

THE NEW VALUE FRONTIER



4-edge Face Mills with Vertical Inserts  
for Heavy Milling

**MFLN**

4-edge Face Mills with Vertical Inserts for Heavy Milling

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**NEW**



Rigid, Heavy Milling with Tough 4-edge Inserts for Large Depths of Cut and High Feed Rates

Tough and Reliable 4-edge Vertical Inserts for Stable Heavy Milling

Highly Efficient Milling with Large Depths of Cut ( $a_p \approx 20\text{mm}$ )

and High Feed Rates ( $f_z \approx 0.4\text{mm/t}$ )

Three Different Cutting Edge Angles Available



## 4-edge Face Mills with Vertical Inserts for Heavy Milling

# MFLN

Tough 4-edge Vertical Inserts Provide High Reliability on Heavy Milling at Large Depths of Cut and High Feed Rates  
Three Cutting Edge Angles Optimized for Various Machining Applications

### 1 Tough and Reliable Inserts for Stable Heavy Milling

22 mm long inserts offer increased rigidity

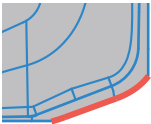
Tangentially mounted inserts provide 2 cutting edges on both sides

#### Corner Chamfer

(only available on MFLN90)

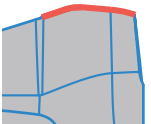
Both general corner-R type and chamfered corner type available

Prevents chattering and insert fracturing



#### Convex cutting edge ridge

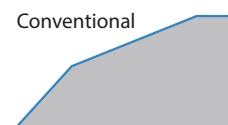
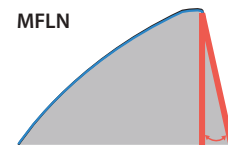
Reduced impact forces when entering the workpiece



#### Obtuse Edge Design

Increases the cutting edge angle only at the tip to maintain both strength and sharpness

Cross-section view of cutting edge (Image)



#### Wide Flat Mounting Surface

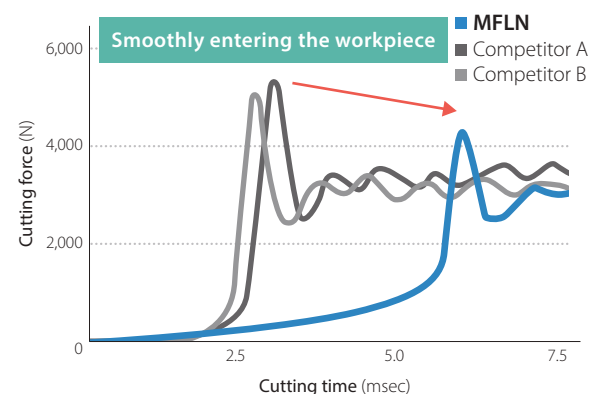
Hold an insert firmly in heavy milling

Tangentially mounted inserts increase rigidity

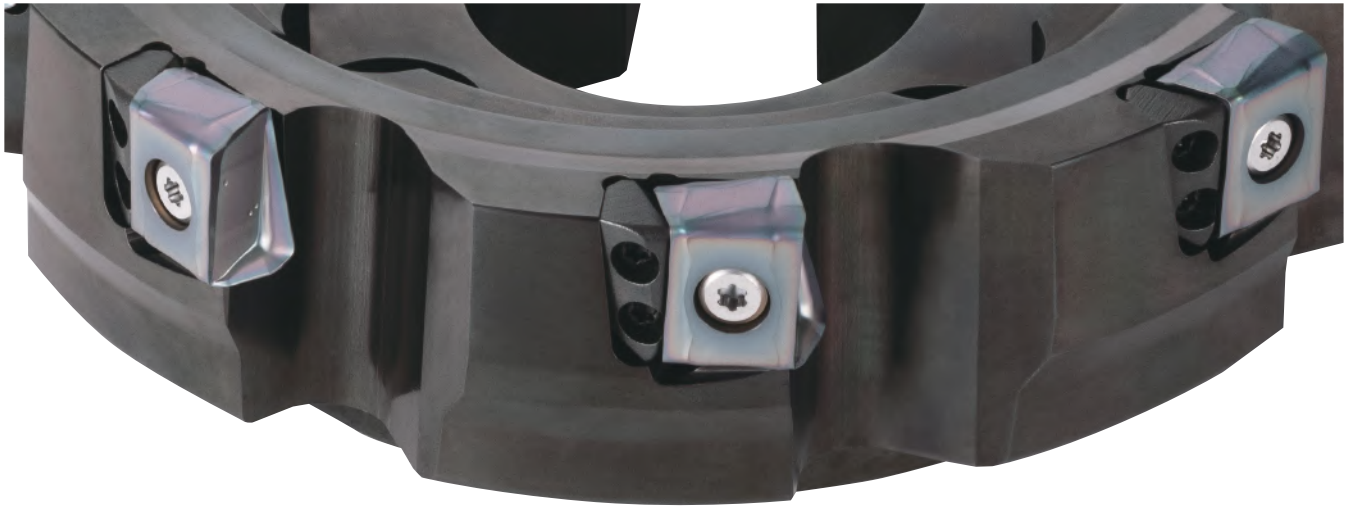


Cutting Forces when Entering the Workpiece (Internal evaluation)

MFLN90 (Insert : Chamfered corner type)



Cutting conditions :  $V_c = 150$  m/min,  $a_p \times a_e = 5 \times 75$  mm,  $f_z = 0.3$  mm/t  
 $\phi 125$  (1 insert), Dry Workpiece : S50C



## 2 Large D.O.C. and High Feed Rates with 90°, 70°, and 45° Cutting Edge Angles Available

3 Cutter styles cover a wide variety of machining applications

### MFLN90

(Cutting edge angle 90°)



### MFLN70

(Cutting edge angle 70°)

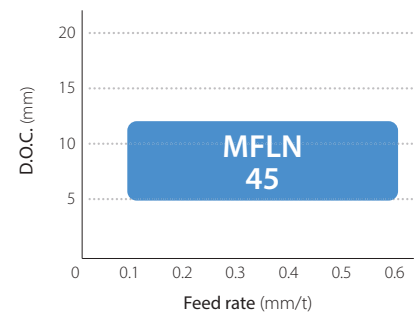
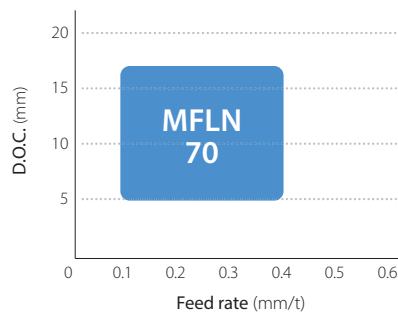
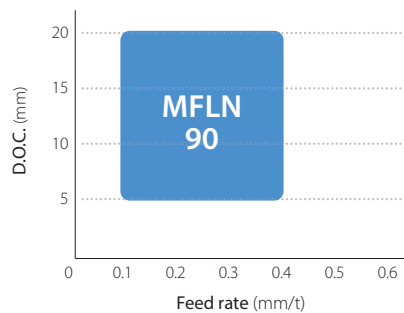


### MFLN45

(Cutting edge angle 45°)



### Applicable Range



### Chip Comparison (Internal evaluation)

Helix-shaped chips prevent chip recutting and provide stable machining at high feed rates.

#### MFLN90

Stable



fz = 0.3 mm/t



fz = 0.4 mm/t

#### Competitor A

Unstable



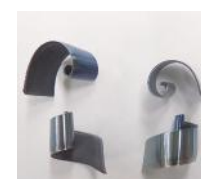
fz = 0.3 mm/t



fz = 0.4 mm/t

#### Competitor B

Unstable



fz = 0.3 mm/t



fz = 0.4 mm/t

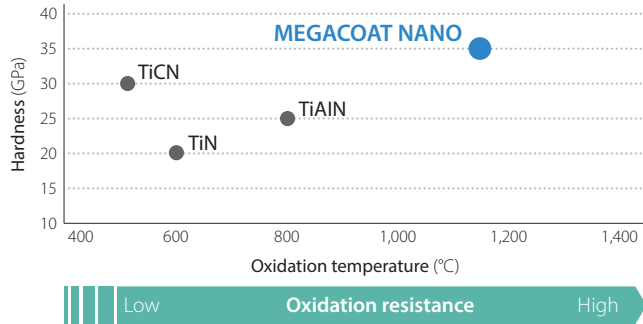
Cutting conditions : Vc = 150 m/min, ap x ae = 10 x 100 mm, fz = 0.3, 0.4 mm/t, ø125 (1 insert), Dry Workpiece : S50C

### 3

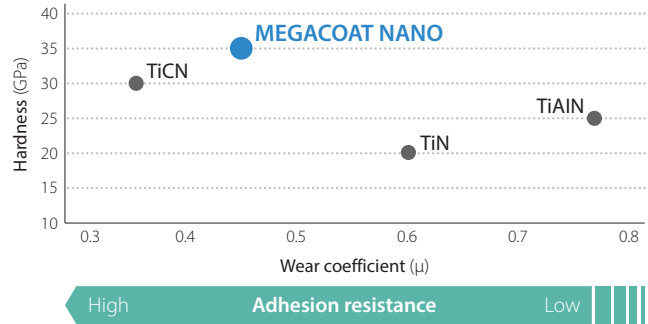
## Stable machining and long tool life with MEGACOAT NANO

"MEGACOAT NANO" coating technology with high hardness (35GPa) and excellent oxidation resistance (oxidation temperature: 1,150 °C) improves wear resistance and chipping resistance.

Properties of Coating (Wear resistance)



Properties of Coating (Adhesion resistance)



Long tool life with the combination of a tough substrate and a special nano layer coating

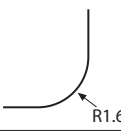
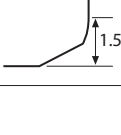
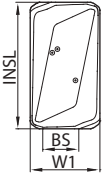
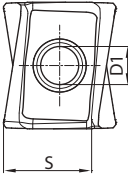
Stable machining with excellent wear resistance

**PR1525** : 1st recommendation for wear resistance. Great for scale removal and cast iron machining

**PR1535** : Defect resistant, tough substrate for stable machining



## Insert Description

| Insert                                                                                                                                                                                                   |                                                                                                                                                                                           |                                                                                                                                                                            | Description      | Dimensions (mm) |      |     |      |     | MEGACOAT NANO |        | Applicable Toolholders           |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|-----------------|------|-----|------|-----|---------------|--------|----------------------------------|
|                                                                                                                                                                                                          |                                                                                                                                                                                           |                                                                                                                                                                            |                  | W1              | S    | D1  | INSL | BS  | PR1535        | PR1525 |                                  |
| <br>Corner-R<br><br>Corner Chamfer | <br>R1.6<br><br>1.5 | <br> | LOGU 221616ER-GM | 12.5            | 16.6 | 6.8 | 22.8 | 6.3 | ●             | ●      | MFLN90..<br>MFLN70..<br>MFLN45.. |
|                                                                                                                                                                                                          |                                                                                                                                                                                           |                                                                                                                                                                            | LOGU 2216PAER-GM | 12.5            | 16.9 | 6.8 | 22.8 | 4.8 | ●             | ●      | MFLN90..                         |

● : Standard Item

## How to mount inserts

1. Completely eliminate chips and dust from the insert mounting side.
2. After mounting a clamp screw on the top edge of wrench, tighten the screw while keeping the insert pushed against the shim seat surface and holder surface(Fig.1,2)
3. Make sure that the identification on the top of the insert is the same in each pocket.(Fig.3)
4. Tighten the wrench (20IP) in while holding parallel to the clamp screw.
5. Tighten the insert clamp screw at an appropriate torque. (Recommended torque: 6.0 N-m)
6. After tightening, check that there is no gap between the insert and the surface of the shim, or between the side surface of insert and the holder surface. If there is a gap, remount the insert using the directions above.



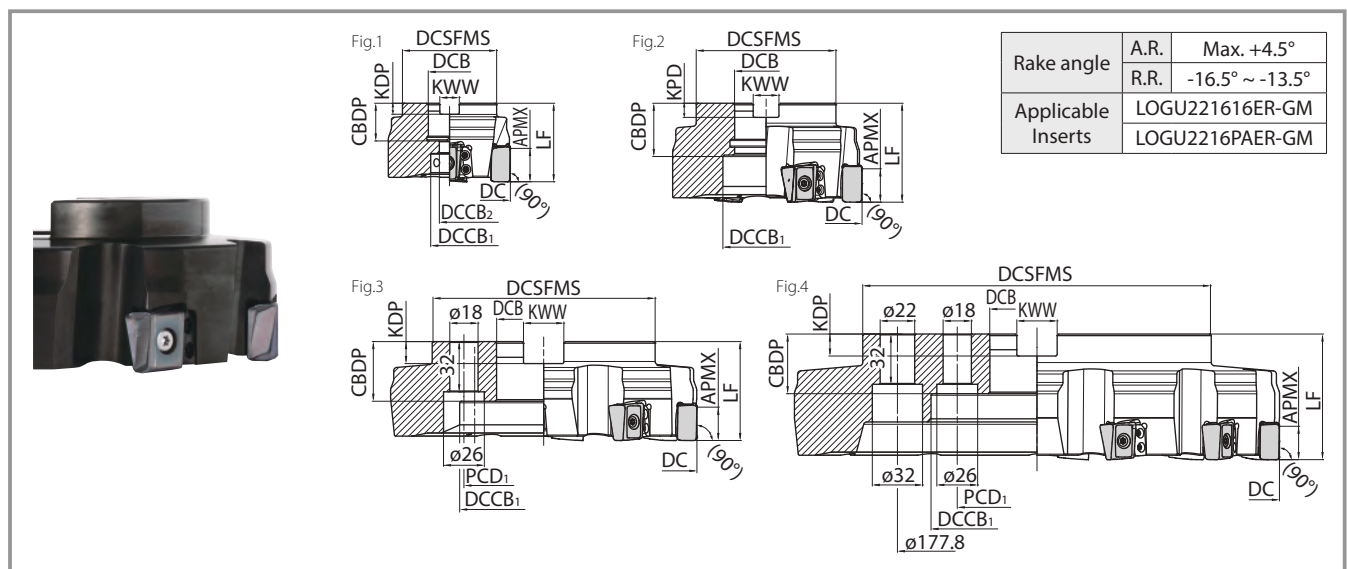
Fig.1



Fig.2



Fig.3



## Toolholder Dimensions

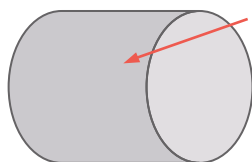
| Description      |      | Stock        | No. of Inserts | Dimensions (mm) |        |     |                   |                   |    |      |     |      |       |                  | Coolant Hole | Insert | Weight (kg) |      |
|------------------|------|--------------|----------------|-----------------|--------|-----|-------------------|-------------------|----|------|-----|------|-------|------------------|--------------|--------|-------------|------|
|                  |      |              |                | DC              | DCSFMS | DCB | DCCB <sub>1</sub> | DCCB <sub>2</sub> | LF | CBDP | KDP | KWW  | APMX  | PCD <sub>1</sub> |              |        |             |      |
| Inch Bore Dia.   | MFLN | 90080R-4T    | ●              | 4               | 80     | 60  | 25.4              | 24                | 13 | 50   | 27  | 6    | 9.5   | 20               | -            | Yes    | Fig.1       | 1.0  |
|                  |      | 90100R-4T    | ●              |                 | 100    | 70  | 31.75             | 45                |    |      | 34  | 8    | 12.7  |                  |              |        |             | 1.6  |
|                  |      | 90125R-6T    | ●              | 6               | 125    | 89  | 38.1              | 55                | 63 | 38   | 10  | 15.9 | 101.6 |                  | No           | Fig.2  | 3.0         |      |
|                  |      | 90160R-7T    | ●              | 7               | 160    | 110 | 50.8              | 90                |    |      |     | 11   |       |                  |              | 19.1   |             | 4.6  |
|                  |      | 90200R-8T    | ●              | 8               | 200    | 142 | 47.625            | 132               |    |      | 14  | 25.4 |       |                  |              |        | 7.2         |      |
|                  |      | 90250R-10T   | ●              | 10              | 250    |     |                   | 172               |    | 10.5 |     |      |       |                  |              |        |             |      |
|                  |      | 90315R-12T   | MTO            | 12              | 315    | 222 |                   | 205               | 80 |      |     |      |       |                  |              | Fig.4  | 21.8        |      |
| Metric Bore Dia. | MFLN | 90080R-4T-M  | ●              | 4               | 80     | 60  | 27                | 24                | 13 | 50   | 24  | 7    | 12.4  | 20               | -            | Yes    | Fig.1       | 1.0  |
|                  |      | 90100R-4T-M  | ●              |                 | 100    | 70  | 32                | 45                |    |      | 30  | 8    | 14.4  |                  |              |        |             | 1.5  |
|                  |      | 90125R-6T-M  | ●              | 6               | 125    | 89  | 40                | 55                | 63 | 33   | 9   | 16.4 | 101.6 |                  | No           | Fig.2  | 2.9         |      |
|                  |      | 90160R-7T-M  | ●              | 7               | 160    | 110 |                   | 90                |    |      |     |      |       |                  |              |        |             |      |
|                  |      | 90200R-8T-M  | ●              | 8               | 200    | 142 | 60                | 132               |    | 38   | 14  | 25.7 |       |                  |              |        | 6.9         |      |
|                  |      | 90250R-10T-M | ●              | 10              | 250    |     |                   | 172               |    |      |     |      |       |                  |              | 10.3   |             |      |
|                  |      | 90315R-12T-M | MTO            | 12              | 315    | 222 |                   | 205               | 80 |      |     |      |       |                  |              |        | Fig.4       | 20.9 |

● : Standard Item  
MTO : Made to order

## Case Study

### Roll material, Alloy steel

Vc = 120 m/min  
ap = 10 mm  
fz = 0.27 mm/t Dry  
MFLN90200R-8T-M (ø200-8 inserts)  
LOGU2216PAER-GM PR1525



Chip Removal Volume

**MFLN90**  $v_f=412 \text{ mm/min}$

**Cutting Edge**  
Excellent

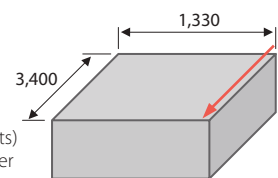
Competitor E  $v_f=412 \text{ mm/min}$

MFLN maintained good cutting edge condition and during scale removing.

(User evaluation)

### Machining base FCD600

Vc = 120 m/min  
ap = 11×165 mm  
fz = 0.65 mm/t Dry  
XMFLN70250R-13T-OH-M (ø250-13 Inserts)  
Fine pitch, internal coolant, custom holder  
LOGU221616ER-GM PR1525



Chip Removal Volume

**MFLN70**  $Q=2,340 \text{ cc/min}$   $Q=2,340 \text{ cc/min}$

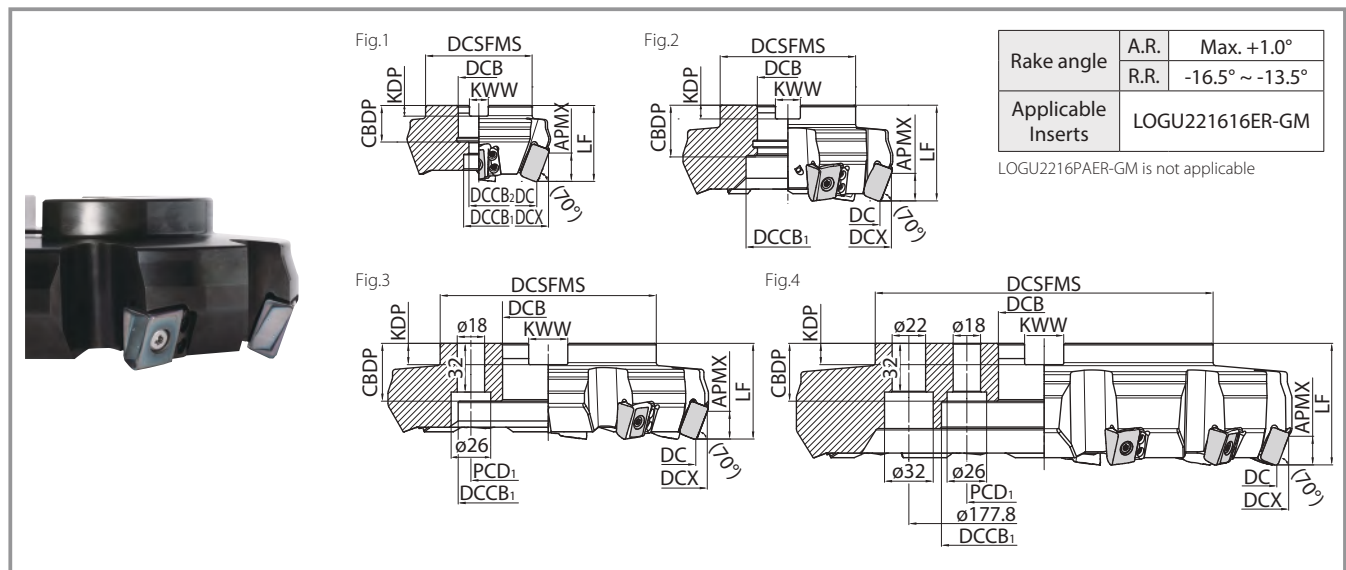
**Milling Efficiency**  
x1.1

Competitor  $Q=2,100 \text{ cc/min}$   $Q=1,970 \text{ cc/min}$

MFLN improved machining efficiency with lower cutting force.  
Also it can be used both for roughing and finishing.

(User evaluation)





### Toolholder Dimensions

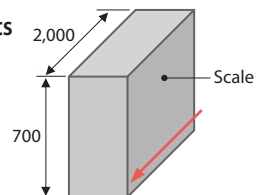
| Description      | Stock            | No. of Inserts | Dimensions (mm) |     |        |        |                   |                   |    |      |     |      |      |                  | Coolant Hole | Insert | Weight (kg) |
|------------------|------------------|----------------|-----------------|-----|--------|--------|-------------------|-------------------|----|------|-----|------|------|------------------|--------------|--------|-------------|
|                  |                  |                | DC              | DCX | DCSFMS | DCB    | DCCB <sub>1</sub> | DCCB <sub>2</sub> | LF | CBDP | KDP | KWW  | APMX | PCD <sub>1</sub> |              |        |             |
| Inch Bore Dia.   | MFLN 70080R-4T   | ●              | 80              | 93  | 70     | 25.4   | 20                | 13                | 50 | 27   | 6   | 9.5  | 17   | -                | Yes          | Fig.1  | 1.4         |
|                  | 70100R-4T        | ●              | 100             | 113 | 78     | 31.75  | 45                | -                 | 50 | 34   | 8   | 12.7 | 17   | -                | Yes          | Fig.2  | 2.0         |
|                  | 70125R-6T        | ●              | 125             | 138 | 89     | 38.1   | 55                | -                 | 63 | 38   | 10  | 15.9 | 17   | -                | No           | Fig.2  | 3.5         |
|                  | 70160R-7T        | ●              | 160             | 173 | 110    | 50.8   | 70                | -                 | 63 | 38   | 11  | 19.1 | 17   | -                | No           | Fig.3  | 5.8         |
|                  | 70200R-8T        | ●              | 200             | 213 | 142    | 50.8   | 120               | -                 | 63 | 38   | 14  | 25.4 | 17   | 101.6            | No           | Fig.3  | 8.5         |
|                  | 70250R-10T       | ●              | 250             | 263 | 222    | 47.625 | 160               | -                 | 80 | 38   | 14  | 25.4 | 17   | 101.6            | No           | Fig.4  | 15.1        |
|                  | 70315R-12T       | MTO            | 315             | 328 | 222    | 47.625 | 215               | -                 | 80 | 38   | 14  | 25.4 | 17   | 101.6            | No           | Fig.4  | 22.2        |
| Metric Bore Dia. | MFLN 70080R-4T-M | ●              | 80              | 93  | 70     | 27     | 20                | 13                | 50 | 24   | 7   | 12.4 | 17   | -                | Yes          | Fig.1  | 1.4         |
|                  | 70100R-4T-M      | ●              | 100             | 113 | 78     | 32     | 45                | -                 | 50 | 30   | 8   | 14.4 | 17   | -                | Yes          | Fig.2  | 1.9         |
|                  | 70125R-6T-M      | ●              | 125             | 138 | 89     | 40     | 55                | -                 | 63 | 33   | 9   | 16.4 | 17   | 66.7             | No           | Fig.2  | 3.4         |
|                  | 70160R-7T-M      | ●              | 160             | 173 | 110    | 50.8   | 90                | -                 | 63 | 33   | 9   | 16.4 | 17   | 66.7             | No           | Fig.3  | 5.3         |
|                  | 70200R-8T-M      | ●              | 200             | 213 | 142    | 50.8   | 120               | -                 | 63 | 38   | 14  | 25.7 | 17   | 101.6            | No           | Fig.3  | 8.2         |
|                  | 70250R-10T-M     | ●              | 250             | 263 | 222    | 60     | 160               | -                 | 80 | 38   | 14  | 25.7 | 17   | 101.6            | No           | Fig.4  | 14.8        |
|                  | 70315R-12T-M     | MTO            | 315             | 328 | 222    | 60     | 215               | -                 | 80 | 38   | 14  | 25.7 | 17   | 101.6            | No           | Fig.4  | 21.9        |

● : Standard Item  
MTO : Made to order

### Case Study

#### Forging Die for Automotive Parts

Vc = 90 m/min  
ap × ae = ~10 × ~80 mm  
fz = 0.36 mm/t Dry  
MFLN45080R-4T-M (ø80-4 Inserts)  
LOGU221616ER-GM PR1535



Chip Removal Volume

**MFLN45** (ø80-4 Inserts) **Q=416 cc/min**

Competitor H (ø100-5 Inserts) **Q=336 cc/min**

MFLN achieved 1.2 times machining efficiency.  
Quieter machining and good chip shapes

(User evaluation)



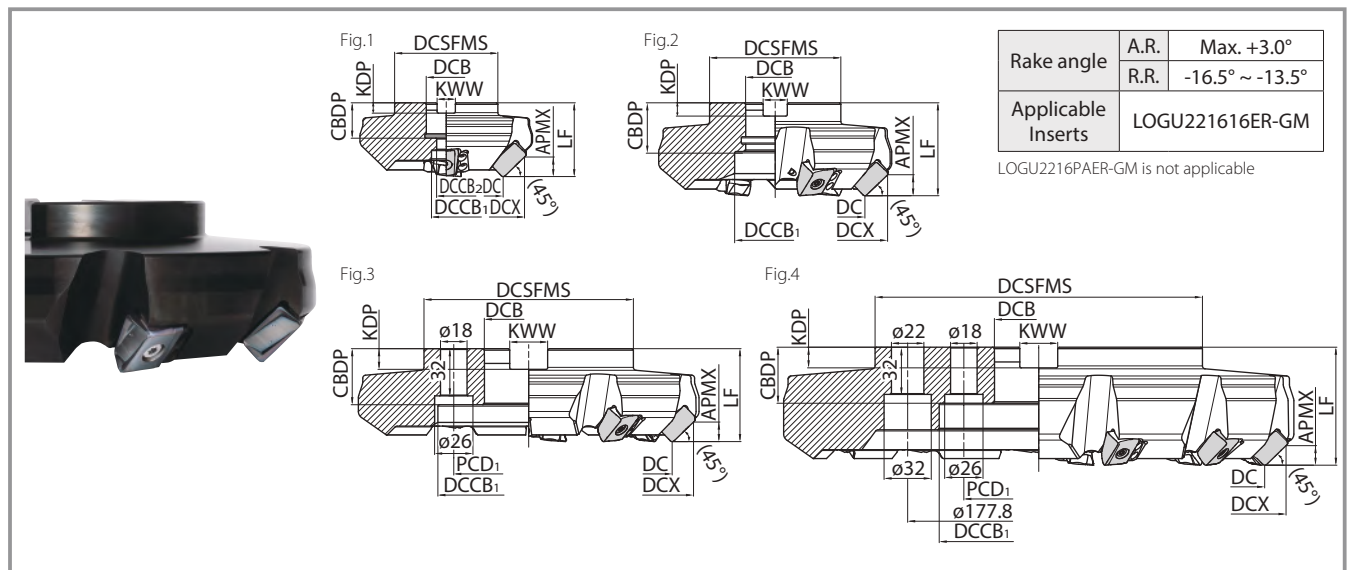
### About Applicable Insert

|         | LOGU221616ER-GM<br>(Corner-R) | LOGU2216PWER-GM<br>(Corner Chamfer) |
|---------|-------------------------------|-------------------------------------|
| MFLN 90 | ✓                             | ✓                                   |
| MFLN 70 | ✓                             | Not applicable                      |
| MFLN 45 | ✓                             | Not applicable                      |

### Max.Revolution(min<sup>-1</sup>) for Each Cutting Diameter

| Cutting Dia.<br>DC (mm) | Max. Revolution<br>n (min <sup>-1</sup> ) |
|-------------------------|-------------------------------------------|
| ø80                     | 5,970                                     |
| ø100                    | 4,780                                     |
| ø125                    | 3,820                                     |
| ø160                    | 2,990                                     |
| ø200                    | 2,390                                     |
| ø250                    | 1,910                                     |
| ø315                    | 1,520                                     |

Common to MFLN90/70/45



## Toolholder Dimensions

| Description      |      | Stock        | No. of Inserts | Dimensions (mm) |     |        |     |                   |                   |    |      |       |      |       |                  | Coolant Hole | Insert | Weight (kg) |      |  |
|------------------|------|--------------|----------------|-----------------|-----|--------|-----|-------------------|-------------------|----|------|-------|------|-------|------------------|--------------|--------|-------------|------|--|
|                  |      |              |                | DC              | DCX | DCSFMS | DCB | DCCB <sub>1</sub> | DCCB <sub>2</sub> | LF | CBDP | KDP   | KWW  | APMX  | PCD <sub>1</sub> |              |        |             |      |  |
| Inch Bore Dia.   | MFLN | 45080R-4T    | ●              | 4               | 80  | 104    | 70  | 25.4              | 20                | 13 | 50   | 27    | 6    | 9.5   | 12               | -            | Yes    | Fig.1       | 2.0  |  |
|                  |      | 45100R-4T    | ●              |                 | 100 | 124    | 78  | 31.75             | 45                |    |      | 34    | 8    | 12.7  |                  |              |        |             |      |  |
|                  |      | 45125R-6T    | ●              | 6               | 125 | 149    | 89  | 38.1              | 55                | 63 | 38   | 10    | 15.9 | 101.6 |                  |              | No     | Fig.3       | 4.6  |  |
|                  |      | 45160R-7T    | ●              | 7               | 160 | 184    | 110 | 50.8              | 90                |    |      |       | 11   |       |                  |              |        |             | 19.1 |  |
|                  |      | 45200R-8T    | ●              | 8               | 200 | 224    | 142 |                   | 124               |    |      | 80    | 14   |       | 25.4             |              |        |             | 10.0 |  |
|                  |      | 45250R-10T   | ●              | 10              | 250 | 274    | 222 | 47.625            | 160               |    |      |       |      |       |                  | 17.1         |        |             |      |  |
|                  |      | 45315R-12T   | MTO            | 12              | 315 | 339    |     |                   | 215               |    |      |       |      |       |                  | Fig.4        | 25.3   |             |      |  |
| Metric Bore Dia. | MFLN | 45080R-4T-M  | ●              | 4               | 80  | 104    | 70  | 27                | 20                | 13 | 50   | 24    | 7    | 12.4  | 12               | -            | Yes    | Fig.1       | 2.0  |  |
|                  |      | 45100R-4T-M  | ●              |                 | 100 | 124    | 78  | 32                | 45                |    |      | 30    | 8    | 14.4  |                  |              |        |             |      |  |
|                  |      | 45125R-6T-M  | ●              | 6               | 125 | 149    | 89  |                   | 55                | 63 | 33   | 9     | 16.4 | 66.7  |                  |              | No     | Fig.3       | 4.6  |  |
|                  |      | 45160R-7T-M  | ●              | 7               | 160 | 184    | 110 |                   | 90                |    |      |       |      |       |                  |              |        |             |      |  |
|                  |      | 45200R-8T-M  | ●              | 8               | 200 | 224    | 142 |                   | 124               |    |      |       |      |       | 38               | 14           |        |             | 25.7 |  |
|                  |      | 45250R-10T-M | ●              | 10              | 250 | 274    | 222 | 60                | 160               |    |      | 16.9  |      |       |                  |              |        |             |      |  |
|                  |      | 45315R-12T-M | MTO            | 12              | 315 | 339    |     |                   | 215               |    |      | Fig.4 | 25.1 |       |                  |              |        |             |      |  |

● : Standard Item  
MTO : Made to order

## Parts List

| Description        | Parts       |        |            |             |        |                          |            |
|--------------------|-------------|--------|------------|-------------|--------|--------------------------|------------|
|                    | Clamp Screw | Wrench | Shim Sheet | Clamp Screw | Wrench | Coat Anti-seize Compound | Arbor Bolt |
|                    |             |        |            |             |        |                          |            |
| MFLN **080R-4T(-M) | SB-60200TRP | TTP-20 | MAP-2216   | SB-40140TR  | DTM-15 | P-37                     | HH12X35    |
| **100R-4T(-M)      |             |        |            |             |        |                          | -          |
| **315R-12T(-M)     |             |        |            |             |        |                          |            |

## Recommended Cutting Conditions

★ : 1st Recommendation ☆ : 2nd Recommendation

|         | Workpiece         | D.O.C. (mm)            |                        | Feed (fz : mm/t) | Recommended Insert Grades (Cutting Speed Vc : m/min) |                      |
|---------|-------------------|------------------------|------------------------|------------------|------------------------------------------------------|----------------------|
|         |                   | Width of Cut (≤0.5×DC) | Width of Cut (>0.5×DC) |                  | MEGACOAT NANO                                        |                      |
|         |                   |                        |                        |                  | PR1535                                               | PR1525               |
| MFLN 90 | Carbon Steel      | ~18                    | ~15                    | 0.1 – 0.2 – 0.4  | ☆<br>80 – 120 – 150                                  | ★<br>100 – 150 – 180 |
|         | Alloy Steel       |                        |                        |                  | ☆<br>80 – 120 – 150                                  | ★<br>100 – 150 – 180 |
|         | Die Steel         |                        |                        |                  | ☆<br>70 – 100 – 120                                  | ★<br>80 – 120 – 150  |
|         | Gray Cast Iron    | ~20                    | ~18                    | 0.1 – 0.2 – 0.4  | ☆<br>80 – 120 – 150                                  | ★<br>100 – 150 – 180 |
|         | Nodular Cast Iron |                        |                        |                  | ☆<br>80 – 120 – 150                                  | ★<br>100 – 150 – 180 |
| MFLN 70 | Carbon Steel      | ~15                    | ~12                    | 0.1 – 0.2 – 0.4  | ☆<br>80 – 120 – 150                                  | ★<br>100 – 150 – 180 |
|         | Alloy Steel       |                        |                        |                  | ☆<br>80 – 120 – 150                                  | ★<br>100 – 150 – 180 |
|         | Die Steel         |                        |                        |                  | ☆<br>70 – 100 – 120                                  | ★<br>80 – 120 – 150  |
|         | Gray Cast Iron    | ~17                    | ~15                    | 0.1 – 0.2 – 0.4  | ☆<br>80 – 120 – 150                                  | ★<br>100 – 150 – 180 |
|         | Nodular Cast Iron |                        |                        |                  | ☆<br>80 – 120 – 150                                  | ★<br>100 – 150 – 180 |
| MFLN 45 | Carbon Steel      | ~10                    | ~8                     | 0.1 – 0.3 – 0.6  | ☆<br>80 – 120 – 150                                  | ★<br>100 – 150 – 180 |
|         | Alloy Steel       |                        |                        |                  | ☆<br>80 – 120 – 150                                  | ★<br>100 – 150 – 180 |
|         | Die Steel         |                        |                        |                  | ☆<br>70 – 100 – 120                                  | ★<br>80 – 120 – 150  |
|         | Gray Cast Iron    | ~12                    | ~10                    | 0.1 – 0.3 – 0.6  | ☆<br>80 – 120 – 150                                  | ★<br>100 – 150 – 180 |
|         | Nodular Cast Iron |                        |                        |                  | ☆<br>80 – 120 – 150                                  | ★<br>100 – 150 – 180 |

The table above provides recommendations based on product specifications.

Before using the product, check the machine's specifications such as power.

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.

Dry machining is recommended.

## How to replace the insert shim seat

1. Completely eliminate chips and dust from the shim mounting side.
2. Coat medium strength screw locking adhesive on the screws.
3. Tighten the screw keeping the shim pushed against the pocket surface of toolholder.
4. After tightening both screws temporarily, tighten them with appropriate torque. (Recommended torque:3.5 N·m)
5. Please check that there is no gap between the shim and the pocket surfaces of toolholder.



Fig.1

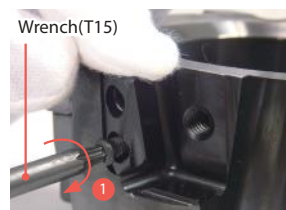


Fig.2



Fig.3



Fig.4