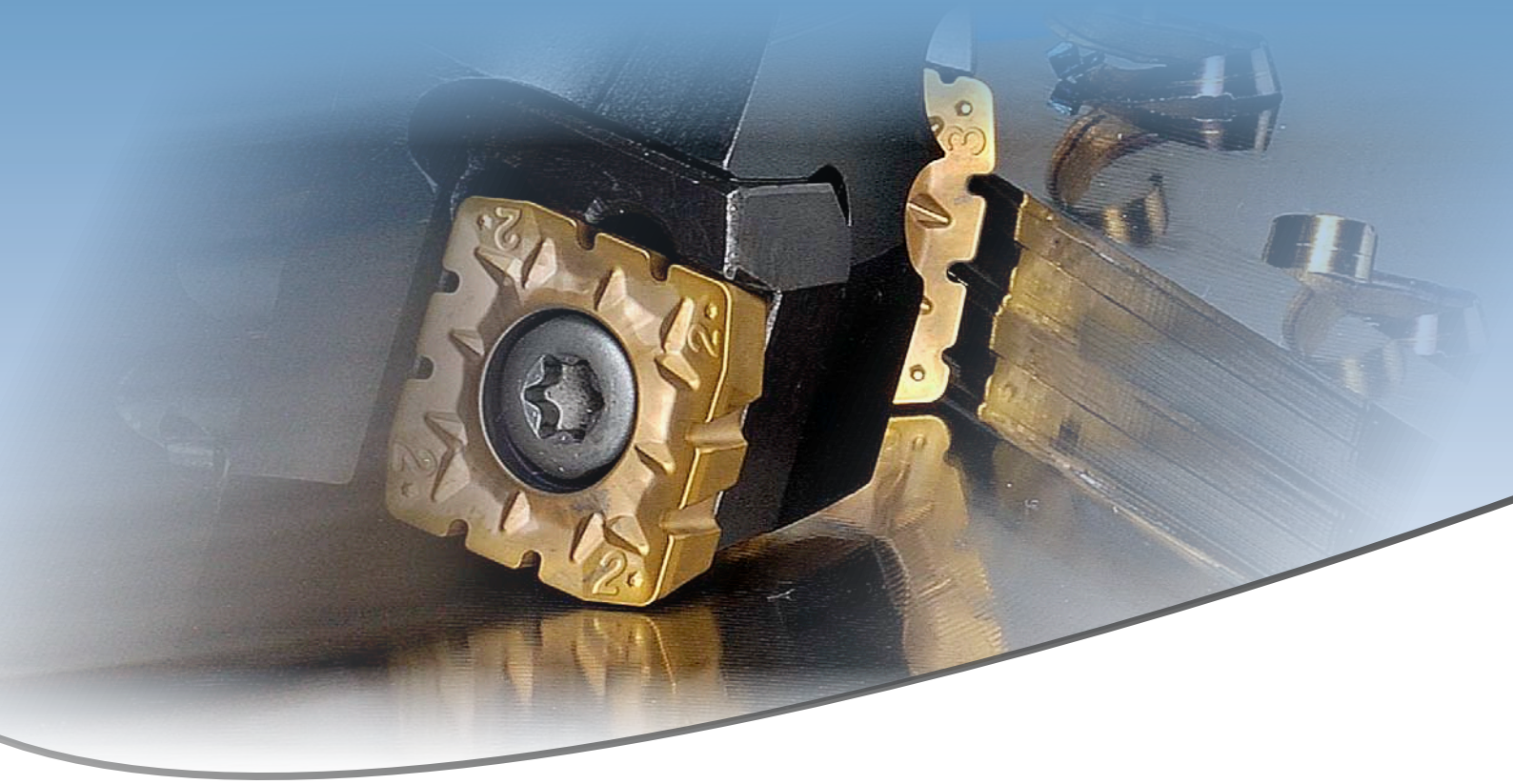
THE NEW VALUE FRONTIER

KYOCERA

MSRS15

Milling Cutter for Heavy Roughing

- Notched insert reduces cutting force, chattering and enables efficient cutting.
- Large depth of cut and high feed rate enable high effi ciency cutting.



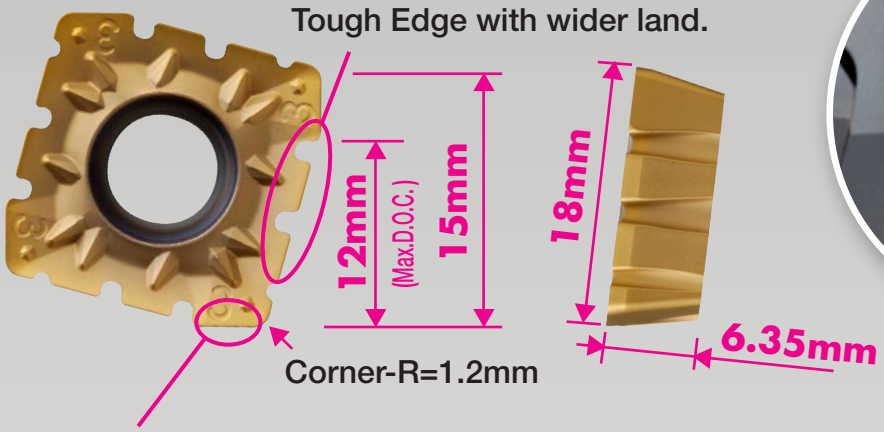
ADVANCING PRODUCTIVITY

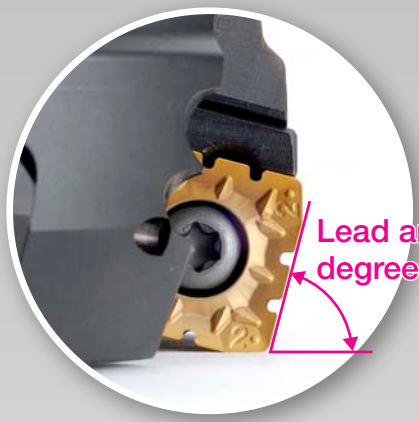
MSRS changes Heavy Milling!

Maximum depth of cut is 12mm

1. Large depth of cut and high feed rate achieve high efficiency machining.

●Recommended depth of cut: 5 to 10mm.





Large wiper edges achieve high feed rate.

Tough insert with thickness of 6.35mm.

A.R. +9°
R.R. –9°(ø80)
–5°(more than ø100)

2. Economical square inserts with four edges

With two notches
NB2

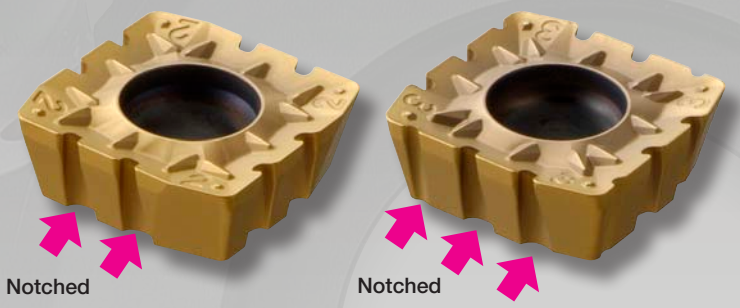
With three notches
NB3

Without notches
V

MonSteR Square Mill MSRS

3. Notched insert reduces cutting force, chattering and enables efficient machining.

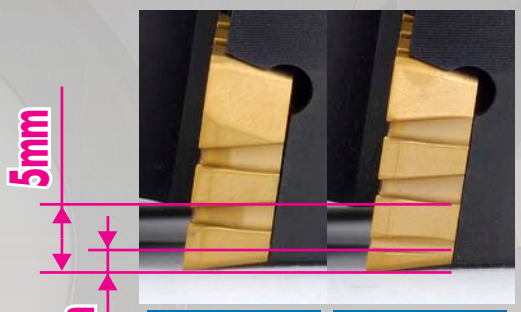
●Notched Insert



NB2 **NB3**

●Notch effect

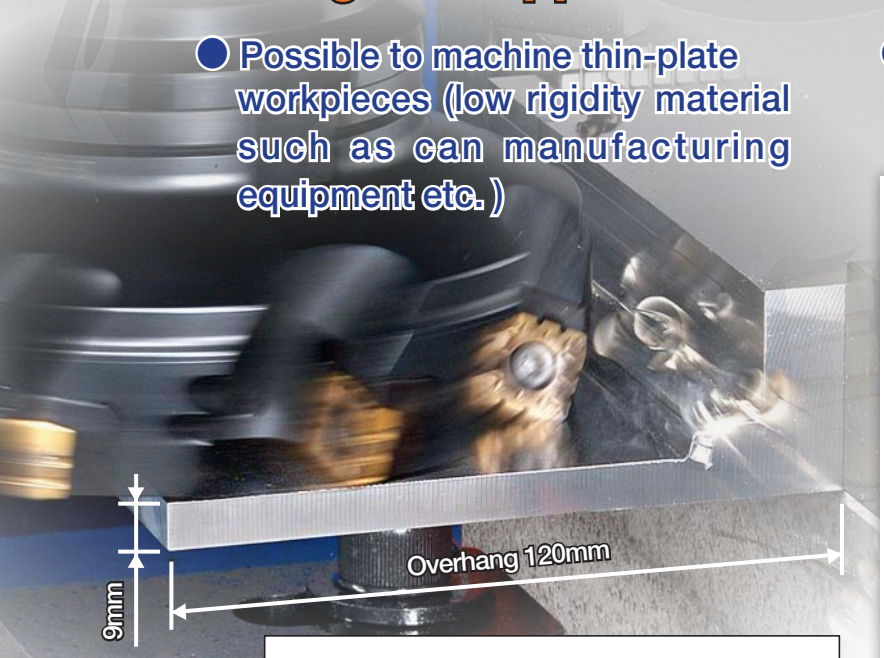
The effects of the notch can be seen at more than 5mm of vertical depth of cut. (effects for NB3 appears from at least 2mm or more)



With two notches **NB2** | With three notches **NB3**

4. Design to suppress chattering with low cutting force.

● Possible to machine thin-plate workpieces (low rigidity material such as can manufacturing equipment etc.)

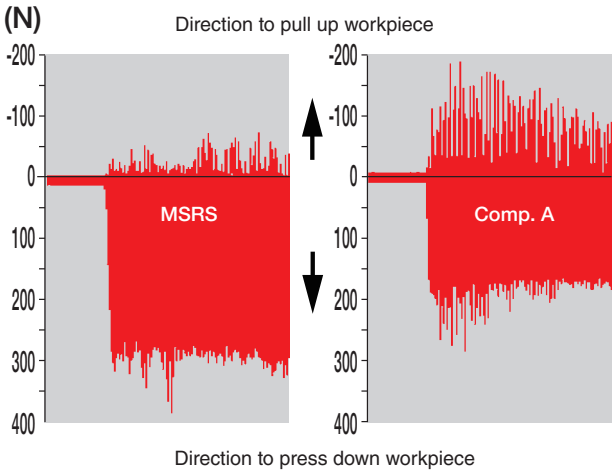


MSRS15160R-8T

Workpiece Material : C50
Vc=200m/min(n=398min^{-1})
fz=0.15mm/t(Vf=477mm/min), ap x ae=6x100mm
(Machining of overhang from 15mm to 9mm)

● Comparison of cutting force (radial force)

MSRS Type suppresses chattering since less force to lift workpiece is needed during machining.



■MSRS

(The photograph shows the standard type.)

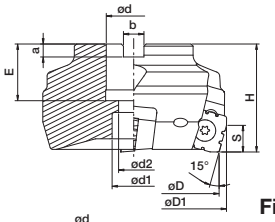


Fig.1

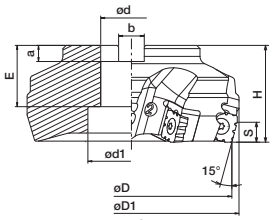


Fig.2

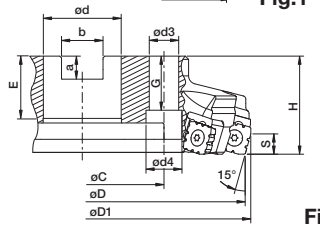


Fig.3

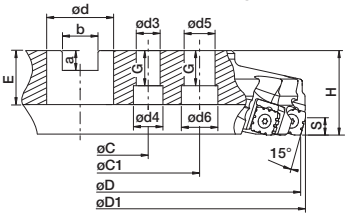


Fig.4

Rake Angle(°)		
Description	A.R.	R.R.
MSRS15080R-···	+9°	-9°
MSRS15100R-··· ~ MSRS15315R-···	+9°	-5°

●Holder dimension

Description			Stock	No. of Insert	Dimension (mm)																	Shape	Weight (kg)
					øD	øD1	ød	ød1	ød2	H	E	a	b	S	ød3	ød4	ød5	ød6	øC	øC1	G		
Standard type	MSRS	15080R-4T-M	●	4	80	87	27	20	13	50	24	7	12.4	12	-	-	-	-	-	-	-	Fig.1	1.3
		15100R-4T-M	●	4	100	107	32	45	-		29	8	14.4									Fig.2	2.0
		15125R-6T-M	●	6	125	132	40	55		60	33	9	16.4										3.6
		15160R-8T-M	●	8	160	167		68															5.0
		15200R-10T-M	●	10	200	207	60	-	-		38	15	25.7		18	26	-	-	101.6	-	32	Fig.3	7.7
		15250R-12T-M	●	12	250	257																	12.0
		15315R-14T-M	●	14	315	322											22	32		177.8		Fig.4	17.0
Multi-edge type	MSRS	15080R-6T-M	●	6	80	87	27	20	13	50	24	7	12.4	12	-	-	-	-	-	-	-	Fig.1	1.3
		15100R-6T-M	●	6	100	107	32	45	-		29	8	14.4									Fig.2	1.9
		15125R-8T-M	●	8	125	132	40	55		60	33	9	16.4										3.5
		15160R-10T-M	●	10	160	167		68															4.9
		15200R-12T-M	●	12	200	207	60	-	-		38	15	25.7		18	26	-	-	101.6	-	32	Fig.3	7.6
		15250R-14T-M	●	14	250	257																	11.9
		15315R-16T-M	○	16	315	322											22	32		177.8		Fig.4	17.0

·Arbor mounting bolts (HH12X35) are included in MSRS15080R-○T Type.
·Cartridge is included in the standard type, but no Cartridge in the multi-edges type.

●: Standard Stock ○: made to order

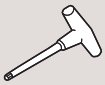
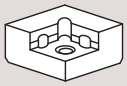
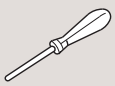
●Holder dimension

Description			Stock	No. of Insert	Dimension (mm)																	Shape	Weight (kg)
					øD	øD1	ød	ød1	ød2	H	E	a	b	S	ød3	ød4	ød5	ød6	øC	øC1	G		
Standard type	MSRS	15080R-4T	●	4	80	87	25.4	20	13	50	26	6	9.5	12	-	-	-	-	-	-	-	Fig.1	1.3
		15100R-4T	●	4	100	107	31.75	42	-		32	8	12.7									Fig.2	2.0
		15125R-6T	●	6	125	132	38.1	54		60	38	10	15.9										3.6
		15160R-8T	●	8	160	167	50.8	68				11	19.0										5.0
		15200R-10T	●	10	200	207	47.625	-	-			14	25.4		18	26	-	-	101.6	-	32	Fig.3	7.7
		15250R-12T	●	12	250	257																	12.0
		15315R-14T	●	14	315	322											22	32		177.8	25	Fig.4	17.0
Multi-edge type	MSRS	15080R-6T	●	6	80	87	25.4	20	13	50	26	6	9.5	12	-	-	-	-	-	-	-	Fig.1	1.3
		15100R-6T	●	6	100	107	31.75	42	-		32	8	12.7									Fig.2	1.9
		15125R-8T	●	8	125	132	38.1	54		60	38	10	15.9										3.5
		15160R-10T	●	10	160	167	50.8	68				11	19.0										4.9
		15200R-12T	●	12	200	207	47.625	-	-			14	25.4		18	26	-	-	101.6	-	32	Fig.3	7.6
		15250R-14T	●	14	250	257																	11.9
		15315R-16T	○	16	315	322											22	32		177.8	25	Fig.4	17.0

·Arbor mounting bolts (HH12X35) are included in MSRS15080R-○T Type.
·Cartridge is included in the standard type, but no Cartridge in the multi-edges type.

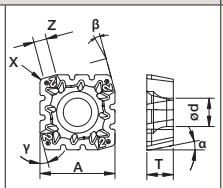
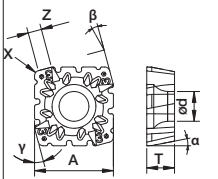
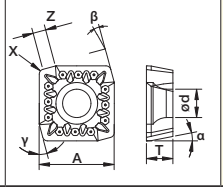
●:Standard Stock ○: made to order

●Parts

Description		Spare Part						
		Clamp Screw	Wrench	Cartridge	Clamp Screw	Wrench	Anti-seize Compound	Arbar Clamp Screw
								
Standard type	MSRS 15080R-○○(M)	SB-60120TR	TT-25L	MAP-1806	SB-40140TR	DT-15	MP-1	HH12×35
	MSRS 15100R-○○(M) ~ 15315R-○○(M)	for Insert Clamp Tightening Torque 7.5Nm		for Insert Clamp Tightening Torque 3.5Nm				-
Multi-edge type	MSRS 15080R-○○(M)	SB-60120TR	TT-25L	-	-	-	MP-1	HH12×35
	MSRS 15100R-○○(M) ~ 15315R-○○(M)	for Insert Clamp Tightening Torque 7.5Nm						-

·Coat Anti-seize Compound (MP-1) thinly on clamp screw when insert is fixed.

●Applicable Insert

Shape		Description	Dimension(mm)					Angle(°)			PVD Coated			Applicable Toolholder
			A	T	ød	X	Z	α	β	γ	PR660	PR830	PR905	
 With two notchs		SPMT 1806EDER-NB2	18	6.35	6.8	R1.2	3.1	11°	15°	15°	●	●	●	MSRS… MSRS…M
 With three notchs		SPMT 1806EDER-NB3	18	6.35	6.8	R1.2	3.1	11°	15°	15°	●	●	●	
 Without notch		SPMT 1806EDER-V	18	6.35	6.8	R1.2	3.1	11°	15°	15°	●	●	●	

●:Standard Stock

■Insert Grades

Workpiece Material	Good wear resistance ⟷ Good fracture resistance
Steel	PR830, PR660
Cast Iron	PR905, PR830

■Combination of inserts

1st Recommendation	
Emphasis on edge strength and biting	
Emphasis on edge strength	

Inserts are sold in 10 piece boxes.

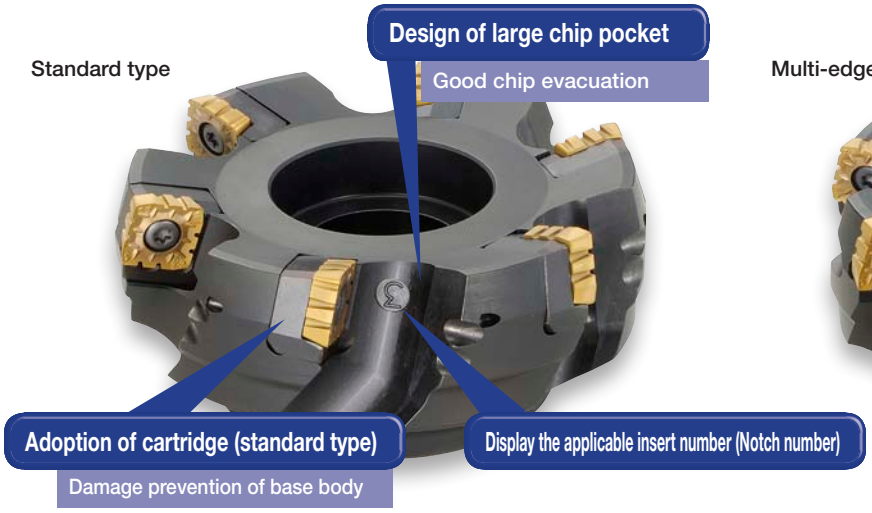
●Recommended Cutting Condition

Workpiece Material	Feed Rate (mm/t)	Recommended Insert Grades (Speed Vc:m/min)		
		PVD Coated Carbide		
		PR660	PR830	PR905
Carbon Steel	0.2	☆ 150~200	★ 180~220	-
Alloy Steel	0.2	☆ 150~200	★ 180~220	-
Die Steel	0.15	☆ 120~180	★ 150~200	-
Gray Cast Iron	0.25	-	☆ 180~220	★ 150~250
Nodular Cast Iron	0.2	-	☆ 180~220	★ 180~220
Stainless Steel	-	Not Recommended		
Non-ferrous Material	-	Not Recommended		

★:1st Recommendation ☆:2nd Recommendation

●Cutter body advantage

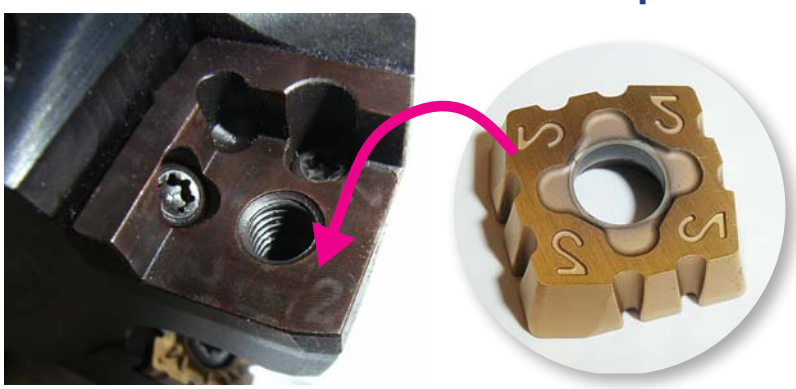
Standard type



Multi-edge type

Higher productivity due to multi-edge design

More definite distinction at insert replacement



Transcribe letters by using load during machining.

*Depending on the cutting conditions,marks are not transcribed.

Q&A

Q-1 What is the target cutting width toward diameter (ae)?

A-1 Recommendation is 70 to 80% of cutter diameter.

Q-2 Why is the cutting edge angle 75 degrees of MSRS type?

A-2 Type with 45 degree cutting edge angle suppresses the impact of cutting into workpiece, but has bigger radial force. Meanwhile, type with 90 degree cutting edge angle has smaller radial force, but bigger impact on cutting into workpiece. The MSRS cutter with 75 degree cutting edge angle generates small radial force even on large depth of cut, as well as less impact on approaching, and, due to its well-balanced design, enables smooth machining.

The chip evacuation volume with MSRS is much more than conventional tools.

Conventional tools

The chip evacuation per unit time is increased considerably.

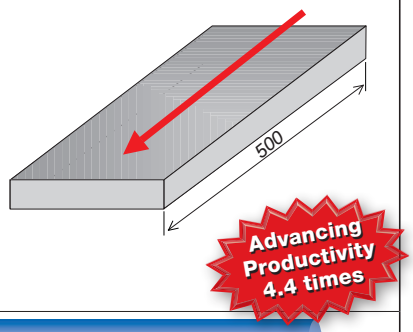
MSRS

Case studies

1.0040

Plate

·Vc=150m/min
(n=382min^{-1})
·apxae=10×125mm
·fz=0.2mm/t
(Vf=458mm/min)
·Dry
·6edges
·MSRS15125R-6T
·SPMT1806EDER-NB2
·SPMT1806EDER-NB3
(PR830)



MSRS Chip removal 572cc/min.

Competitor Cutter A 129cc/min.

(Competitor Cutter A)
ø125,6edges
Vc=150m/min
(n=382min^{-1})
ap×ae=3×125mm
fz=0.15mm/t
(Vf=344mm/min)

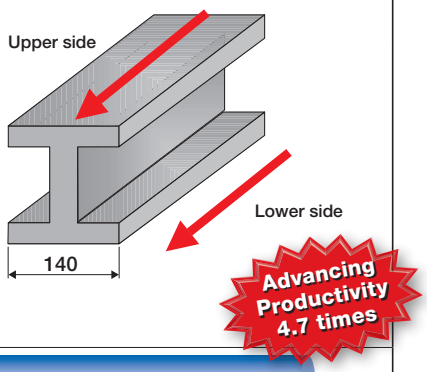
(User comment)
Improvement of the condition to a large extent results in time reduction. Productivity has improved 4.4 times.

(Evaluation by the user)

C50

Rail

·Vc=150m/min
(n=300min^{-1})
·apxae=6×140mm
·fz=0.2mm/t
(Vf=480mm/min)
·Dry
·8edges
·MSRS15160R-8T
·SPMT1806EDER-NB2
·SPMT1806EDER-NB3
(PR830)



MSRS Chip removal 403cc/min.

Competitor Cutter B 84cc/min.

(Competitor Cutter B)
2mmx3pass
Vc=150m/min
(n=300min^{-1})
ap×ae=2×140mm
fz=0.125mm/t
(Vf=300mm/min)

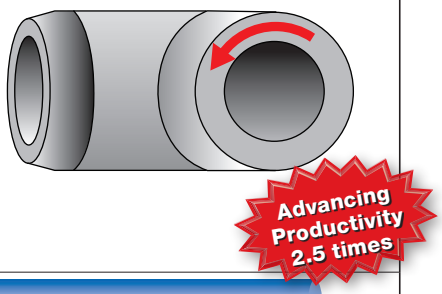
(User comment)
MSRS enabled one pass cutting, while it formerly took three pass. Still, the MSRS has less cutting noise. Productivity has improved 4.7 times.

(Evaluation by the user)

Cast steel

Industrial machinery components

·Vc=100m/min
(n=200min^{-1})
·apxae=10×114mm
·fz=0.4mm/t
(Vf=635mm/min)
·Dry
·8edges
·MSRS15160R-8T
·SPMT1806EDER-NB2
·SPMT1806EDER-NB3
(PR830)



MSRS Chip removal 724cc/min.

Competitor Cutter C 290cc/min.

(Competitor Cutter C)
6inch Dia., 8edges
Vc=250m/min
(n=522min^{-1})
ap×ae=2.5×114mm
fz=0.25mm/t
(Vf=1016mm/min)

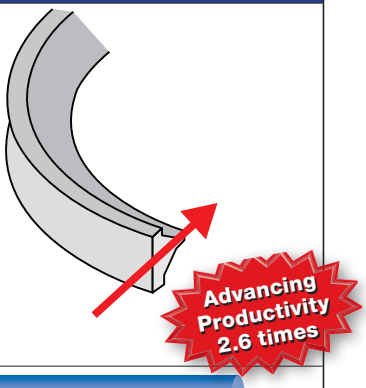
(User comment)
Although conventional type could not increase depth of cut due to high cutting force, MSRS has enabled to increase depth of cut without increasing spindle load. Productivity increased 2.5 times.

(Evaluation by the user)

C45

Gear

·Vc=200m/min
(n=255min^{-1})
·apxae=10×200mm
·fz=0.17mm/t
(Vf=600mm/min)
·Dry
·14edges
·MSRS15250R-14T
·SPMT1806EDER-NB2
·SPMT1806EDER-NB3
(PR830)



MSRS Chip removal 1200cc/min.

Competitor Cutter D 459cc/min.

(Competitor Cutter D)
ø250,12edges
Vc=120m/min
(n=153min^{-1})
ap×ae=5×200mm
fz=0.25mm/t
(Vf=459mm/min)

(User comment)
Cutting noise is quiet even when cutting width is nearly 80% of cutter diameter. Productivity increased 2.6 times.

(Evaluation by the user)

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