



MSRS90

- ◆ **Notched Inserts**
Reduce Cutting Forces
When Entering the Workpiece
Stable Machining without Chattering
- ◆ **Smooth Chip Evacuation**
Prevents Fracturing Caused by Biting Chips
- ◆ **MEGACOAT NANO**
For Extended Tool Life
High Machining Efficiency with a
Significant Reduction in Cutting Costs

MSRS90

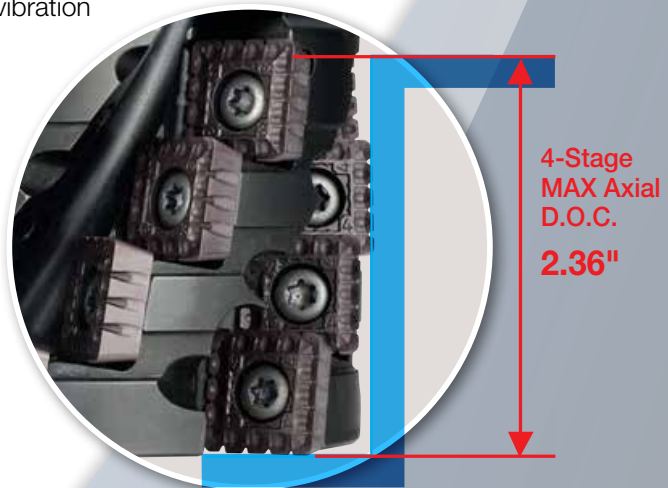
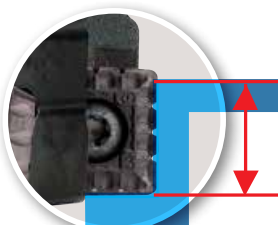
Multiple Cutting Edge Lengths Available

1, 2, and 4-Stage (ø3.00in, ø80mm, ø100mm)

MSRS90

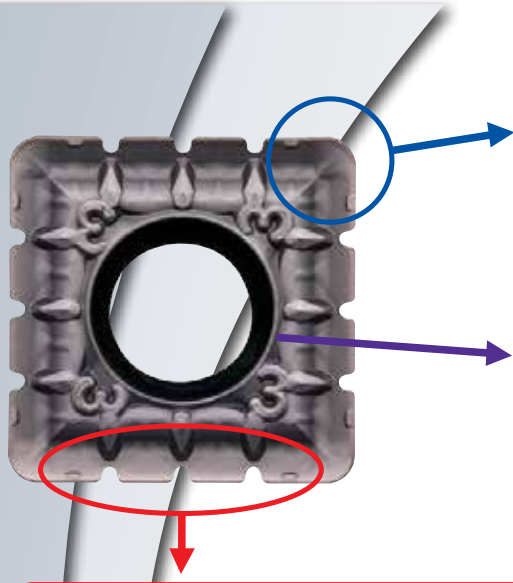
Features

- Hi-efficiency cutter with low cutting forces and reduced vibration
- Smooth chip evacuation
- MEGACOAT technology for extended tool life




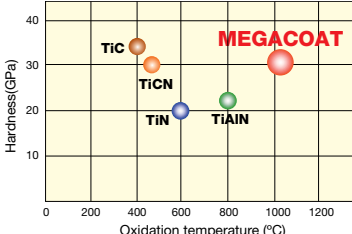
Hi-Efficiency Notched

Neutral-Handed Inserts



Neutral-handed inserts offer expansive possibilities for custom-designed cutters

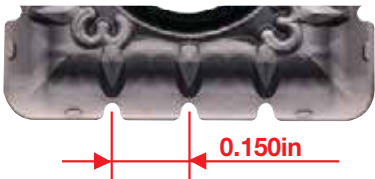
MEGACOAT Technology for extended tool life

Coating	Oxidation temperature (°C)	Hardness (GPa)
TiC	~400	~35
TiCN	~450	~30
TiN	~600	~20
TiAlN	~800	~25
MEGACOAT	~1000	~35

MEGACOAT combines high strength and fracture resistance for long tool life

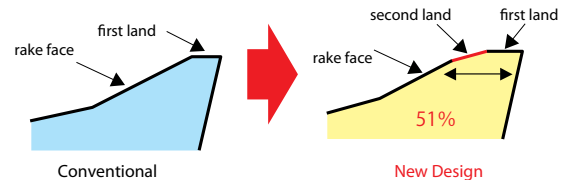
Notched inserts for lower cutting forces



- Notched inserts break chips into smaller pieces and reduce cutting forces.
- Available for high feed cutting due to lower cutting forces at workpiece entry.
- New, double-land edge prep improves the cutting edge strength, while a small notch helps to reduce cutting forces



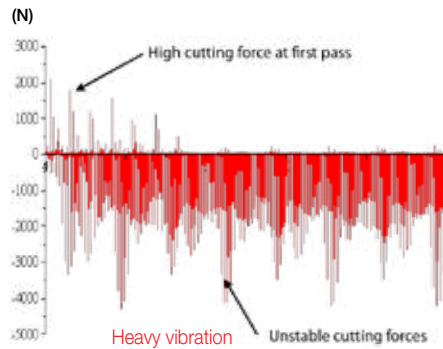
- Neutral insert hand cutters
- Available for various cutting angles
- Cutting edge length 0.709in



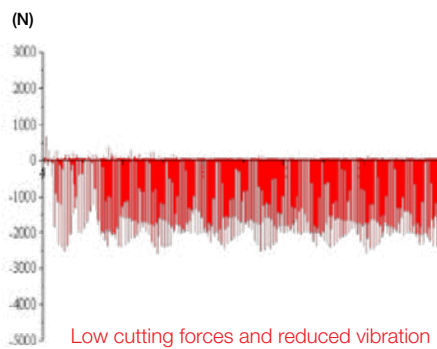
Edge Preparation

Low Cutting Forces (effect of notched inserts)

Comparison of cutting forces

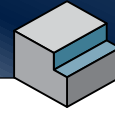


Competitor A



MSRS90

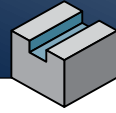
Notched inserts provide lower cutting forces and reduce vibration



Shouldering



Facing

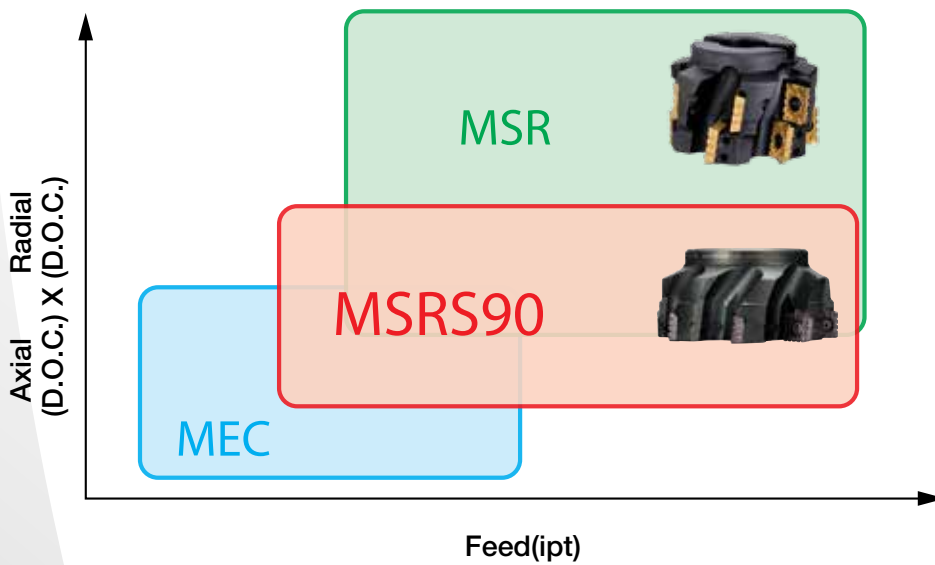


Slotting

MSRS90








Application Range

(standard toolholder)

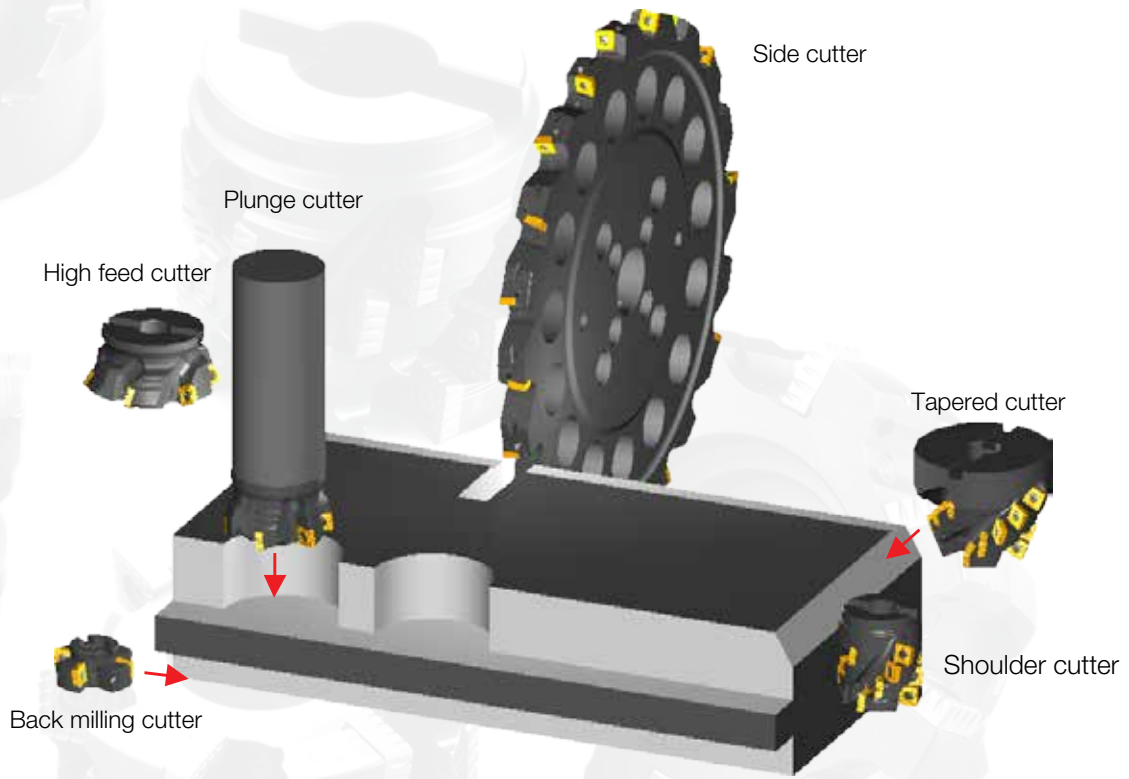


Insert Cross-Section

With new inserts available for numerous applications

Application	3 notches		4 notches		Solid Edge
General purpose 1st Recommendation	 NB3	+	 NB4		
Low cutting force	 NB3P	+	 NB4P		
Emphasis on edge strength	( NB3	or	 NB4) +	 -V

Various Cutting Possibilities



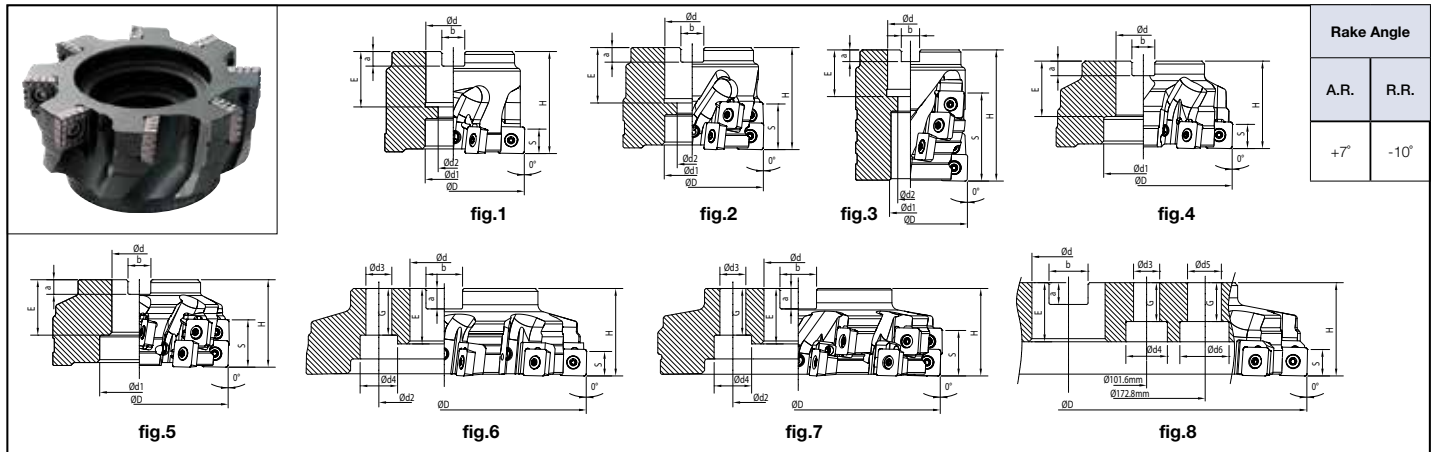
- **Setting Shaft Length**



Custom-Design and Standard

Toolholders

MSRS90



Toolholder Dimension (Inches)

Description	Stock	No. of Inserts	No. of Flute	No. of Stage	Dimension (inch)													Shape	Weight (lbs)					
					ϕD	ϕd	$\phi d1$	$\phi d2$	H	E	a	b	S	$\phi d3$	$\phi d4$	G								
MSRS 903000R-1-4T	●	4	4	1	3.00																		Fig.1	2.43
903000R-2-4T	●	8	4	2	3.00	1.00	0.87	0.55		2.36	1.06	0.24	0.38										Fig.2	2.21
903000R-4-4T	●	16	4	4	3.00					3.35													Fig.3	3.50
904000R-1-6T	●	6	6	1	4.00																		Fig.4	4.41
904000R-2-6T	●	12	6	2	4.00	1.50	2.05			2.76	1.14		0.625										Fig.5	3.97
905000R-1-8T	●	8	8	1	5.00																		Fig.4	5.73
906000R-1-8T	●	8	8	1	6.00	2.00	2.76			2.36	1.50	0.43	0.75										Fig.4	7.50
908000R-1-10T	●	10	10	1	8.00	2.50		4			1.58	0.55	1.01										Fig.6	13.23
901000R-1-12T	●	12	12	1	10.00																		Fig.6	27.49


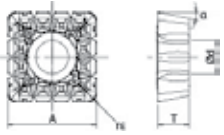

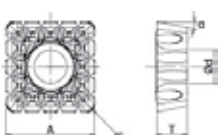

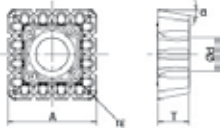

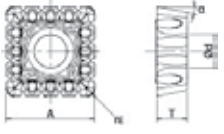

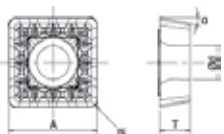
Toolholder Dimension (Metric)

● : Stock Std.

Description	Stock	No. of Inserts	No. of Line	No. of Stage	Dimension (mm)													Shape	Weight (kg)							
					ϕD	ϕd	$\phi d1$	$\phi d2$	H	E	a	b	S	$\phi d3$	$\phi d4$	$\phi d5$	$\phi d6$			G						
Bore ϕ inch	Without Cartridge	MSRS 90080R-1-4T	○	4	4	1					60													Fig.1	1.4	
		90080R-2-4T	○	8	4	2					80	31.75	27	18		32	8	12.7							Fig.2	1.2
		90080R-4-4T	○	16	4	4																			Fig.3	1.5
		90100R-1-6T	○	6	6	1																			Fig.1	2.3
		90100R-2-6T	○	12	6	2					100			39	21										Fig.2	2.1
		90100R-4-6T	MTO	24	6	4																			Fig.3	3.2
	With Cartridge	MSRS 90125R-1-8T	○	8	8	1					125													Fig.4	2.6	
		90125R-2-8T	MTO	16	8	2																		Fig.5	2.4	
		90160R-1-8T	○	8	8	1					160	50.8	70											Fig.4	4.3	
		90160R-2-8T	MTO	16	8	2																		Fig.5	4.1	
		90200R-1-10T	○	10	10	1					200													Fig.6	6.7	
		90200R-2-10T	MTO	20	10	2																		Fig.7	6.6	
Bore ϕ mm	Without Cartridge	MSRS 90250R-1-12T	○	12	12	1					250	47.625		101.6										Fig.6	12.6	
		90250R-2-12T	MTO	24	12	2																	Fig.7	12.5		
		90315R-1-14T	○	14	14	1					315												Fig.8	16.1		
		90315R-2-14T	MTO	28	14	2																	-	16.0		
		MSRS 90080R-1-4T-M	○	4	4	1					80	27	20	13		60	7	12.4						Fig.1	1.3	
		90080R-2-4T-M	○	8	4	2																		Fig.2	1.1	
	With Cartridge	MSRS 90080R-4-4T-M	○	16	4	4																	Fig.3	1.4		
		90100R-1-6T-M	○	6	6	1																	Fig.1	2.2		
		90100R-2-6T-M	○	12	6	2					100	32	45										Fig.2	2.0		
		90100R-4-6T-M	MTO	24	6	4																	Fig.3	3.1		
		90125R-1-8T-M	○	8	8	1					125												Fig.4	2.6		
		90125R-2-8T-M	MTO	16	8	2																	Fig.5	2.4		
With Cartridge	MSRS 90160R-1-8T-M	○	8	8	1					160												Fig.6	4.2			
	90160R-2-8T-M	MTO	16	8	2																	Fig.7	4.0			
	90200R-1-10T-M	○	10	10	1					200												Fig.6	6.7			
	90200R-2-10T-M	MTO	20	10	2																	Fig.7	6.6			
	90250R-1-12T-M	○	12	12	1					250	60		101.6										Fig.6	12.6		
	90250R-2-12T-M	MTO	24	12	2																	Fig.7	12.5			
	90315R-1-14T-M	○	14	14	1					315												Fig.8	16.1			
	90315R-2-14T-M	MTO	28	14	2																	-	16.0			

○ : World Express
MTO : (Made to Order)


Applicable Inserts

Shape		Description		Dimension (in)				Angle (°)	MEGACOAT	
				A	T	ød	rε	α	PR1230 (Steel)	PR1210 (Cast Iron, Titanium)
 3 notches		SPMT	180616EN-NB3	0.709	0.250	0.268	0.063	11°	●	●
 4 notches			180616EN-NB4						●	●
 3 notches Low resistance		SPMT	180616EN-NB3P	0.709	0.250	0.268	0.063	11°	●	●
 4 notches Low resistance			180616EN-NB4P						●	●
 Without notches		SPMT	180616EN-V	0.709	0.250	0.268	0.063	11°	●	●

●: Stock Std.

Use Caution when installing notched inserts:

It is important to install the appropriate notched insert into the correct position. Failure to do so may result in damage to the cutter body. The appropriate insert is marked on the pocket of the cutter body.



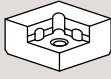

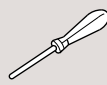

 How to install the insert, Refer to Page 8

Description	Total No. of Stages	No. of Flutes	No. of Inserts	No. of Inserts	
				Notched	
				NB3(P)	NB4(P)
MSRS 903000R-1-4T	1	4	4	2	2
903000R-2-4T	2		8	4	4
903000R-4-4T	4		16	6	6



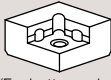

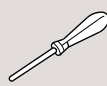



Parts

Spare Parts (Inch)

Description			Spare Parts					Arbar Clamp Screw				
			Insert Clamp Screw	Wrench	Cartridge	Cartridge Screw	Wrench		Anti-seize Compound			
												
Without Cartridge	MSRS	903000R-1-4T	SB-60120TR	TT-25L	-	-	-	MP-1	HH16-45			
		903000R-2-4T										
		903000R-4-4T										
Without Cartridge	MSRS	904000R-1-6T			SB-60120TR	TT-25L	-		-	-	MP-1	HH20-55
		904000R-2-6T										
		905000R-1-8T										
With Cartridge	MSRS	906000R-1-8T	SB-60120TR	TT-25L			MAP-1806M	SB-40140TR	DT15	MP-1		-
		908000R-1-10T										
		901000R-1-12T										

Spare Parts (Metric)

Description			Spare Parts					Arbar Clamp Screw				
			Insert Clamp Screw	Wrench	Cartridge	Cartridge Screw	Wrench		Anti-seize Compound			
					 (For bottom edge of applicable 1, 2, or 4 stage cutters)							
Without Cartridge	MSRS	90080R-○-4T	SB-60120TR	TT-25L	-	-	-	MP-1	HH16x45			
		90100R-○-6T							HH20x55			
		90125R-○-8T										
With Cartridge	MSRS	90160R-○-8T			SB-60120TR	TT-25L	MAP-1806M *1		SB-40140TR	DT-15	MP-1	-
		~					<div style="border: 1px solid black; padding: 5px; text-align: center;"> 3.5Nm for Cartridge Tightening Torque </div>					
Without Cartridge	MSRS	90080R-○-4T-M					SB-60120TR		TT-25L	-		-
		90100R-○-6T-M										
		90125R-○-8T-M										
With Cartridge	MSRS	90160R-○-8T-M	SB-60120TR	TT-25L				MAP-1806M *1		SB-40140TR		DT-15
		~			<div style="border: 1px solid black; padding: 5px; text-align: center;"> 3.5Nm for Cartridge Tightening Torque </div>							
Without Cartridge	MSRS	90080R-○-4T-M			SB-60120TR	TT-25L		-		-	-	MP-1
		90100R-○-6T-M										
90125R-○-8T-M												
With Cartridge	MSRS	90160R-○-8T-M					SB-60120TR	TT-25L	MAP-1806M *1	SB-40140TR	DT-15	
		~	<div style="border: 1px solid black; padding: 5px; text-align: center;"> 3.5Nm for Cartridge Tightening Torque </div>									
Without Cartridge	MSRS	90080R-○-4T-M	SB-60120TR	TT-25L					-	-	-	
		90100R-○-6T-M										
90125R-○-8T-M												
With Cartridge	MSRS	90160R-○-8T-M			SB-60120TR	TT-25L			MAP-1806M *1	SB-40140TR	DT-15	MP-1
		~					<div style="border: 1px solid black; padding: 5px; text-align: center;"> 3.5Nm for Cartridge Tightening Torque </div>					
Without Cartridge	MSRS	90080R-○-4T-M					SB-60120TR	TT-25L	-	-	-	
		90100R-○-6T-M										
90125R-○-8T-M												
With Cartridge	MSRS	90160R-○-8T-M	SB-60120TR	TT-25L					MAP-1806M *1	SB-40140TR	DT-15	
		~			<div style="border: 1px solid black; padding: 5px; text-align: center;"> 3.5Nm for Cartridge Tightening Torque </div>							

Note) *1: MAP-1806M is only for applicable..R-1..cutters
 *2: MAP-1806S is only for applicable..R-2..bottom edge (1st stage) cartridge. This cartridge is used for bottom edge (1st stage) only.
 How to attach cartridge: To fix the cartridge, tighten the slant screw first, then tighten the other screw.

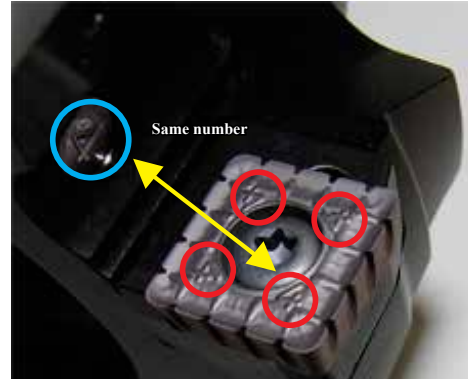
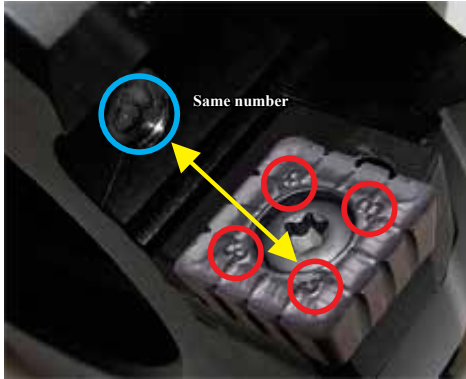


Apply a light coating of Anti-seize Compound (MP-1) on the clamp screw when insert is fixed.

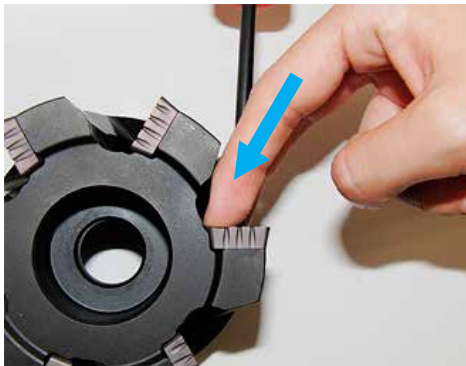
How to Install the Insert

Installation of Notched Inserts

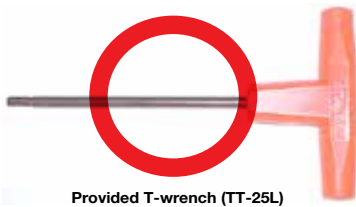
When installing the inserts, match the insert's top surface number to the number on the holder.



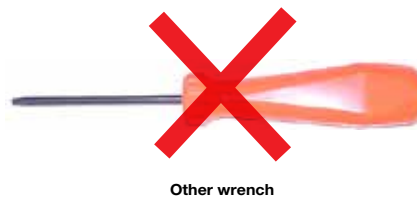
1. Remove dust and chips from the insert mounting pocket.
2. Install inserts by pushing down the insert with a finger.



3. Please use only the T-wrench (TT-25L) provided for insert installation.
*Inserts might not be clamped properly when using a different wrench.

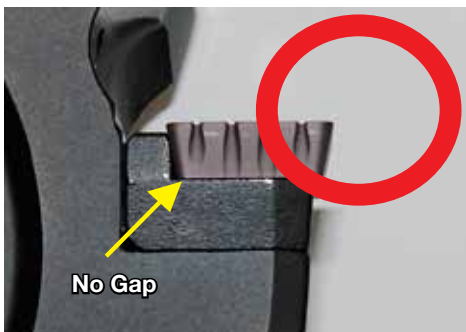


Provided T-wrench (TT-25L)

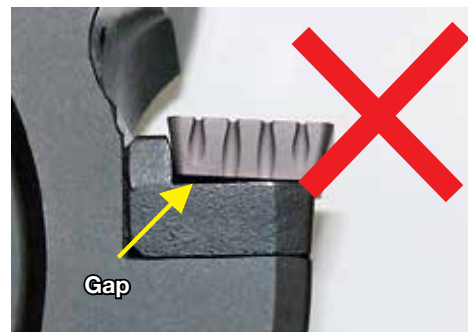


Other wrench

4. When installing the insert, ensure there is no gap between the insert and the cartridge.



No Gap



Gap

5. After each use, additional clamping is recommended using the T-wrench provided.

Cutting Conditions

Recommended Cutting Conditions

Workpiece Material	Feed Rate (ipt)		Cutting Speed (sfm)	
	Standard type NB3+NB4	Low resistance type NB3P+NB4P	MEGACOAT	
			PR1230	PR1210
Soft Steel (SS)	0.004~ 0.008 ~0.010	0.004~ 0.008 ~0.010	★ 390~ 490 ~720	☆ 390~ 490 ~720
Carbon Steel (SxxC)	0.004~ 0.008 ~0.010	0.004~ 0.008 ~0.010	★ 330~ 490 ~660	☆ 330~ 490 ~660
Alloy Steel (SCM)	0.004~ 0.006 ~0.008	0.004~ 0.006 ~0.008	★ 330~ 490 ~660	☆ 330~ 490 ~660
Die Steel (SKD/NAK)	0.004~ 0.006 ~0.008	0.004~ 0.005 ~0.006	★ 330~ 490 ~590	☆ 330~ 490 ~590
Gray Cast Iron (FC)	0.004~ 0.008 ~0.012	0.004~ 0.008 ~0.010	☆ 330~ 590 ~820	★ 330~ 590 ~820
Nodular Cast Iron (FCD)	0.004~ 0.008 ~0.010	0.004~ 0.007 ~0.008	☆ 330~ 590 ~720	★ 330~ 590 ~720
Stainless Steel (SUS304)	Not Recommended			
Non-ferrous Metals	Not Recommended			

★:1st Recommendation ☆:2nd Recommendation

Various Custom Order Cutters



High Feed Cutter



45° Face Mill



Plunge Cutter



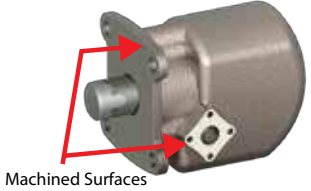
Tapered Cutter



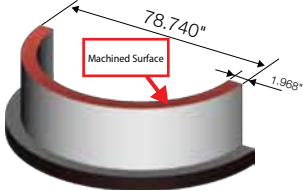
Side Cutter

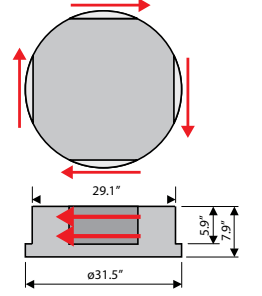
Custom-made cutters can be designed to meet your cutting requirements, such as cutting diameter, cutting angle, and cutting edge length (stages), etc.


Case Studies

Ductile Iron, 60-40-8	
Industrial parts Cutter and inserts MSRS90100R-1-6T($\phi 100\text{mm}$ • 6 flutes) SPMT180616EN-NB3/NB4 (PR1210) • $V_c=490\text{sfm}$ • $a_p \times a_e=0.236" \times 2.559"$ • $f_z=0.006\text{ipt}$ ($V_f=16.929\text{in}/\text{min}$)	 <p>Machined Surfaces</p>
MSRS90(PR1210)	Chip removal 15.7in ³ /min.
Competitor A	6.5in ³ /min.
Results <ul style="list-style-type: none"> MSRS90 doubled the cutting efficiency compared with comp. A. Comp. A required 2 passes ($a_p \times a_e=0.118" \times 2.56"$). MSRS90 completed the cut in only 1 pass. Cutting time reduced <p style="text-align: right;">Customer Evaluation</p>	

Chrome-Moly Steel	
Construction machine parts Cutter and inserts MSRS90125R-1-8T($\phi 125\text{mm}$ • 8 flutes) SPMT180616EN-NB3/NB4 (PR1230) • $V_c=660\text{sfm}$ • $a_p \times a_e=0.394" \times 1.968"$ • $f_z=0.004\text{ipt}$ ($V_f=15.748\text{in}/\text{min}$)	 <p>19.685"</p>
MSRS90(PR1230)	Chip removal 12.2in ³ /min.
Competitor B	9.3in ³ /min.
Results <ul style="list-style-type: none"> MSRS90 improved cutting efficiency to 1.3 times that of comp. B. Comp. B: $a_p \times a_e=0.197" \times 1.968"$ Tool cost reduced to 1/3 since comp. B is a 2-edge insert. MSRS90 reduced machining cost as well as improving cutting efficiency. <p style="text-align: right;">Customer Evaluation</p>	

Tool Steel	
Ship parts Cutter and inserts MSRS90160R-1-8T($\phi 160\text{mm}$ • 8 flutes) SPMT180616EN-NB3/NB4 (PR1230) • $V_c=490\text{sfm}$ • $a_p \times a_e=0.394" \times 0.394-1.968"$ • $f_z=0.004\text{ipt}$ ($V_f=9.449\text{in}/\text{min}$)	 <p>78.740"</p> <p>Machined Surface</p> <p>1.968"</p>
MSRS90(PR1230)	Chip removal 7.32in ³ /min.
Competitor C	3.66in ³ /min.
Results <ul style="list-style-type: none"> MSRS90 doubled the cutting efficiency compared with comp. C. Comp. C: $a_p \times a_e=0.197" \times 0.394-1.968"$, MSRS90 doubled the axial D.O.C. due to low cutting forces. MSRS90 can increase the D.O.C. as well as cutting speed ($V_c=490$). This resulted in total cutting efficiency improvement. (time reduction) <p style="text-align: right;">Customer Evaluation</p>	

Structural Steel	
Power generator parts Cutter and inserts MSRS90125R-1-8T($\phi 125\text{mm}$ • 8 flutes) SPMT180616EN-NB3/NB4 (PR1230) • $V_c=530\text{sfm}$ • $a_p \times a_e=0.394" \times 0-0.787"$ • $f_z=0.006\text{ipt}$ ($V_f=19.685\text{in}/\text{min}$)	 <p>29.1"</p> <p>5.9"</p> <p>2.9"</p> <p>$\phi 31.5"$</p>
MSRS90(PR1230)	12 faces / edge
Competitor D	8 faces / edge
Results <ul style="list-style-type: none"> MSRS90 improved tool life to 1.5 times that of comp. D. Comp. D required 2 passes ($a_p \times a_e=0.472" \times 0-0.394"$) with a low feed rate ($V_f=15.748\text{in}/\text{min}$). MSRS90 improved cutting efficiency. (time reduction) Comp. D was very noisy due to large cutting forces. MSRS90 reduced the cutting force and noise level as well. <p style="text-align: right;">Customer Evaluation</p>	



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