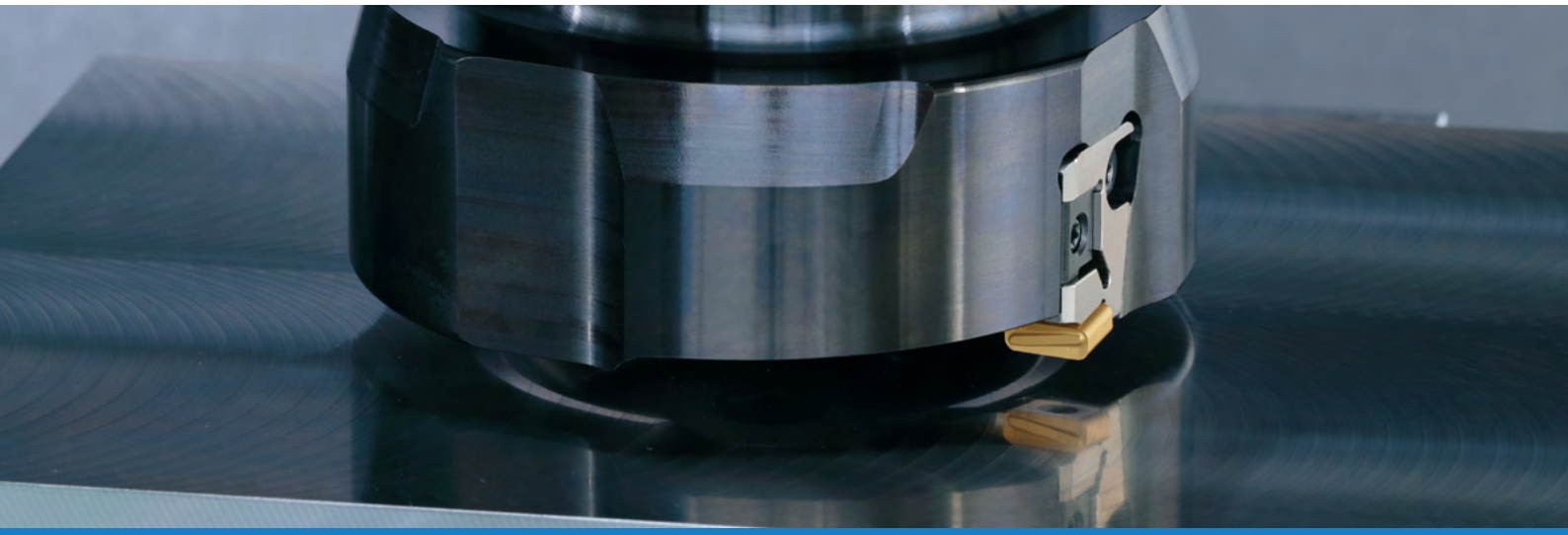
# MFF



## Innovative finishing technology with increased efficiency

**Enhanced cutter design for better finishing solution**
**Molded wiper insert design**
**High feed rates (f = Max 5.0 mm/rev) and high-quality surface finish (0.8 µm 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

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


### SOLUTION

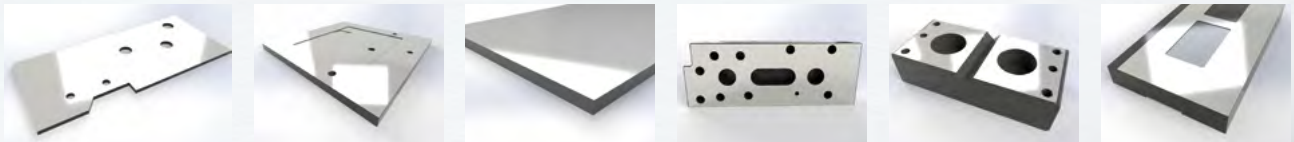
**Increase feed to f = 5.0 mm/rev**
**Achieved 0.8 µm Ra surface finish**
**No grinding required**
**Achieved 5 µm flatness**

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 or parts and workpieces

| Part name | Workpiece | Industry |
|---|---|---|
| Plate / Frame / Case<br>Cylinder Pump / Rail<br>Turbine housing<br>Casing / Mold base | S275, GG25, GGG60<br>Ni-resistant cast iron<br>X40CrMoV5-1 equivalent (mold steel)<br>Carburized and hardened steel (60 HRC) | Industrial machining<br>Machine tools<br>Shipbuilding / Automotive<br>Construction machinery<br>Molds |



# 2 Molded wiper insert for high-quality surface finish


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

**Low cutting force with special edge preparation**

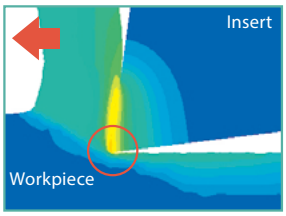
Micro-honing
Good sharpness

**Wiper edge**

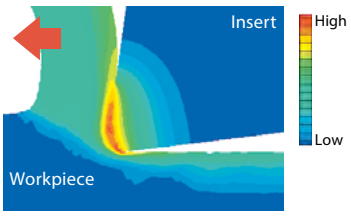
Large arc-curve shape developed for higher feed rates

Edge temperature simulation comparison (Internal evaluation)

**MFF**




Conventional tool **After 2 sec machining**




**MEGACOAT NANO Cermet PV60M**

For high-speed machining
Recommended Vc = ~ 350 m/min

**High-quality surface finish**

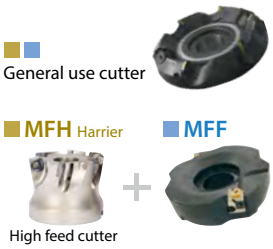
**Molded TT Chipbreaker**

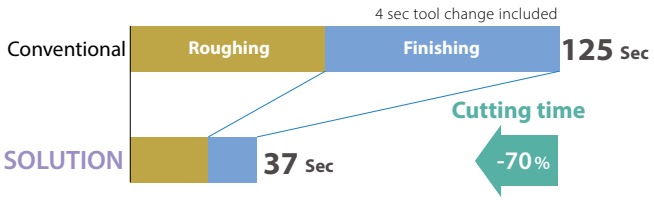
Reduces chip clogging
High feed machining

## Comprehensive machining solutions

From roughing to finishing machining improvements (Internal evaluation)

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




Cutting conditions
Conventional ø200 (6 inserts)
Vc = 200 m/min
Roughing : Vf = 286 mm/min (fz = 0.15 mm/t), ap = 1.2 mm
Finishing : Vf = 230 mm/min (fz = 0.12 mm/t), ap = 0.3 mm

SOLUTION
Roughing: MFH Harrier ø 63 (6 inserts)
Vc = 200 m/min
Vf = 7,300 mm/min (fz = 1.2 mm/t), ap = 0.7 mm
Finishing: MFF ø 200 (2 inserts)
Vc = 300 m/min
Vf = 2,400 mm/min (f = 5.0 mm/rev), ap = 0.1 mm

Surface finish quality after machining

**SOLUTION**

Excellent surface finish (0.27 µm Ra)

Conventional machining

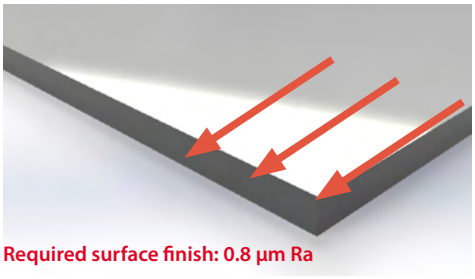
Cloudy surface finish (1.01 µm Ra)

# 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 µm Ra surface finish

**Plate** (S275/Ust 42-2)



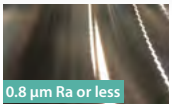
Required surface finish: 0.8 µm Ra

**SOLUTION**
**MFF**
ø 200 2 inserts

**1.7 times**

Vf = **2,600** mm/min

Vc = 330 m/min, f = 5.0 mm/rev, ap = 0.1 mm, dry




**Conventional**
Competitor A
ø 200 2 inserts

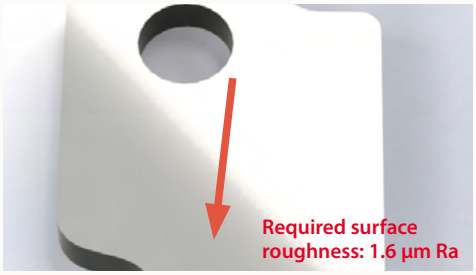
Vf = **1,500** mm/min

Vc = 220 m/min, f = 4.3 mm/rev, ap = 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 µm 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 µm Ra. No grinding required

**Valve** (GJS-450/cast iron)



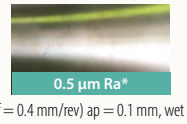
Required surface roughness: 1.6 µm Ra

**SOLUTION**
**MFF**
ø 160 2 inserts

**No grinding required**

**127** sec

Vc = 300 m/min, Vf = 250 mm/min (f = 0.4 mm/rev) ap = 0.1 mm, wet




**Conventional**
Competitor B
ø 200 10 inserts

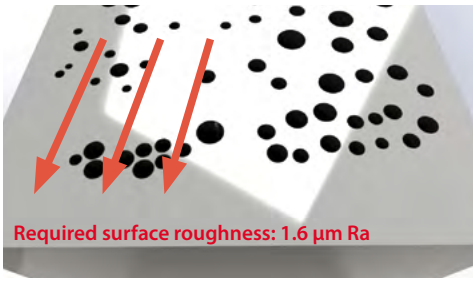
Machining **32** sec + Grinding **10** min

Vc = 300 m/min, Vf = 800 mm/min (f = 1.6 mm/rev) ap = 0.1 mm, wet

Conventional tool showed cloudy finished surface, MFF provided 0.5 µm 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** (X40CrMoV5-1 equivalent)




**SOLUTION**
**MFF**
ø 200 2 inserts

3 times
Vf = 380 mm/min 6 Pass
Vc = 120 m/min, f = 2.0 mm/rev, ap = 0.05 mm, dry

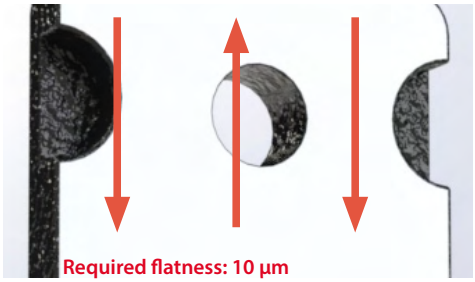

**Conventional**
Competitor C
ø 125 5 inserts

Vf = 210 mm/min 10 Pass
Vc = 120 m/min, f = 0.65 mm/rev, ap = 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.

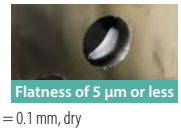
## SOLUTION 4 Flatness of 5 µm and good surface finish with reduced chattering on thin part

**Case** (GG25)




**SOLUTION**
**MFF**
ø 100 2 inserts

Machining quality improvement
Reduced chattering and good finish
Vc = 330 m/min, Vf = 1,600 mm/min (f = 0.1.5 mm/rev) ap = 0.1 mm, dry




**Conventional**
Competitor D
ø 100 8 inserts (CBN)

Chattering occurred in thin wall
Vc = 1,200 m/min, Vf = 2,450 mm/min (f = 0.64 mm/rev) ap = 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.

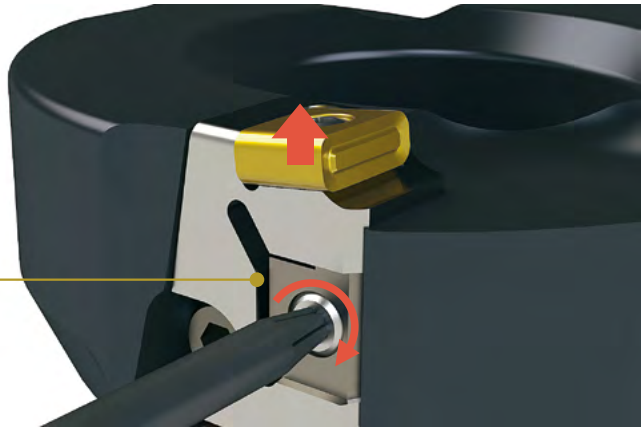
# 3 Adjustable cutting edge for increased usability

**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

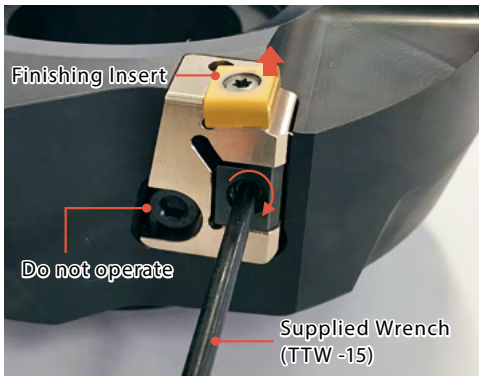


Included adjustment wrench

## 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:



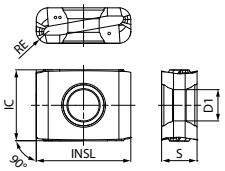
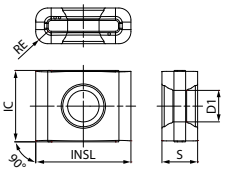

**Adjusting the cutting edge**
Use the supplied TTW-15 wrench to rotate the screw and easily adjust the cutting edge position.

**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

# MFF

| Rake angle | |
|---|---|
| A.R. | R.R. |
| -8° | Medium-Finishing insert: -9° Finishing insert: -20° |

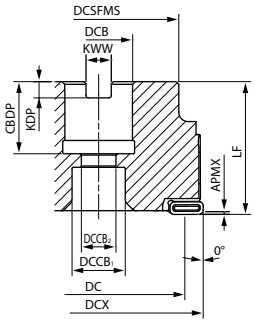



Fig.1

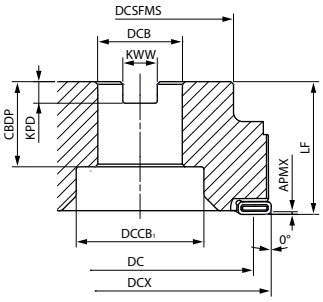



Fig.2

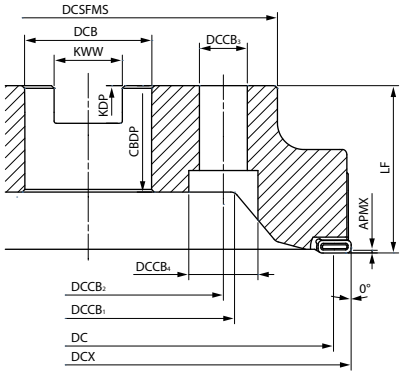



Fig.3

## Toolholder dimensions

| Description | Availability | No. of inserts | Dimensions (mm) | | | | | | | | | | | | | Coolant hole | Shape | Weight (kg) | Max. Revolution ($min^{-1}$) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | DCX | DC | DCSFMS | DCB | $DCCB_1$ | $DCCB_2$ | $DCCB_3$ | $DCCB_4$ | LF | CBDP | KDP | KWW | APMX | | | | |
| 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 | | | | 5.9 | 1,000 |
| MFF200R-M-SF | MTO | | 200 | 187.3 | 142 | 60 | 110 | 101.6 | 26 | 18 | 63 | 40 | 14 | 25.7 | | | Fig.3 | 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.

MTO : Made to order

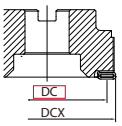
**Caution with max. revolution**

Set the number of revolutions per minute within the recommended cutting speed specified by the workpiece on back cover.

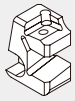
Do not use the end mill or cutter at the maximum revolution or higher since the centrifugal force may cause chips and parts to scatter even under no load.

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 ★1st recommendation ☆2nd recommendation

| Chipbreaker | Workpiece | f (mm/rev) | Depth of cut ap (mm) | Recommended insert grade ( Vc: m/min) | |
|---|---|---|---|---|---|
| | | | | PV60M | PR1525 |
| TT | Structural steel | 1.5 – **4.0** – 5.0 | 0.03 – **0.1** – 0.3 | ★ 230 – **280** – 350 | ☆ 230 – **280** – 350 |
| | Carbon steel | 1.0 – **4.0** – 5.0 | | ★ 200 – **250** – 350 | ☆ 200 – **250** – 350 |
| | Alloy steel | 1.0 – **4.0** – 5.0 | | ★ 200 – **250** – 350 | ☆ 200 – **250** – 350 |
| | Mold steel (X40CrMoV5-1, etc.) | 1.0 – **2.0** – 4.0 | 0.03 – **0.1** – 0.2 | ☆ 120 – **200** – 250 | ★ 120 – **200** – 250 |
| | Mold steel (X40CrMoV5-1 50 HRC ~ etc.) | 0.6 – **1.0** – 1.2 | 0.03 – **0.05** – 0.1 | – | ★ 50 – **70** – 80 |
| | Austenitic stainless steel * | 1.0 – **2.0** – 4.0 | 0.03 – **0.1** – 0.2 | ☆ 120 – **200** – 250 | ★ 120 – **200** – 250 |
| | Martensitic stainless steel * | 1.0 – **3.0** – 4.0 | | ☆ 150 – **200** – 300 | ★ 150 – **200** – 300 |
| Standard | Gray cast iron | 1.0 – **2.0** – 4.0 | 0.03 – **0.1** – 0.3 | ☆ 200 – **250** – 350 | ★ 200 – **250** – 350 |
| | Nodular cast iron | 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.



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