Face mill for heavy milling MSRS90

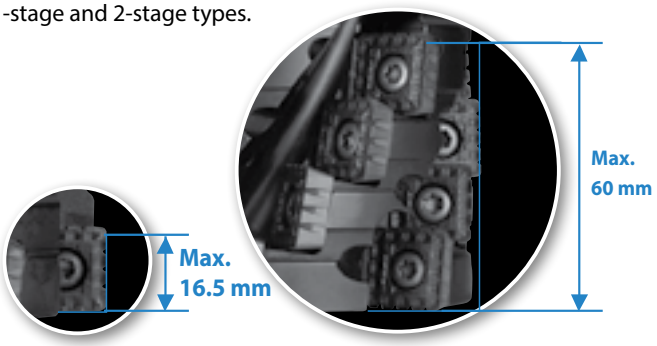
NB3

+

NB4

Wide selection of cutting edge length according to cutting conditions

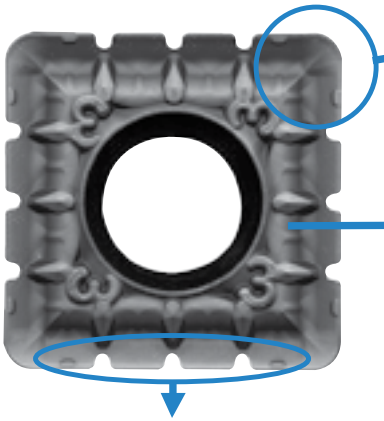
4-stage type (ø80, ø100) is added to the standard lineup as well as 1-stage and 2-stage types.



High efficiency, low cutting force and stable machining without chattering Neutral and corner-R insert

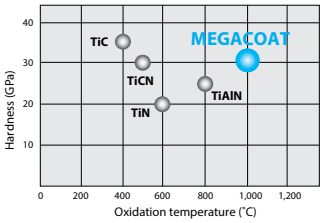
Applicable to shouldering (Cutting edge angle: 90˚),
high feed milling (Cutting edge angle: 30˚), plunging, and side cutter.

Custom-ordered milling cutter with high performance notched neutral inserts provides various applications



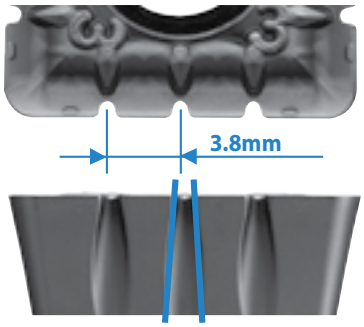
Neutral insert with corner-R is available to various applications

Long tool life: MEGACOAT



High hardness and high oxidation resistance long tool life: MEGACOAT

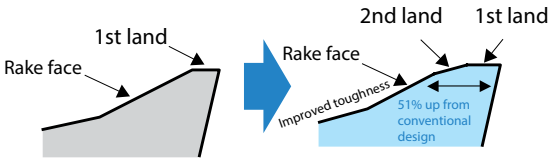
Notched insert SPMT180616EN



The notched insert breaks chips into small pieces and reduces cutting force.

The second land near the cutting edge improves edge strength.

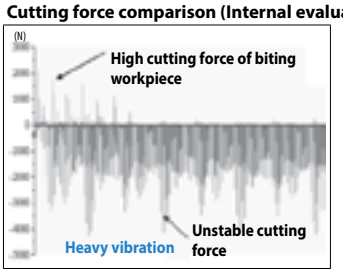
For neutral (Right/Left) hand
Applicable for various cutting edge angle.
Cutting edge length: 18mm



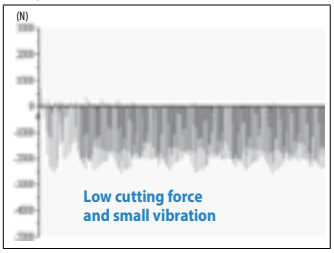
Edge preparation

Low cutting force (Notched insert benefit)

Cutting force comparison (Internal evaluation)



Competitor A



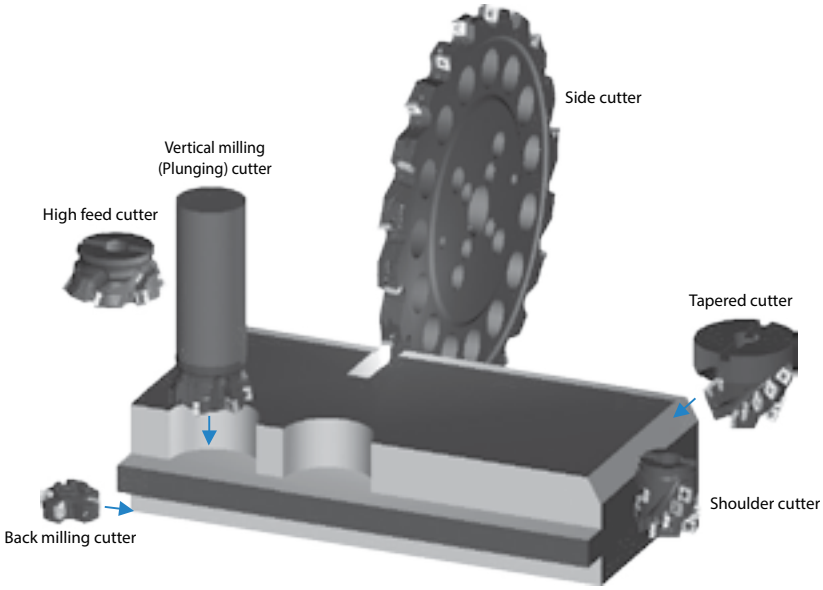
MSRS90

Notched insert realizes lower cutting force and smaller vibration

Applicable inserts: Available for various applications

Applications	Chipbreaker selection	3-notched	4-notched	Without notch
General purpose	Standard	NB3 +	NB4	
Low cutting force	Low cutting force	NB3P +	NB4P	
Edge strength oriented	Without notch (Usable with notched inserts)	(NB3 or	NB4) +	

Various expansive possibilities (Custom-ordered and standard milling cutter)



The custom-ordered milling cutter can be customized for your requirements such as diameter, Cutting edge angle, number of insert stages.

Shaft length determination

Tapered cutter

Vertical milling (Plunging) cutter

45˚ Face mill

High feed cutter

Shoulder cutter

MSRS90

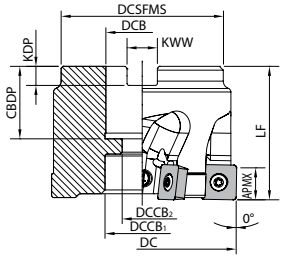


Fig. 1

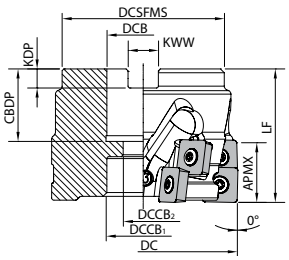


Fig. 2

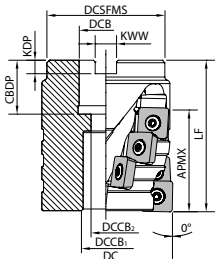


Fig. 3

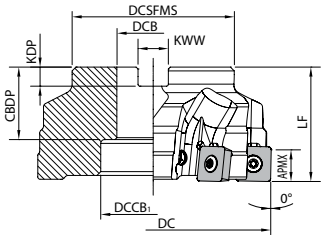


Fig. 4

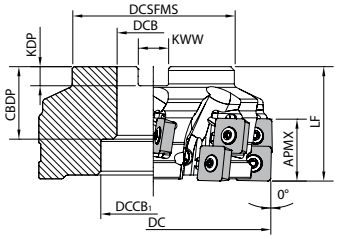


Fig. 5

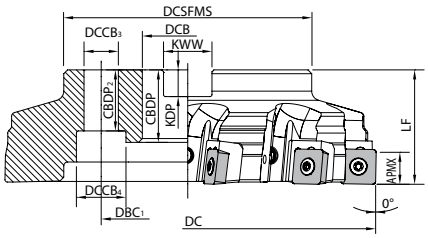


Fig. 6

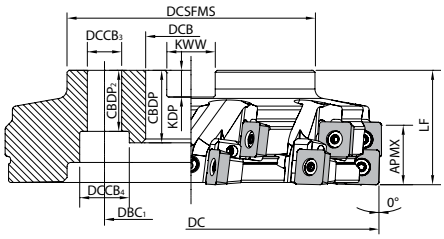


Fig. 7

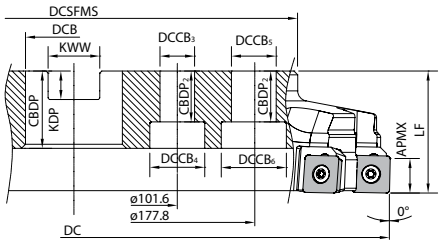


Fig. 8

Toolholder dimensions

	Description		Availability	Inserts	Flutes	Stages	Dimension (mm)																A.R. (°)	R.R. (°)	Coolant hole	Weight (kg)	Fig.	Applicable inserts M160
			R				DC	DCSFMS	DCB	$DCCB_1$	$DCCB_2$	$DCCB_3$	$DCCB_4$	$DCCB_5$	$DCCB_6$	DBC_1	LF	CBDP	$CBDP_2$	KDP	KWW	APMX						
Metric	MSRS	90080R-1-4T-M	●	4	4	1	80	70	27	20	13	-	-	-	-	-	60	24	-	7	12.4	16.5	+7	-10	No	1.3	1	SPMT180616EN-...
		90080R-2-4T-M	●	8		2																31				1.1	2	
		90080R-4-4T-M	●	16		4											85					60				1.4	3	
		90100R-1-6T-M	●	6	6	1	100	85	32	45							70	30		8	14.4	16.5				2.2	1	
		90100R-2-6T-M	●	12		2																31				2	2	
		90100R-4-6T-M	MTO	24		4											90					60				3.1	3	
		90125R-1-8T-M	●	8	8	1	125		40	55				-	-		60	33		9	16.4	16.5				2.6	4	
		90125R-2-8T-M	MTO	16		2																31				2.4	5	
		90160R-1-8T-M	●	8		1	160	110				14	20			66.7			28			16.5				4.2	6	
		90160R-2-8T-M	MTO	16		2																31				4	7	
		90200R-1-10T-M	●	10	10	1	200	140	60	-		18	26			101.6		40	32	14	25.7	16.5				6.7	6	
		90200R-2-10T-M	MTO	20		2																31				6.6	7	
		90250R-1-12T-M	●	12	12	1	250															16.5				12.6	6	
		90250R-2-12T-M	MTO	24		2																31				12.5	7	
		90315R-1-14T-M	●	14	14	1	315	220				17	27	22	32	-			25			16.5				16.1	8	
		90315R-2-14T-M	MTO	28		2																31				16		
Bore dia. inch spec	MSRS	90080R-1-4T	□	4	4	1	80	70	31.75	27	18	-	-	-	-	-	60	32	-	8	12.7	16.5	+7	-10	No	1.4	1	SPMT180616EN-...
		90080R-2-4T	□	8		2																31				1.2	2	
		90080R-4-4T	□	16		4											85					60				1.5	3	
		90100R-1-6T	□	6	6	1	100	85	38.1	39	21						70	38		10	15.9	16.5				2.3	1	
		90100R-2-6T	□	12		2																31				2.1	2	
		90100R-4-6T	MTO	24		4											90					60				3.2	3	
		90125R-1-8T	□	8	8	1	125			55				-	-		60			11	19.1	16.5				2.6	4	
		90125R-2-8T	MTO	16		2																31				2.4	5	
		90160R-1-8T	□	8		1	160	100	50.8	70												16.5				4.3	4	
		90160R-2-8T	MTO	16		2																31				4.1	5	
		90200R-1-10T	□	10	10	1	200	130	47.625	-	-	18	26			101.6			32	14	25.4	16.5				6.7	6	
		90200R-2-10T	MTO	20		2																31				6.6	7	
		90250R-1-12T	□	12	12	1	250															16.5				12.6	6	
		90250R-2-12T	MTO	24		2																31				12.5	7	
		90315R-1-14T	□	14	14	1	315	220				17	27	22	32	-			25			16.5				16.1	8	
		90315R-2-14T	MTO	28		2																31				16		

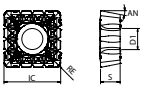
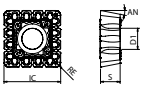
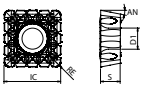
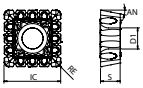
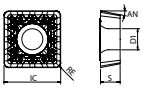
● : Standard item R : Right-hand only L : Left-hand only □ : Check availability MTO : Made to order

SPMT

Classification of usage

★ : Roughing / 1st Choice
☆ : Roughing / 2nd Choice
■ : Finishing / 1st Choice
□ : Finishing / 2nd Choice
(In case hardness is 45HRC or under)

Carbon steel / Alloy steel		★	P
Mold and die steel		★	P
Austenitic stainless steel			M
Martensitic stainless steel			M
Precipitation hardening stainless steel			M
Gray cast iron	★		K
Nodular cast iron	★		K
Non-ferrous metals			N
Heat-resistant alloy			S
Titanium alloy			S
Hard materials			H

Insert	Description	No. of edges	Dimension (mm) IC	S	D1	RE	Angle (°) AN	Carbide PVD PR1810	PVD PR1835	Applicable toolholder ➡ M159
  3-notch	SPMT 180616EN-NB3	4	18	6.35	6.8	1.6	11	●	●	MSRS90...
  3-notch / Low cutting force	SPMT 180616EN-NB3P	4	18	6.35	6.8	1.6	11	●	●	MSRS90...
  4-notch	SPMT 180616EN-NB4	4	18	6.35	6.8	1.6	11	●	●	MSRS90...
  4-notch / Low cutting force	SPMT 180616EN-NB4P	4	18	6.35	6.8	1.6	11	●	●	MSRS90...
  Without notch	SPMT 180616EN-V	4	18	6.35	6.8	1.6	11	●	●	MSRS90...

Recommended cutting conditions ➡ M161

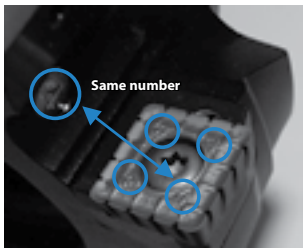
● : Standard item R : Right-hand only L : Left-hand only □ : Check availability

Caution when installing notched insert

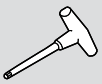
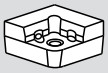
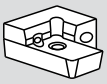
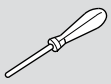
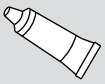
It is important to install the appropriate notched insert into the correct position. If it is installed in incorrect position, the tool cannot cut the workpiece and it may damage the toolholder body. For MSRS90, notched insert location indicator is marked at insert installed pocket of the cutter body.

Description		No. of inserts	No. of flutes	No. of stages	No. of inserts	
					Notched	
					NB3(P)	NB4(P)
MSRS	90100R-1-6T	6	6	1	3	3
	90100R-2-6T	12		2	6	6
	90100R-4-6T	24		4	12	12

When installing the inserts, match the number on the top surface of insert to the number of the cutter body.



Spare parts

Description			Spare parts							
			Clamp screw	Wrench	Cartridge		Clamp screw	Wrench	Anti-seize compound	Mounting bolt
					MAP-1806M 	MAP-1806S  (Bottom edge only)				
Without cartridge	MSRS	90080R-○-4T-M	SB-60120TR	TT-25L	-	-	-	-	P-37	HH12X35
		90100R-○-6T-M								-
		90125R-○-8T-M								
With cartridge	MSRS	90160R-○-8T-M ~ 90315R-○-14T-M			MAP-1806M*1	MAP-1806S*2	SB-40140TR	DT-15		
					Recommended tightening torque for cartridge clamp 3.5N·m					
Without cartridge	MSRS	90080R-○-4T	Recommended tightening torque for insert clamp 7.5N·m		-	-	-	-		HH16X45
		90100R-○-6T								HH20X55
		90125R-○-8T								-
With cartridge	MSRS	90160R-○-8T ~ 90315R-○-14T			MAP-1806M*1	MAP-1806S*2	SB-40140TR	DT-15		
					Recommended tightening torque for cartridge clamp 3.5N·m					

Notes: *1: MAP-1806M is only for the bottom edge (1st stage) of MSRS90..R-1.

*2: MAP-1806S is only for the bottom edge (1st stage) of MSRS90..R-2... Use it only for the bottom edge (1st stage).

How to attach the cartridge: You need to tighten 2 clamp screws to fix the cartridge. Tighten the slant screw first and then tighten the other screw.

Coat anti-seize compound thinly on portion of taper and thread when insert is fixed.

Recommended cutting conditions

Workpiece material	fz (mm/t)		Vc (m/min)	
	Standard NB3+NB4	Low cutting force NB3P+NB4P	MEGACOAT NANO EX	
			PR1810	PR1835
Soft steel	0.1~**0.2**~0.25	0.1~**0.2**~0.25	-	★ 120~**150**~220
Carbon steel	0.1~**0.2**~0.25	0.1~**0.2**~0.25	-	★ 100~**150**~200
Alloy steel	0.1~**0.15**~0.2	0.1~**0.15**~0.2	-	★ 100~**150**~200
Mold steel	0.1~**0.15**~0.2	0.1~**0.12**~0.15	-	★ 100~**150**~180
Gray cast iron	0.1~**0.2**~0.3	0.1~**0.2**~0.25	★ 100~**180**~250	-
Nodular cast iron	0.1~**0.2**~0.25	0.1~**0.18**~0.2	★ 100~**180**~220	-
Stainless steel	Not recommended			
Aluminum/Copper	Not recommended			

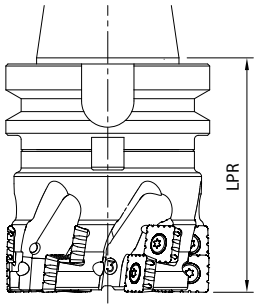
★: 1st Recommendation ☆: 2nd Recommendation

Cutting conditions (Shouldering)

In case of MSRS90100R-1-6T

Workpiece material	Overhang length LPR(mm)	Cutting conditions		(ap × ae)	Chip evacuation rate (cc/min)
		Cutting speed Vc (m/min)	Feed fz (mm/t)		
Cast iron	Less than 120mm	180	0.2	15 × 80	826
	120~200mm	180	0.2	15 × 40	413
	201mm and over	230	0.1	15 × 40	263
Carbon steel	Less than 120mm	150	0.2	15 × 80	689
	120~200mm	150	0.2	15 × 40	344
	201mm and over	200	0.1	15 × 40	229

Overhang length LPR(mm)



In case of MSRS90100R-2-6T

Workpiece material	Overhang length LPR(mm)	Cutting conditions		(ap × ae)	Chip evacuation rate (cc/min)
		Cutting speed Vc (m/min)	Feed fz (mm/t)		
Cast iron	Less than 120mm	180	0.2	30 × 50	1,032
	120~200mm	180	0.2	30 × 30	619
	201mm and over	230	0.1	30 × 25	329
Carbon steel	Less than 120mm	150	0.2	30 × 50	861
	120~200mm	150	0.2	30 × 30	517
	201mm and over	200	0.1	30 × 25	287

In case of MSRS90100R-4-6T

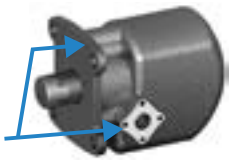
Workpiece material	Overhang length LPR(mm)	Cutting conditions		(ap × ae)	Chip evacuation rate (cc/min)
		Cutting speed Vc (m/min)	Feed fz (mm/t)		
Cast iron	Less than 140mm	180	0.2	60 × 20	826
	140~200mm	180	0.2	60 × 10	413
	201mm and over	230	0.1	60 × 10	263
Carbon steel	Less than 140mm	150	0.2	60 × 20	689
	140~200mm	150	0.2	60 × 10	344
	201mm and over	200	0.1	60 × 10	229

Case studies

Nodular Cast Iron

Industrial parts
- Vc=150m/min
- ap x ae=6 x 65mm
- fz=0.15mm/t
(Vf=430mm/min)

MSRS90100R-1-6T(ø100 -6 flutes)
SPMT180616EN-NB3/NB4
(PR1210)



MSRS90(PR1210)	**Chip evacuation rate = 258cc/min**
Competitor B	107cc/min

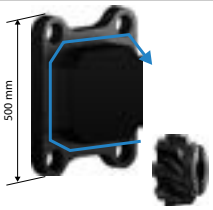
- MSRS90 more than doubled the machining efficiency compared with competitor B.
- Competitor B machined with 2 passes (ap x ae=3 x 65mm).
  MSRS90 machined with only 1 pass.
- Cutting time was reduced.

(User evaluation)

20CrM05

Construction machine part
- Vc=200m/min
- ap x ae=10 x 50mm
- fz=0.1mm/t
(Vf=400mm/min)

MSRS90125R-1-8T(ø125 -8 flutes)
SPMT180616EN-NB3/NB4
(PR1230)



MSRS90(PR1230)	**Chip evacuation rate = 200cc/min**
Competitor C	153cc/min

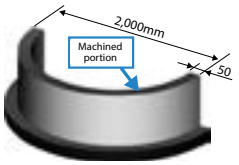
- MSRS90 improved the machining efficiency to 1.3 times that of competitor C.
- Competitor C machined with ap x ae=5 x 50mm
- Tool cost is reduced to 1/3 although competitor C is expensive using 2-corner insert.
  MSRS90 reduced machining cost as well as improved machining efficiency.

(User evaluation)

Mold steel

Shipbuilding parts
- Vc=150m/min
- ap x ae=10 x 10~50mm
- fz=0.1mm/t
(Vf=240mm/min)

MSRS90160R-1-8T(ø160 -8 flutes)
SPMT180616EN-NB3/NB4
(PR1230)



MSRS90(PR1230)	**Chip evacuation rate = 120cc/min**
Competitor D	60cc/min

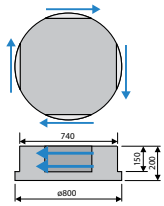
- MSRS90 more than doubled the machining efficiency compared with competitor D.
- Competitor D machined with ap x ae=5 x 10~50mm
  → Low cutting force of MSRS90 enabled twice as large ap as that of competitor.
- It can double the ap as well as increase the cutting speed (Vc=100 → 150).
  → Machining efficiency was improved by MSRS90 (by achieving reduction in cutting time).

(User evaluation)

Alloy steel

Power generation parts
- Vc=160m/min
- ap x ae=10 x 0~20mm
- fz=0.15mm/t
(Vf=500mm/min)

MSRS90125R-1-8T(ø125 -8 flutes)
SPMT180616EN-NB3/NB4
(PR1230)



MSRS90(PR1230)	**12 surfaces/edge**
Competitor E	8 surfaces/edge

- MSRS90 showed 1.5 times longer tool life than that of competitor E.
- Competitor E machined with 2 passes on a side (ap x ae=12 x 0 to 10mm).
- Competitor E was poor in feed rate (Vf=400mm/min).
  → Machining efficiency was improved by MSRS90 (by achieving reduction in cutting time).
- Although competitor E is load due to high cutting force. MSRS90 operates fairly quietly.

(User evaluation)