	●	1	30	32	230	29.5	130	35	1	RS8030T	TKY30T	SUFT30R
Long	<b>SRFH20S20LW</b>	●	1	20	20	250	19.5	150	24	1	RS5020T	TKY20T	SUFT20R
	<b>25S25LW</b>	●	1	25	25	300	24.5	200	30	1	RS6025T	TKY25T	SUFT25R
	<b>30S32LW</b>	●	1	30	32	350	29.5	250	35	1	RS8030T	TKY30T	SUFT30R

(Note) Fit inserts in the right direction. (See page 6)

\* Clamp Torque (N · m) : RS5020T=5.0, RS6025T=7.5, RS8030T=10.0

## Inserts

Shape	Order Number	Coated			Dimensions (mm)						Geometry
		VP15TF			D1	Re	F1	ap	L1	S1	
	<b>SUFT20R05</b>	●			20	0.5	2	2.5	15	5	
	<b>20R10</b>	●			20	1	2	3	15	5	
	<b>20R20</b>	●			20	2	2	4	15	5	
	<b>20R30</b>	●			20	3	2	5	15	5	
	<b>25R05</b>	●			25	0.5	2.5	3	18.5	6	
	<b>25R10</b>	●			25	1	2.5	3.5	18.5	6	
	<b>25R20</b>	●			25	2	2.5	4.5	18.5	6	
	<b>25R30</b>	●			25	3	2.5	5.5	18.5	6	
	<b>30R05</b>	●			30	0.5	3	3.5	22.5	7	
	<b>30R10</b>	●			30	1	3	4	22.5	7	
	<b>30R20</b>	●			30	2	3	5	22.5	7	
	<b>30R30</b>	●			30	3	3	6	22.5	7	

## Recommended Cutting Conditions

### Shoulder milling (The setting of the width of cut is smaller.\*)

	Work Material	Hardness	Insert Grades	Cutting Speed vc (m/min)	Depth of Cut ap (mm)	Wide of Cut ae (mm)	Feed per Tooth fz (mm/tooth)
P	Carbon Steel Alloy Steel	180–280HB	VP15TF	200 (80–300)	≤ 0.05D <sub>1</sub>	≤ 0.05D <sub>1</sub>	0.2 (≤ 0.4)
	Pre-hardened steels	≤ 45HRC	VP15TF	150 (80–200)	≤ 0.05D <sub>1</sub>	≤ 0.05D <sub>1</sub>	0.15 (≤ 0.3)
	Alloy Tool Steel	180–380HB	VP15TF	150 (80–200)	≤ 0.05D <sub>1</sub>	≤ 0.05D <sub>1</sub>	0.15 (≤ 0.3)
K	Cast Iron	Tensile Strength ≤ 350MPa	VP15TF	200 (80–300)	≤ 0.05D <sub>1</sub>	≤ 0.1D <sub>1</sub>	0.3 (≤ 0.4)
	Ductile Cast Iron	Tensile Strength ≤ 800MPa	VP15TF	150 (80–200)	≤ 0.05D <sub>1</sub>	≤ 0.1D <sub>1</sub>	0.3 (≤ 0.4)
H	Hardened Steel	45–55HRC	VP15TF	80 (60–100)	≤ 0.05D <sub>1</sub>	≤ 0.02D <sub>1</sub>	0.1 (≤ 0.15)

\* When the pick feed direction is along the axis of the tool such as finish machining at the wall part.

### Slot milling / Shoulder milling (The setting of the width of cut is larger.\*)

	Work Material	Hardness	Insert Grades	Cutting Speed vc (m/min)	Depth of Cut ap (mm)	Width of Cut ae (mm)	Feed per Tooth fz (mm/tooth)
P	Carbon Steel Alloy Steel	180–280HB	VP15TF	200 (80–300)	≤ 0.02D <sub>1</sub>	≤ D <sub>1</sub>	0.2 (≤ 0.4)
	Pre-hardened steels	≤ 45HRC	VP15TF	150 (80–200)	≤ 0.02D <sub>1</sub>	≤ D <sub>1</sub>	0.15 (≤ 0.3)
	Alloy Tool Steel	180–380HB	VP15TF	150 (80–200)	≤ 0.02D <sub>1</sub>	≤ D <sub>1</sub>	0.15 (≤ 0.3)
K	Cast Iron	Tensile Strength ≤ 350MPa	VP15TF	200 (80–300)	≤ 0.03D <sub>1</sub>	≤ D <sub>1</sub>	0.3 (≤ 0.4)
	Ductile Cast Iron	Tensile Strength ≤ 800MPa	VP15TF	150 (80–200)	≤ 0.03D <sub>1</sub>	≤ D <sub>1</sub>	0.3 (≤ 0.4)
H	Hardened Steel	45–55HRC	VP15TF	80 (60–100)	≤ 0.01D <sub>1</sub>	≤ D <sub>1</sub>	0.1 (≤ 0.15)

\* When the pick feed direction is along the radius of the tool such as finish face machining.

(Note 1) This cutting condition is the standard condition when using the steel standard shank type.

If it is occurred vibration or chipping on the cutting edge, please decrease the cutting condition as width of cut, depth of cut and feed per tooth depending on the situation.

(Note 2) The value of cutting speed is stood at the peripheral diameter of the tool.

Please calculate the spindle speed of tool in the following expressions.

Spindle speed of cutting tool  $n(\text{min}^{-1}) = 1000 \times \text{Cutting speed } vc \div \text{Diameter of cutting tool } D_1 \div 3.14$

## Insert Installation

### 1. Clean the insert and seat

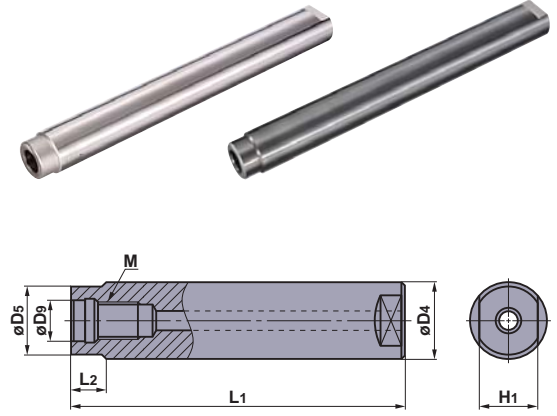
Thoroughly clean the insert and seat in the holder body.

### 2. Fitting the insert

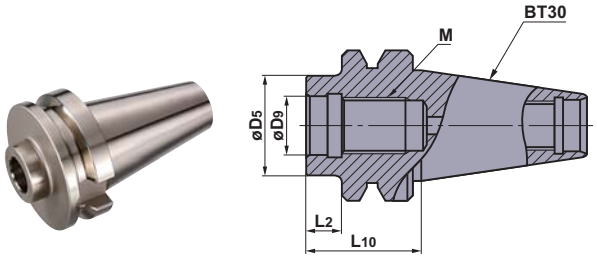
Place the concave mark on the insert uppermost as shown with the clamp screw inserted from above. Fasten the clamp screw while firmly pressing the insert against the insert seat wall. Use of a special anti seize lubricant MK1KS is recommended. Tighten within the recommended torque range.



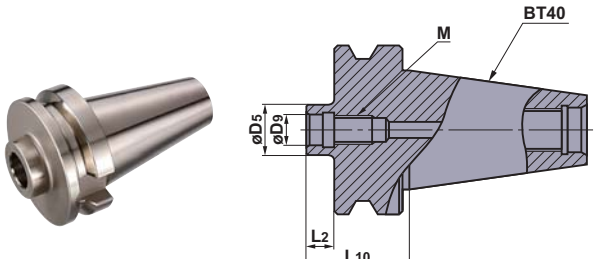
- Screw-in arbor
- Straight Shank Arbor

	Type	Order Number	Stock	Dimensions (mm)						
				D9	D4	D5	L1	L2	H1	M
				Steel Shank	SC16M08S100S	●	8.5	16	14.5	100
	08S200L	●	8.5	16	14.5	200	10	10	M8	
	SC20M10S120S	●	10.5	20	18.5	120	10	14	M10	
	10S220L	●	10.5	20	18.5	220	10	14	M10	
	SC25M12S125S	●	12.5	25	23.5	125	10	19	M12	
	12S245L	●	12.5	25	23.5	245	10	19	M12	
	SC32M16S140S	●	17	32	28.5	140	15	24	M16	
	16S280L	●	17	32	28.5	280	15	24	M16	
Carbide Shank	SC16M08S100SW	●	8.5	16	14.5	100	10	10	M8	
	08S200LW	●	8.5	16	14.5	200	10	10	M8	
	SC20M10S120SW	●	10.5	20	18.5	120	10	14	M10	
	10S220LW	●	10.5	20	18.5	220	10	14	M10	
	SC25M12S125SW	●	12.5	25	23.5	125	10	19	M12	
	12S245LW	●	12.5	25	23.5	245	10	19	M12	
	SC32M16S140SW	●	17	32	28.5	140	15	24	M16	
	16S280LW	●	17	32	28.5	280	15	24	M16	

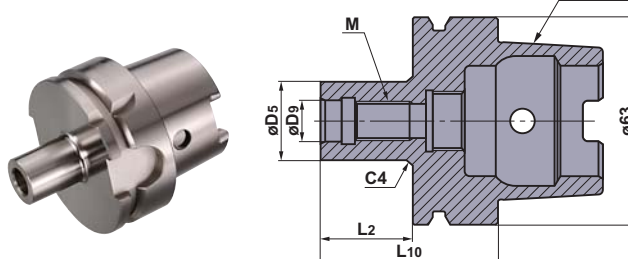
### ● BT30 Shank Arbor

	Order Number	Stock	Dimensions (mm)				
			D9	D5	L10	L2	M
	SC16M08S10-BT30	●	8.5	14.5	32	10	M8
	20M10S10-BT30	●	10.5	18.5	32	10	M10
	25M12S10-BT30	●	12.5	23.5	32	10	M12
	32M16S10-BT30	●	17.0	28.5	32	10	M16

### ● BT40 Shank Arbor

	Order Number	Stock	Dimensions (mm)				
			D9	D5	L10	L2	M
	SC16M08S10-BT40	●	8.5	14.5	37	10	M8
	20M10S10-BT40	●	10.5	18.5	37	10	M10
	25M12S10-BT40	●	12.5	23.5	37	10	M12
	32M16S10-BT40	●	17.0	28.5	37	10	M16

### ● HSK63A Shank Arbor

	Order Number	Stock	Dimensions (mm)				
			D9	D5	L10	L2	M
	SC16M08S22-HSK63A	●	8.5	14.5	48	22	M8
	20M10S24-HSK63A	●	10.5	18.5	50	24	M10
	25M12S27-HSK63A	●	12.5	23.5	53	27	M12
	32M16S28-HSK63A	●	17.0	28.5	54	28	M16

● : Inventory maintained.

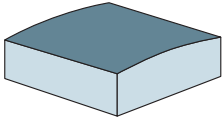
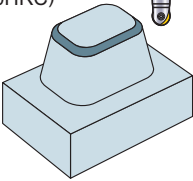
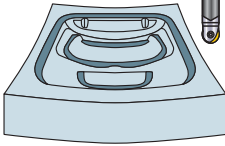
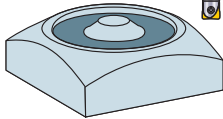
## How to Install the Screw-in Head

- ① Thoroughly clean the clamp section of the head and the arbor with an air blower or brush before installation.
- ② Tighten the head at the recommended torque and ensure that there is no gap between the head and arbor.

Screw Size	Recommended Torque (N · m)	Wrench Size (mm)
M8	23	10
M10	46	14
M12	80	19
M16	90	24

- Cutting tools become extremely hot during cutting. Never touch them with bare hands after operation as this may produce risk of injuries or burns.
- Do not handle the cutting tools with bare hands as this may cause injuries.

## Application Examples

Tool	SRFH20S25M	SRFH20S25M	SRFH30S32LW	SRFH20S20LW
Insert	SRFT20	SRFT20	SRFT30	SUFT20R10
Grade	VP15TF	MP8010	MP8010	VP15TF
Machine	Bridge-column machining centre	Vertical type M/C	Bridge-column machining centre	Vertical type M/C
Work Material	PX5(33HRC) 	JIS SKD11 (60HRC) 	JIS FC300 	JIS SCM445 (35HRC) 
Component	Mould for forming resin	Press mould	Press mould	Mould for forming resin
Cutting Conditions	Actual Cutting Speed (m/min)	250	30-100	150-940
	Table Feed (mm/min)	1400	636	10000
	Feed per Tooth (mm/tooth)	0.18	0.2	0.3
	Depth of Cut (mm)	0.2	0.2	0.2
	Width of Cut (mm)	1.2	0.3	0.5
Coolant	Water soluble	Air blow	Air blow	Air blow
Results	Low cutting noise and good surface finish.	Higher efficiency machining is achieved and the cutting time can be decreased compared with conventional PVD coated carbide.	Under the cutting condition as same as using conventional CBN grade, the cutting length of 10,000m is achieved with surface finish equal to using CBN grade maintained. The cost of cutting tools can be decreased.	The surface roughness on the bottom is greatly improved compared with competitor's. Tool life increase by 2 times.

### 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

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