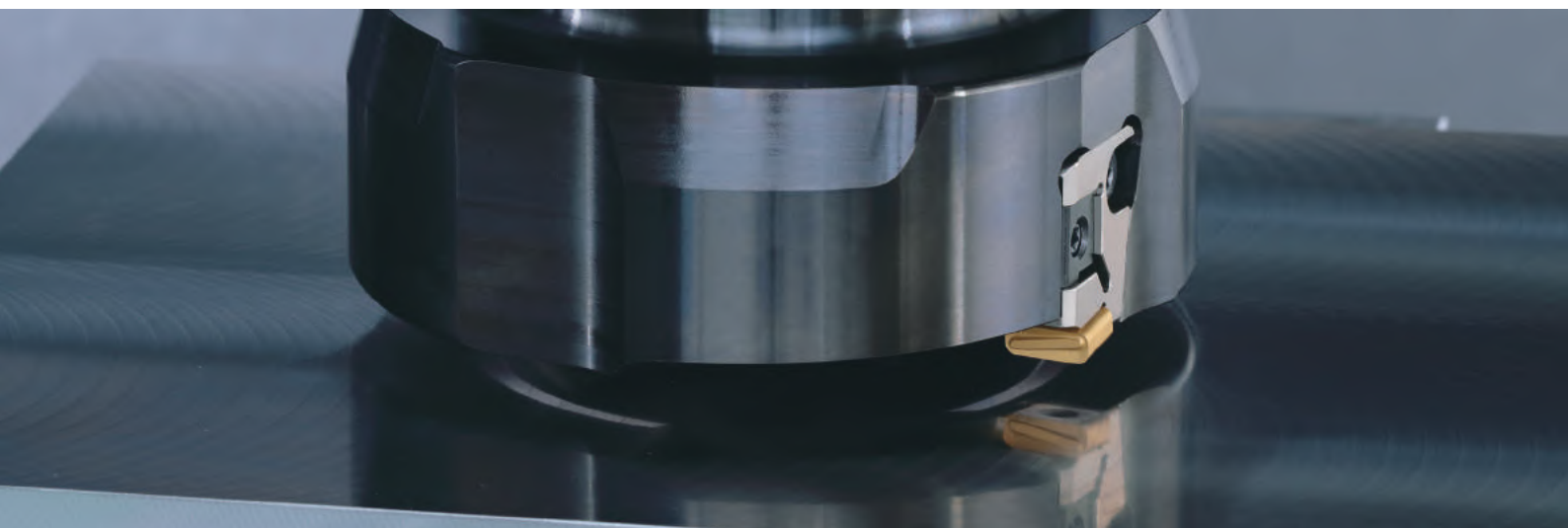


High-Precision Cutter for Finishing Applications

MFF

NEW



Innovative Finishing Technology with Increased Efficiency

Enhanced Cutter Design for a Better Finishing Solution

Molded Wiper Insert Design

High Feed Rates ($f = \text{Max } 5.0 \text{ mm/rev}$) and High-Quality Surface Finish ($0.8 \mu\text{m Ra}$) *

Adjustable Cutting Edge Height for Improved Usability



*User evaluation

High-Precision Cutter for Finishing Applications

MFF

Cutter Body Design Provides Excellent Reliability

Molded Wiper Inserts Increases Machining Efficiency

1

Our Solution for Finish Machining

MFF was made to solve the problems in machining.

Designed with a unique insert combination of semi-finishing and finishing, the MFF drastically improves productivity by reducing quality issues.



SOLUTION

Increase feed to $f = 5.0$ mm/rev

Achieved $0.8 \mu\text{m}$ Ra surface finish

No grinding required

Achieved $5 \mu\text{m}$ flatness

The above is the result of a field test. Actual results will depend on machining environment, workpiece rigidity, machine, etc. For more details, see case studies on page 3 and 4.

MFF

Machining Solutions

Can be used on a wide variety of parts and workpieces

Part Name

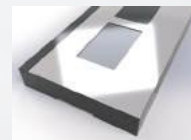
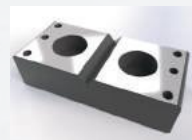
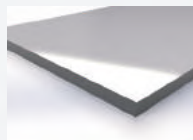
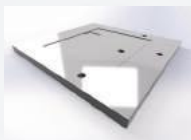
Plate / Frame / Case
Cylinder Pump / Rail
Turbine Housing
Casing / Mold Base

Workpiece

SS400 / FC250 / FCD600
Ni-resist Cast Iron
SKD 61 equivalent (Mold Steel)
Carburized and hardened steel (60 HRC)

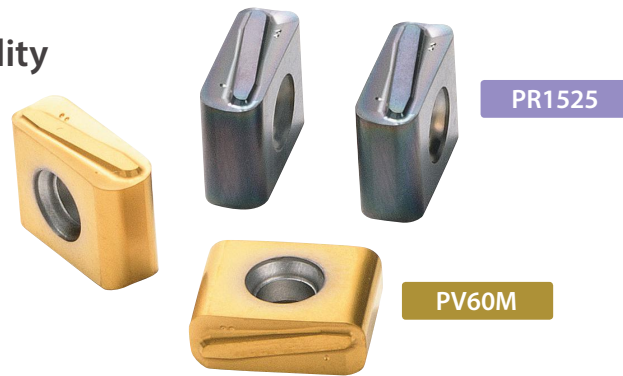
Industry

Industrial Machining
Machine Tools
Shipbuilding / Automotive
Construction Machinery
Molds

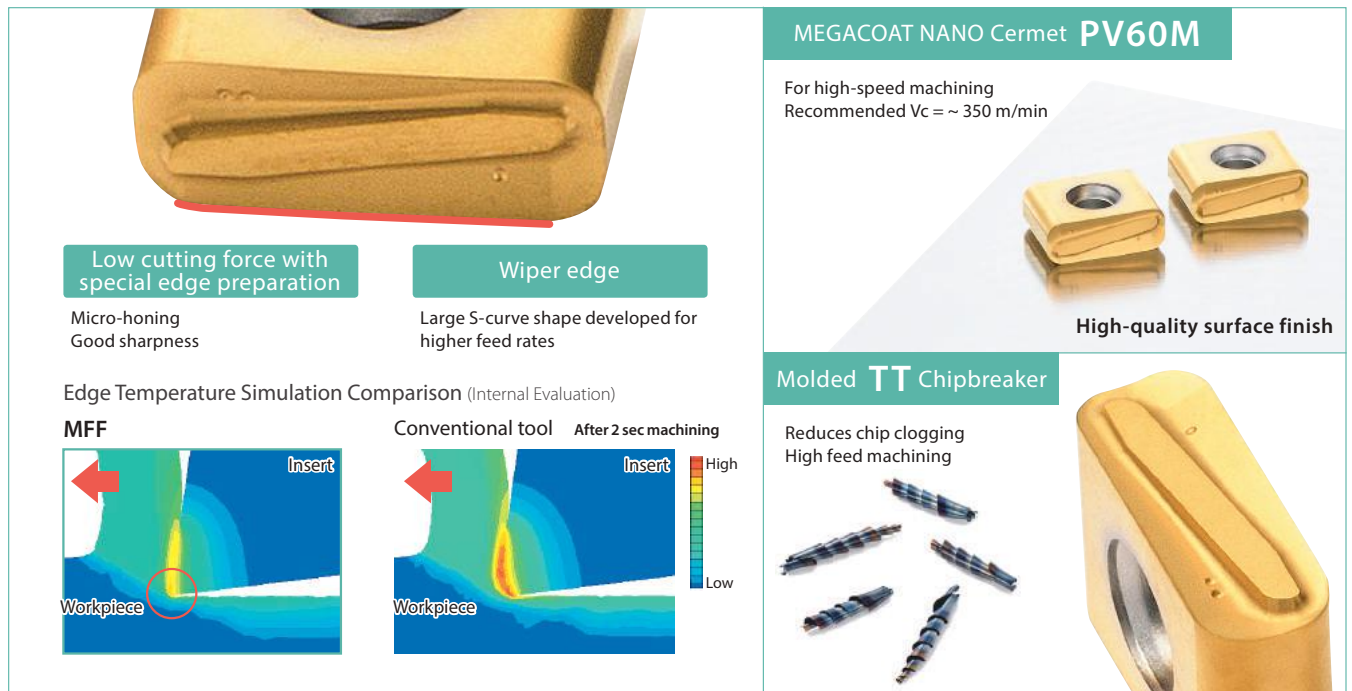


2

Molded Wiper Insert for High-Quality Surface Finish



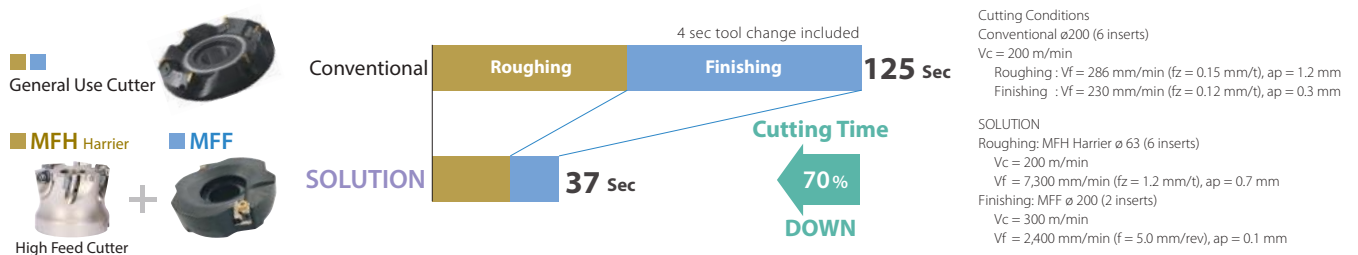
Utilizes Kyocera's unique molded insert technology for high feed rates and excellent surface finish



Comprehensive Machining Solutions

From Roughing to Finishing Machining Improvements (Internal Evaluation)

Combine with Kyocera's MFH high feed cutter to improve quality and efficiency



Surface Finish Quality after Machining

SOLUTION



Conventional Machining



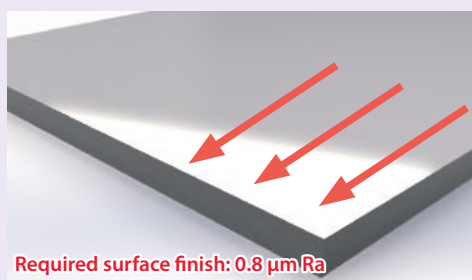
The MFF provides excellent finishing solutions

*User evaluation

SOLUTION 1

1.7 times increase in efficiency at $f = 5.0$ mm/rev with a $0.8 \mu\text{m Ra}$ surface finish

Plate (SS400)



SOLUTION

MFF

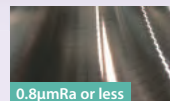
ø 200 2 inserts



1.7 times Machining Efficiency

$V_f = 2,600$ mm/min

$V_c = 330$ m/min, $f = 5.0$ mm/rev, $a_p = 0.1$ mm, Dry



Conventional

Competitor A

ø 200 2 inserts

$V_f = 1,500$ mm/min

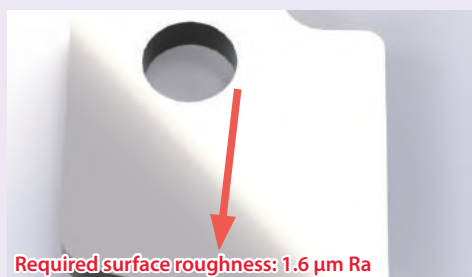
$V_c = 220$ m/min, $f = 4.3$ mm/rev, $a_p = 0.1$ mm, Dry

The conventional cutter was not able to feed faster than $f = 4.3$ mm/rev as surface finish deteriorated. The MFF showed good surface finish of $0.8 \mu\text{m Ra}$ or less even at $f = 5.0$ mm/rev. Increasing the cutting speed increased machining efficiency by 1.7 times.

SOLUTION 2

Surface finish $0.5 \mu\text{m Ra}$. No grinding required (Fewer Processes)

Valve (FCD450)



SOLUTION

MFF

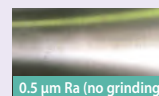
ø 160 2 inserts



No grinding required

127 sec

$V_c = 300$ m/min, $V_f = 250$ mm/min ($f = 0.4$ mm/rev) $a_p = 0.1$ mm, Wet



Conventional

Competitor B

ø 200 10 inserts

Machining 32 sec + Grinding 10 min

$V_c = 300$ m/min, $V_f = 800$ mm/min ($f = 1.6$ mm/rev) $a_p = 0.1$ mm, Wet

Conventional tool showed cloudy finished surface, MFF provided $0.5 \mu\text{m Ra}$ with a glossy finish. Reduced grinding process and cycle time by 80%.



SOLUTION 3

Improved flatness and machining efficiency tripled in interrupted mold steel

Mold (SKD61 equivalent)



SOLUTION MFF

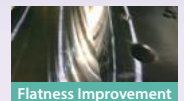
ϕ 200 2 inserts



Machining Efficiency x 3

$V_f = 380$ mm/min 6 Pass

$V_c = 120$ m/min, $f = 2.0$ mm/rev, $a_p = 0.05$ mm, Dry



Conventional Competitor C

ϕ 125 5 inserts



$V_f = 210$ mm/min 10 Pass

$V_c = 120$ m/min, $f = 0.65$ mm/rev, $a_p = 0.05$ mm, Dry

The MFF left a good finished surface with no gaps among tool path seams. Larger cutter diameter reduced the number of passes to six and improved productivity. Desirable chip shape and size were achieved.

SOLUTION 4

Flatness of 5 μm was achieved. Showed good surface finish with reduced chattering on the thin part

Case (FC250)



SOLUTION MFF

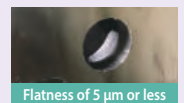
ϕ 100 2 inserts



Machining Quality Improvement

Reduced Chattering and Good Finish

$V_c = 330$ m/min, $V_f = 1,600$ mm/min ($f = 0.15$ mm/rev) $a_p = 0.1$ mm, Dry



Conventional Competitor D

ϕ 100 8 inserts (CBN)

Chattering occurred in thin wall

$V_c = 1,200$ m/min, $V_f = 2,450$ mm/min ($f = 0.64$ mm/rev) $a_p = 0.1$ mm, Dry

Conventional cutter needed adjustment due to chattering on the thin portion. MFF prevent chattering. Finished surface is good and there is no gap in the tool path seams. Flatness of 5 μm achieved.

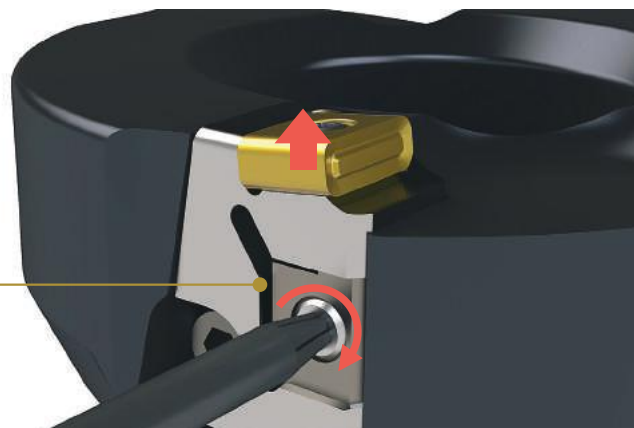
3 Adjustable cutting edge for increased usability

Cartridge height comes pre-adjusted and should not be necessary.

Adjustment is not required after replacing insert.

Easy-to-adjust Cutting Edge

Cutting edge height can be adjusted easily with one screw



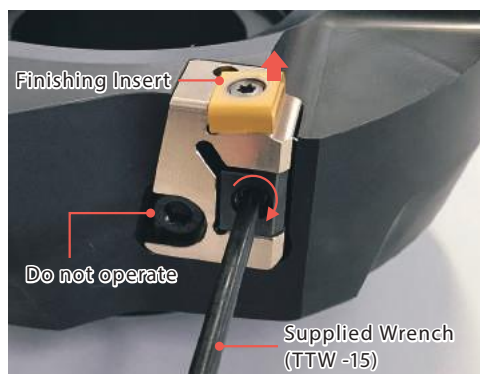
Included adjustment wrench

Edge Adjustment

If D.O.C. is ap 0.1 ~ 0.2 mm, no adjustment is necessary (Pre-adjusted before holder is shipped).

Cutting edge adjustment is NOT required when replacing inserts.

If D.O.C. is less than 0.1 mm or if you prefer a different edge height, use the following method:



Adjusting the Cutting Edge

Use the supplied TTW-15 wrench to rotate the screw and easily adjust the cutting edge position.

Procedure

To adjust, start with the screw turned counterclockwise about two rotations (lowering the cutting edge). Tighten the screw clockwise (raising the cutting edge) to adjust the amount of protrusion.

*Use a dial gauge to measure protrusion amount.

Precautions:

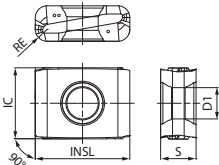
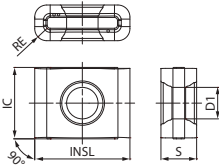
Make sure to lower the cutting edge below the desired height first (turning screw counterclockwise) and then raise the edge up to the final height (turning screw clockwise). If cutting edge is simply lowered to the final edge height, chattering or loosening of the screw may occur due to backlash. Make sure the measurement position of the cutting edge is the same machining diameter.

Standard Cutting Edge Height

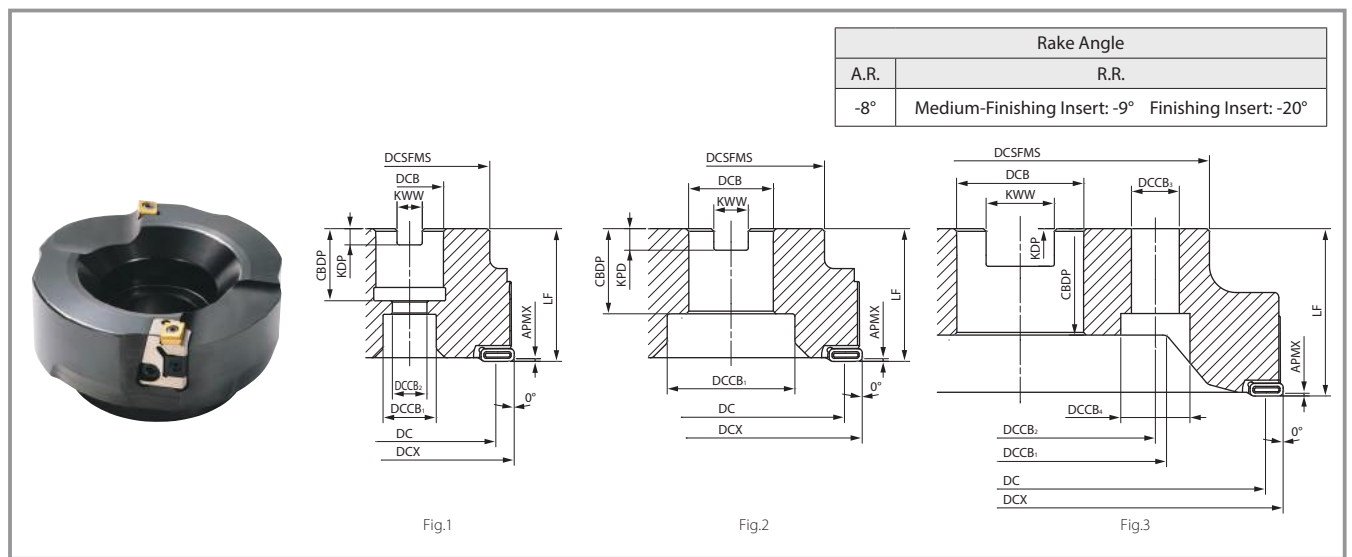
ap = 0.05 mm => protrusion against rough edge: 0.03 mm

ap = 0.10 mm ~ => protrusion against rough edge : 0.06 mm *Pre-adjusted before shipment

Applicable Inserts

Shape		Description	Dimensions (mm)					MEGACOAT NANO Cermet	MEGACOAT NANO
			IC	S	D1	INSL	RE	PV60M	PR1525
 For steel and stainless steel (Low cutting force)		LNGX 120916R-TT	9.525	6.35	4.2	12.7	1.6	MTO	MTO
 For Cast Iron		LNGX 120916	9.525	6.35	4.2	12.7	1.6	MTO	MTO

MTO : Made to order



Toolholder Dimensions

Description		Stock	No. of Inserts	Dimensions (mm)											Coolant hole	Shape	Weight (kg)	Max. Revolution (min ⁻¹)		
				DCX	DC	DCSFMS	DCB	DCB ₁	DCB ₂	DCB ₃	DCB ₄	LF	CBDP	KDP					KWW	APMX
Bore dia. Inch Spec	MFF080R-SF	MTO	2	80	67.3	60	25.4	20	13	-	-	50	27	6	9.5	0.3	No	Fig.1	1.3	2,000
	MFF100R-SF	MTO		100	87.3	70	31.75	48	-	-	-	50	32	8	12.7			Fig.2	1.8	1,600
	MFF125R-SF	MTO		125	112.3	87	38.1	58	-	-	-	63	38	10	15.9				3.5	1,300
	MFF160R-SF	MTO		160	147.3	102	50.8	72	-	-	-	63	38	11	19.1			Fig.3	5.9	1,000
	MFF200R-SF	MTO		200	187.3	142	47.625	110	101.6	26	18	63	40	14	25.4				8.1	800
	MFF250R-SF	MTO		250	237.3	142	47.625	110	101.6	26	18	63	40	14	25.4				10.8*	800
Metric Spec	MFF080R-M-SF	MTO	2	80	67.3	60	27	20	13	-	-	50	24	7	12.4	0.3	No	Fig.1	1.3	2,000
	MFF100R-M-SF	MTO		100	87.3	70	32	48	-	-	-	50	32	8	14.4			Fig.2	1.8	1,600
	MFF125R-M-SF	MTO		125	112.3	87	40	55	-	-	-	63	33	9	16.4				3.5	1,300
	MFF160R-M-SF	MTO		160	147.3	102	40	72	-	-	-	63	33	9	16.4			Fig.3	5.9	1,000
	MFF200R-M-SF	MTO		200	187.3	142	60	110	101.6	26	18	63	40	14	25.7				7.7	800
	MFF250R-M-SF	MTO		250	237.3	142	60	110	101.6	26	18	63	40	14	25.7				10.5*	800

*ø250 sizes have holes for lighter weight.

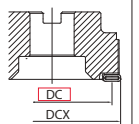
Caution with Max. Revolution

Set the number of revolutions per minute within the recommended cutting speed specified by the workpiece on back cover. Do not use the end mill or cutter at the maximum revolution or higher since the centrifugal force may cause chips and parts to scatter even under no load.

MTO : Made to order

Surface Finish

The surface will be finished flat within the range of DC shown on the right.



Parts

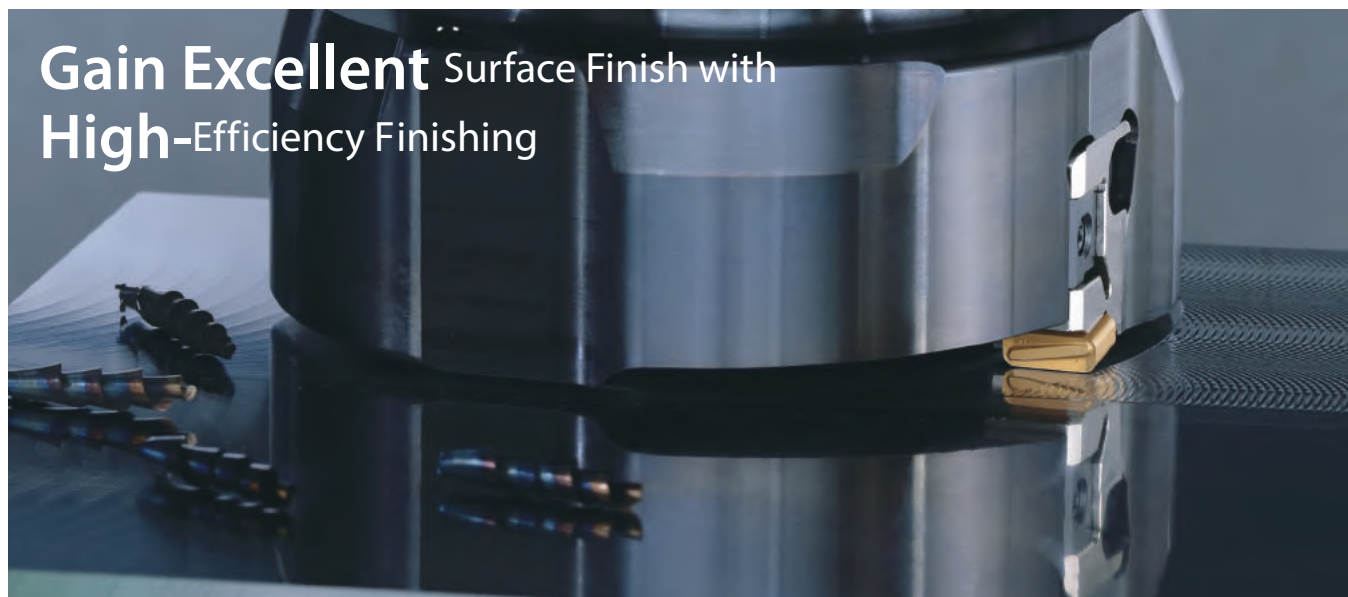
Parts							
Clamp screw	Wrench	Wedge	Cartridge	Cartridge clamp screw	Wrench	Adjusting screw	Anti-seize compound
SB-3592TR	DTM-10	AD-MFF	CR-MFF	HH5X15L	TTW-15	W6X18N	P-37
Fastening torque for clamp insert 1.2 Nm							

Recommended Cutting Conditions Table ★1st recommendation ☆2nd recommendation

Chipbreaker	Workpiece	f (mm/rev)	Depth of cut a_p (mm)	Recommended Insert Grade (Cutting speed V_c : m/min)	
				PV60M	PR1525
TT	Structural Steel (SS 400, etc.)	1.5 – 4.0 – 5.0	0.03 – 0.1 – 0.3	230 – ★280 – 350	230 – ☆280 – 350
	Carbon Steel (S * * C, etc.)	1.0 – 4.0 – 5.0		200 – ★250 – 350	200 – ☆250 – 350
	Alloy Steel (SCM, etc.)	1.0 – 4.0 – 5.0		200 – ★250 – 350	200 – ☆250 – 350
	Mold Steel (SKD, etc.)	1.0 – 2.0 – 4.0	0.03 – 0.1 – 0.2	120 – ☆200 – 250	120 – ★200 – 250
	Mold Steel (SKD 50 HRC ~ etc.)	0.6 – 1.0 – 1.2	0.03 – 0.05 – 0.1	—	50 – ★70 – 80
	Austenitic stainless steel * (SUS 304, etc.)	1.0 – 2.0 – 4.0	0.03 – 0.1 – 0.2	120 – ☆200 – 250	120 – ★200 – 250
	Martensitic stainless steel * (SUS 403, etc.)	1.0 – 3.0 – 4.0		150 – ☆200 – 300	150 – ★200 – 300
Standard	Gray Cast Iron (FC)	1.0 – 2.0 – 4.0	0.03 – 0.1 – 0.3	200 – ☆250 – 350	200 – ★250 – 350
	Nodular Cast Iron (FCD)	1.5 – 2.0 – 4.0		150 – ☆250 – 300	150 – ★250 – 300

*Machining with coolant is recommended for stainless steel

The number in **bold font** is recommended starting conditions. Adjust the cutting speed and the feed rate within the above conditions according to the actual machining situation.



Gain Excellent Surface Finish with
High-Efficiency Finishing