



MFPN

45° Milling with Double-sided 10-edge Inserts



Reduced Chattering with a Low Cutting Force Design

Economical 10-edge Insert

Low Cutting Force due to Curved Cutting Edge Design

Suppresses Fracturing with Dual Angle Edge Design

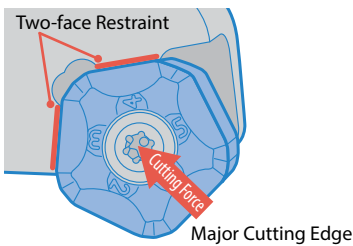


MFPN

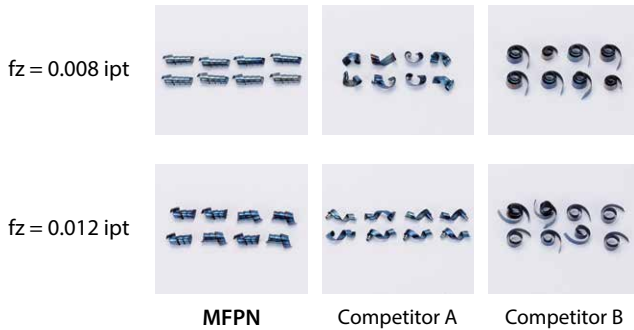
Reduced Chattering with a Low Cutting Force Design and Excellent Fracture Resistance
Economical 10-edge Inserts

1 Economical 10-edge Inserts

Pentagonal double-sided inserts provide excellent stability and stable machining at high feed rates



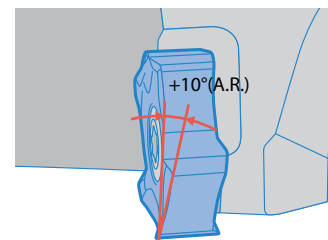
Chip Evacuation (In-house Evaluation)



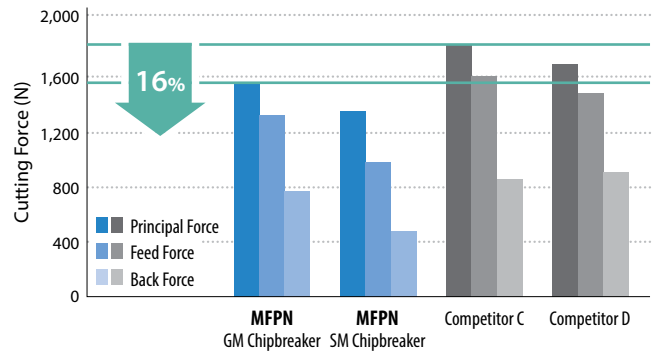
Cutting Conditions: $V_c = 490$ sfm, $f_z = 0.008 - 0.012$ ipt, D.O.C. \times $a_e = 0.118'' \times 4.331''$
Workpiece: 1049

2 Resists Chattering

Low cutting forces due to curved cutting edge with a high axial rake angle (Max. 10°)



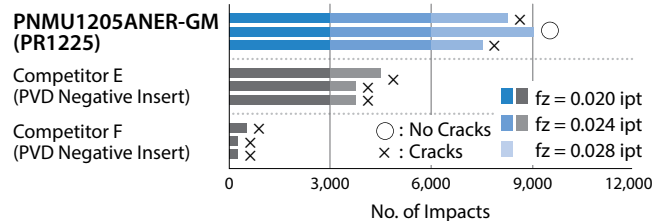
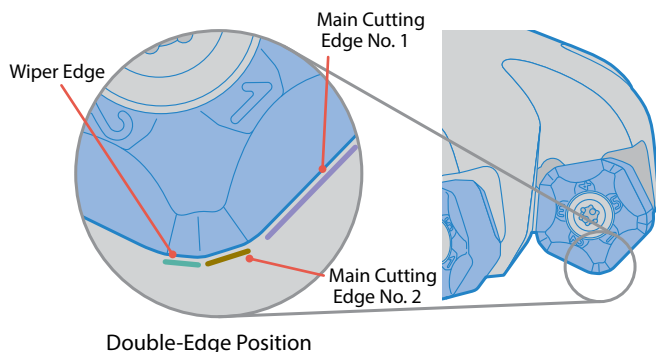
Cutting Force Comparison (In-house Evaluation)



Cutting Conditions: $V_c = 490$ sfm, $f_z = 0.004$ ipt, D.O.C. \times $a_e = 0.197'' \times 4.134''$
Workpiece: 1049

3 Fracture Resistance

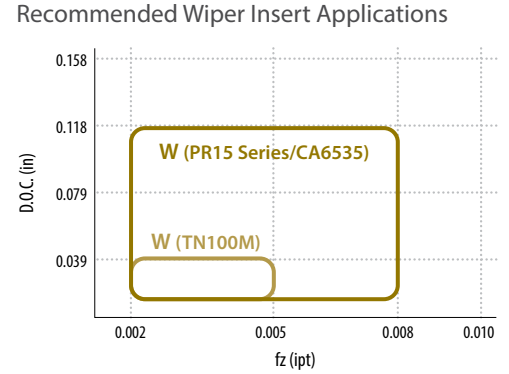
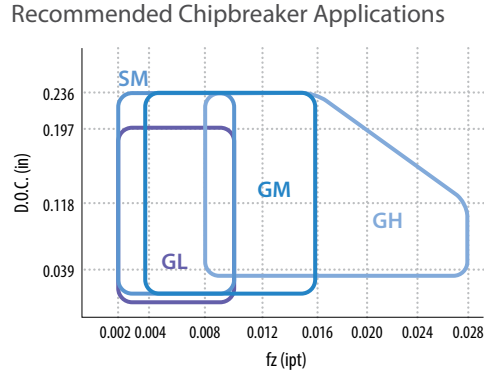
Double-edge position reduces impact load and controls vibration when exiting the workpiece



4 Various Chipbreakers for a Wide Range of Applications

Four unique chipbreakers and a wiper insert cover a wide range of milling applications

| Chipbreaker | Applications | Shape |
|-------------|----------------------------|-------|
| GM | General | |
| SM | Low Cutting Force | |
| GH | Heavy Milling | |
| GL | Surface Finish Oriented | |
| W | Wiper Insert for Finishing | |



For How to Use Wiper Inserts See [Page 10](#)

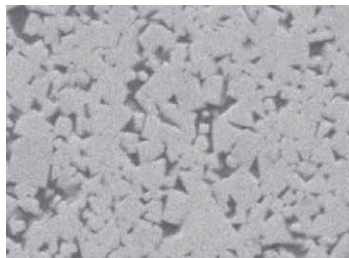
PR1535 MEGACOAT NANO

Fracture resistant with a tough substrate and high heat-resistant coating for stable machining of general steel, mold steel, and difficult-to-cut materials

1 23% Improved Fracture Toughness

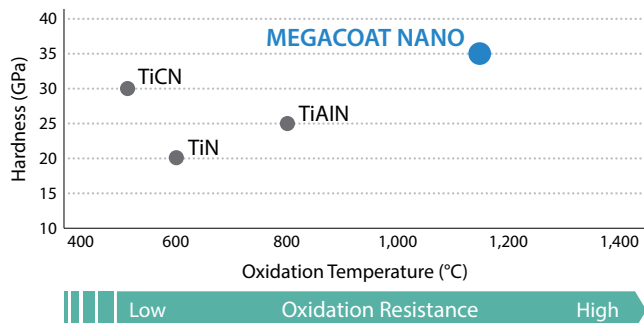
An increase in cobalt content yields a substrate with greater toughness. Fracture toughness values are improved by 23% over previous grades.

High Toughness Carbide Base Material



23%
Fracture
Toughness

Coating Properties (Abrasion Resistance)

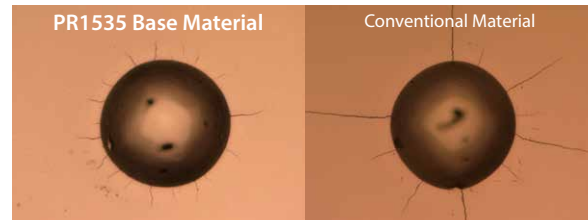


Achieves long tool life with the combination of a tough substrate and a special Nano coating layer

2 Stability Improvement

The coarse grain structure and uniform particle size correspond to improved heat resistance, with conductivity values decreased by 11%. The uniform structure also reduces crack propagation.

Cracking Comparison by Diamond Indenter (In-house Evaluation)

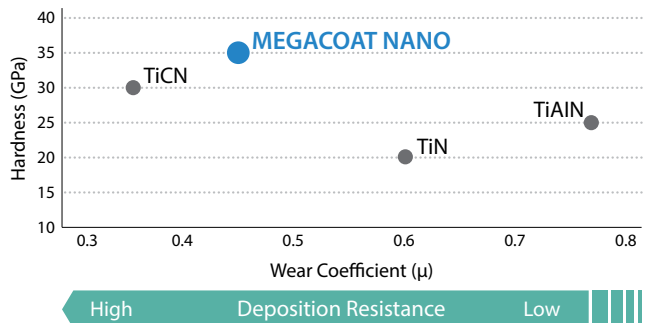


Short Cracks
(High Impact Improvement)

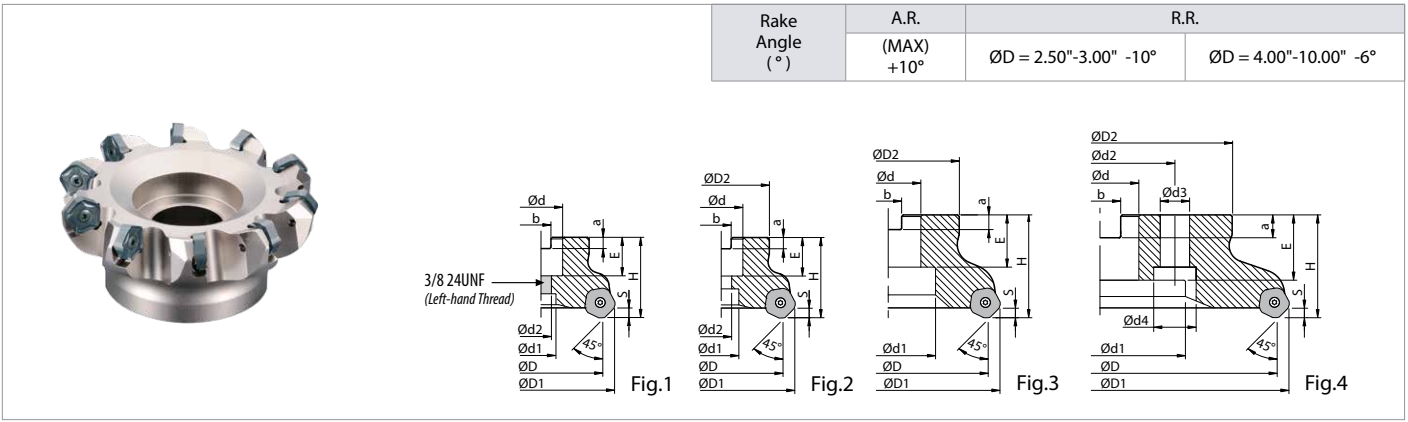
Long Cracks

Shock Resistance

Coating Properties (Deposition Resistance)



Stable machining with excellent wear resistance



Face Mill Dimensions (Inch Size)

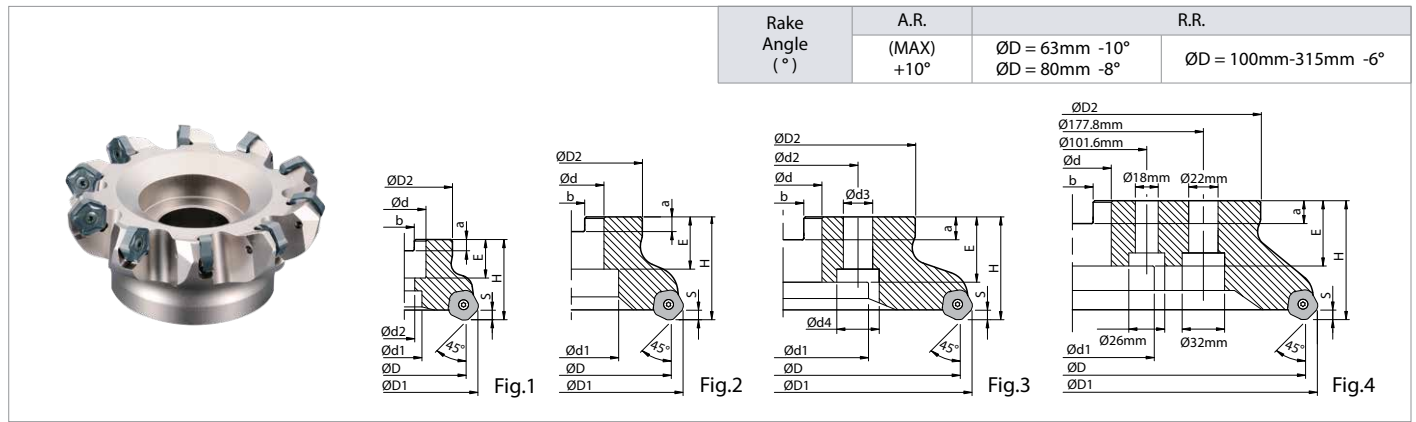
| Part Number | Stock | No. of Inserts | Dimensions (in) | | | | | | | | | | | | | Drawing | Weight (kg) | Shim |
|------------------|-----------------|----------------------------|-----------------|--------|--------|-------|-------|-------|-------|-----------|-------|-------|-------|-------|-------|---------|-------------|------|
| | | | ØD | ØD1 | ØD2 | Ød | Ød1 | Ød2 | H | E | a | b | Ød3 | Ød4 | | | | |
| Coarse Pitch | MFPN 452500R-4T | ● | 4 | 2.500 | 2.815 | 1.890 | 0.750 | 0.669 | 0.433 | 1.575 | 0.750 | 0.187 | 0.313 | - | - | Fig.2 | 0.5 | |
| | 453000R-5T | ● | 5 | 3.000 | 3.315 | 2.283 | 1.000 | 0.866 | 0.551 | 1.969 | 1.063 | 0.236 | 0.375 | - | - | Fig.2 | 1.1 | |
| | 454000R-6T | ● | 6 | 4.000 | 4.315 | 2.756 | 1.500 | 2.047 | - | 1.969 | 1.142 | 0.394 | 0.625 | - | - | Fig.3 | 1.4 | |
| | 455000R-7T | ● | 7 | 5.000 | 5.315 | 3.425 | 1.500 | 2.283 | - | 2.480 | 1.417 | 0.394 | 0.625 | - | - | Fig.3 | 2.6 | ✓ |
| | 456000R-8T | ● | 8 | 6.000 | 6.315 | 4.016 | 2.000 | 2.835 | - | 2.480 | 1.496 | 0.433 | 0.750 | - | - | Fig.3 | 3.8 | |
| | 458000R-10T | ● | 10 | 8.000 | 8.315 | 5.591 | 2.500 | 3.937 | 4.000 | 2.480 | 1.575 | 0.551 | 1.000 | 0.709 | 1.024 | Fig.4 | 6.6 | |
| | 4510000R-12T | ● | 12 | 10.000 | 10.315 | 5.591 | 2.500 | 3.937 | 4.000 | 2.480 | 1.575 | 0.551 | 1.000 | 0.709 | 1.024 | Fig.4 | 9.3 | |
| | Fine Pitch | NEW MFPN 452000R-4T | ● | 4 | 2.000 | 2.315 | 1.750 | 0.750 | - | 3/8-24UNF | 1.969 | 0.830 | 0.187 | 0.313 | - | - | Fig.1 | 0.3 |
| 452500R-5T | | ● | 5 | 2.500 | 2.815 | 1.890 | 0.750 | 0.669 | 0.433 | 1.575 | 0.750 | 0.187 | 0.313 | - | - | Fig.2 | 0.5 | |
| 453000R-6T | | ● | 6 | 3.000 | 3.315 | 2.283 | 1.000 | 0.866 | 0.551 | 1.969 | 1.063 | 0.236 | 0.375 | - | - | Fig.2 | 1.1 | |
| 454000R-8T | | ● | 8 | 4.000 | 4.315 | 2.756 | 1.500 | 2.047 | - | 1.969 | 1.142 | 0.394 | 0.625 | - | - | Fig.3 | 1.3 | |
| 455000R-10T | | ● | 10 | 5.000 | 5.315 | 3.425 | 1.500 | 2.283 | - | 2.480 | 1.417 | 0.394 | 0.625 | - | - | Fig.3 | 2.6 | × |
| 456000R-12T | | ● | 12 | 6.000 | 6.315 | 4.016 | 2.000 | 2.835 | - | 2.480 | 1.496 | 0.433 | 0.750 | - | - | Fig.3 | 3.9 | |
| 458000R-14T | | ● | 14 | 8.000 | 8.315 | 5.591 | 2.500 | 3.937 | 4.000 | 2.480 | 1.575 | 0.551 | 1.000 | 0.709 | 1.024 | Fig.4 | 6.6 | |
| 4510000R-16T | | ● | 16 | 10.000 | 10.315 | 5.591 | 2.500 | 3.937 | 4.000 | 2.480 | 1.575 | 0.551 | 1.000 | 0.709 | 1.024 | Fig.4 | 9.3 | |
| Extra-Fine Pitch | MFPN 452500R-6T | ● | 6 | 2.500 | 2.815 | 1.890 | 0.750 | 0.669 | 0.433 | 1.575 | 0.750 | 0.187 | 0.313 | - | - | Fig.2 | 0.5 | |
| | 453000R-8T | ● | 8 | 3.000 | 3.315 | 2.283 | 1.000 | 0.866 | 0.551 | 1.969 | 1.063 | 0.236 | 0.375 | - | - | Fig.2 | 1.1 | |
| | 454000R-10T | ● | 10 | 4.000 | 4.315 | 2.756 | 1.500 | 2.047 | - | 1.969 | 1.142 | 0.394 | 0.625 | - | - | Fig.3 | 1.3 | |
| | 455000R-13T | ● | 13 | 5.000 | 5.315 | 3.425 | 1.500 | 2.283 | - | 2.480 | 1.417 | 0.394 | 0.625 | - | - | Fig.3 | 2.6 | × |
| | 456000R-16T | ● | 16 | 6.000 | 6.315 | 4.016 | 2.000 | 2.835 | - | 2.480 | 1.496 | 0.433 | 0.750 | - | - | Fig.3 | 3.9 | |
| | 458000R-18T | ● | 18 | 8.000 | 8.315 | 5.591 | 2.500 | 3.937 | 4.000 | 2.480 | 1.575 | 0.551 | 1.000 | 0.709 | 1.024 | Fig.4 | 6.6 | |
| | 4510000R-20T | ● | 20 | 10.000 | 10.315 | 5.591 | 2.500 | 3.937 | 4.000 | 2.480 | 1.575 | 0.551 | 1.000 | 0.709 | 1.024 | Fig.4 | 9.3 | |

Dimension S is 0.236" for GM, SM, GH Chipbreakers, 0.197" for GL Chipbreaker, and 0.118" for W Chipbreaker: PR15 Series

● : U.S. Stock

Spare Parts See [Page 6](#)

Applicable Inserts See [Page 8](#)



| Rake Angle (°) | A.R. | | R.R. | |
|----------------|-------|------|---------------------------------|----------------------|
| | (MAX) | +10° | ØD = 63mm -10° ØD = 80mm -8° | ØD = 100mm-315mm -6° |

Face Mill Dimensions (Metric Size)

| | Part Number | Stock | | No. of Inserts | Dimensions (in) | | | | | | | | | | | Drawing | Weight (kg) | Shim | | |
|------------------|------------------|------------------------------|----|----------------|-----------------|-----|-----|--------|--------|--------|--------|--------|--------|--------|--------|---------|-------------|-------|------|---|
| | | R | L | | ØD | ØD1 | ØD2 | Ød | Ød1 | Ød2 | H | E | a | b | Ød3 | | | | Ød4 | |
| Inch Bore Dia. | Coarse Pitch | MFPN 45080 ^R L-5T | ○ | ○ | 5 | 80 | 93 | 60 | 1.000" | 22 | 13.0 | 50 | 1.063" | 0.236" | 0.375" | | | Fig.1 | 1.1 | ✓ |
| | | 45100 ^R L-6T | ○ | ○ | 6 | 100 | 113 | 70 | 1.250" | 48 | - | 50 | 1.260" | 0.315" | 0.500" | | | Fig.2 | 1.4 | |
| | | 45125 ^R L-7T | ○ | ○ | 7 | 125 | 138 | 87 | 1.500" | 58 | - | 63 | 1.417" | 0.394" | 0.625" | | | Fig.2 | 2.6 | |
| | | 45160 ^R L-8T | ○ | ○ | 8 | 160 | 173 | 102 | 2.000" | 72 | - | 63 | 1.496" | 0.433" | 0.750" | | | Fig.2 | 4.0 | |
| | | 45200R-10T | ○ | | 10 | 200 | 213 | 142 | 1.875" | 110 | 4.000" | 63 | 1.575" | 0.551" | 1.000" | 18 | 26 | Fig.3 | 6.7 | |
| | | 45250R-12T | ○ | | 12 | 250 | 263 | 142 | 1.875" | 110 | 4.000" | 63 | 1.575" | 0.551" | 1.000" | 18 | 26 | Fig.3 | 9.4 | |
| | Fine Pitch | MFPN 45080R-6T | ○ | | 6 | 80 | 93 | 60 | 1.000" | 22 | 13.0 | 50 | 1.063" | 0.236" | 0.375" | | | Fig.1 | 1.1 | × |
| | | 45100R-8T | ○ | | 8 | 100 | 113 | 70 | 1.250" | 48 | - | 50 | 1.260" | 0.315" | 0.500" | | | Fig.2 | 1.4 | |
| | | 45125R-10T | ○ | | 10 | 125 | 138 | 87 | 1.500" | 58 | - | 63 | 1.417" | 0.394" | 0.625" | | | Fig.2 | 2.7 | |
| | | 45160R-12T | ○ | | 12 | 160 | 173 | 102 | 2.000" | 72 | - | 63 | 1.496" | 0.433" | 0.750" | | | Fig.2 | 4.0 | |
| | | 45200R-14T | ○ | | 14 | 200 | 213 | 142 | 1.875" | 110 | 4.000" | 63 | 1.575" | 0.551" | 1.000" | 18 | 26 | Fig.3 | 6.9 | |
| | | 45250R-16T | ○ | | 16 | 250 | 263 | 142 | 1.875" | 110 | 4.000" | 63 | 1.575" | 0.551" | 1.000" | 18 | 26 | Fig.3 | 9.6 | |
| Extra-Fine Pitch | MFPN 45080R-8T | ○ | | 8 | 80 | 93 | 60 | 1.000" | 22 | 13.0 | 50 | 1.063" | 0.236" | 0.375" | | | Fig.1 | 1.1 | × | |
| | 45100R-10T | ○ | | 10 | 100 | 113 | 70 | 1.250" | 48 | - | 50 | 1.260" | 0.315" | 0.500" | | | Fig.2 | 1.3 | | |
| | 45125R-13T | ○ | | 13 | 125 | 138 | 87 | 1.500" | 58 | - | 63 | 1.417" | 0.394" | 0.625" | | | Fig.2 | 2.7 | | |
| | 45160R-16T | ○ | | 16 | 160 | 173 | 102 | 2.000" | 72 | - | 63 | 1.496" | 0.433" | 0.750" | | | Fig.2 | 4.0 | | |
| | 45200R-18T | ○ | | 18 | 200 | 213 | 142 | 1.875" | 110 | 4.000" | 63 | 1.575" | 0.551" | 1.000" | 18 | 26 | Fig.3 | 6.9 | | |
| | 45250R-20T | ○ | | 20 | 250 | 263 | 142 | 1.875" | 110 | 4.000" | 63 | 1.575" | 0.551" | 1.000" | 18 | 26 | Fig.3 | 6.9 | | |
| Metric Bore Dia. | Coarse Pitch | MFPN 45063R-4T-M | ○ | | 4 | 63 | 76 | 47 | 22 | 19 | 11.0 | 40 | 21 | 6.3 | 10.4 | | | Fig.1 | 0.5 | ✓ |
| | | 45080R-5T-M | ○ | | 5 | 80 | 93 | 60 | 27 | 22 | 13.0 | 50 | 24 | 7.0 | 12.4 | | | Fig.1 | 1.1 | |
| | | 45100R-6T-M | ○ | | 6 | 100 | 113 | 70 | 32 | 48 | - | 50 | 30 | 8.0 | 14.4 | | | Fig.2 | 1.4 | |
| | | 45125R-7T-M | ○ | | 7 | 125 | 138 | 87 | 40 | 58 | - | 63 | 32 | 9.0 | 16.4 | | | Fig.2 | 2.6 | |
| | | 45160R-8T-M | ○ | | 8 | 160 | 173 | 102 | 40 | 68 | 66.7 | 63 | 32 | 9.0 | 16.4 | 14 | 20 | Fig.3 | 3.8 | |
| | | 45200R-10T-M | ○ | | 10 | 200 | 213 | 142 | 60 | 110 | 101.6 | 63 | 40 | 14.0 | 25.7 | 18 | 26 | Fig.3 | 6.4 | |
| | | 45250R-12T-M | ○ | | 12 | 250 | 263 | 142 | 60 | 110 | 101.6 | 63 | 40 | 14.0 | 25.7 | 18 | 26 | Fig.3 | 9.1 | |
| | | 45315R-14T-M | □ | | 14 | 315 | 328 | 220 | 60 | 110 | - | 80 | 40 | 14.0 | 25.7 | - | - | Fig.4 | 21.3 | |
| | Fine Pitch | MFPN 45063R-5T-M | ● | | 5 | 63 | 76 | 47 | 22 | 19 | 11.0 | 40 | 21 | 6.3 | 10.4 | | | Fig.1 | 0.5 | × |
| | | 45080R-6T-M | ○ | | 6 | 80 | 93 | 60 | 27 | 22 | 13.0 | 50 | 24 | 7.0 | 12.4 | | | Fig.1 | 1.0 | |
| | | 45100R-8T-M | ○ | | 8 | 100 | 113 | 70 | 32 | 48 | - | 50 | 30 | 8.0 | 14.4 | | | Fig.2 | 1.4 | |
| | | 45125R-10T-M | ○ | | 10 | 125 | 138 | 87 | 40 | 58 | - | 63 | 32 | 9.0 | 16.4 | | | Fig.2 | 2.5 | |
| | | 45160R-12T-M | ○ | | 12 | 160 | 173 | 102 | 40 | 68 | 66.7 | 63 | 32 | 9.0 | 16.4 | 14 | 20 | Fig.3 | 3.8 | |
| | | 45200R-14T-M | ○ | | 14 | 200 | 213 | 142 | 60 | 110 | 101.6 | 63 | 40 | 14.0 | 25.7 | 18 | 26 | Fig.3 | 6.5 | |
| | | 45250R-16T-M | ○ | | 16 | 250 | 263 | 142 | 60 | 110 | 101.6 | 63 | 40 | 14.0 | 25.7 | 18 | 26 | Fig.3 | 9.1 | |
| | | 45315R-14T-M | □ | | 14 | 315 | 328 | 220 | 60 | 110 | - | 80 | 40 | 14.0 | 25.7 | - | - | Fig.4 | 21.3 | |
| | Extra-Fine Pitch | MFPN 45063R-6T-M | ○ | | 6 | 63 | 76 | 47 | 22 | 19 | 11.0 | 40 | 21 | 6.3 | 10.4 | | | Fig.1 | 0.5 | × |
| | | 45080R-8T-M | ○ | | 8 | 80 | 93 | 60 | 27 | 22 | 13.0 | 50 | 24 | 7.0 | 12.4 | | | Fig.1 | 1.1 | |
| 45100R-10T-M | | ○ | | 10 | 100 | 113 | 70 | 32 | 48 | - | 50 | 30 | 8.0 | 14.4 | | | Fig.2 | 1.3 | | |
| 45125R-13T-M | | ○ | | 13 | 125 | 138 | 87 | 40 | 58 | - | 63 | 32 | 9.0 | 16.4 | | | Fig.2 | 2.6 | | |
| 45160R-16T-M | | ○ | | 16 | 160 | 173 | 102 | 40 | 68 | 66.7 | 63 | 32 | 9.0 | 16.4 | 14 | 20 | Fig.3 | 3.9 | | |
| 45200R-18T-M | | ○ | | 18 | 200 | 213 | 142 | 60 | 110 | 101.6 | 63 | 40 | 14.0 | 25.7 | 18 | 26 | Fig.3 | 6.6 | | |
| 45250R-20T-M | ○ | | 20 | 250 | 263 | 142 | 60 | 110 | 101.6 | 63 | 40 | 14.0 | 25.7 | 18 | 26 | Fig.3 | 9.3 | | | |

Dimension S is 6mm for GM, SM, GH Chipbreakers, 5mm for GL Chipbreaker, and 3mm for W Chipbreaker: PR15 Series

Spare Parts See [Page 6](#)
Applicable Inserts See [Page 8](#)

● : U.S. Stock
○ : World Express (Shipping: 7-10 Business Days)
□ : Made to Order / Quoted Item

Spare Parts

Inch Size Face Mill Spare Parts

| Part Number | Insert Screw | Wrench | | Shim | Shim Screw | Wrench | Anti-Seize Compound | Arbor Bolt | Mounting Screw |
|--|--|-------------------|--|---------|------------|--------|---------------------|-------------------------------|----------------------|
| | | TTW* ¹ | DTM | | | | | | |
| Coarse Pitch MFPN 452500R-4T 453000R-5T 454000R-6T ~ 4510000R-12T | SB-50140TR | TTW-15 (TT-15) | - | MFPN-45 | SPW-7050 | LW-5 | P-37 | HH3/8-1.25 HH1/2-1.25 | - |
| | Recommended Torque for Insert Screw 4.2 Nm | | Recommended Torque for Shim Screw 6.0 Nm | | | - | | | |
| | | | | | | - | | - | |
| | | | | | | - | | - | |
| Fine Pitch MFPN 452000R-4T 452500R-5T 453000R-6T 454000R-8T ~ 4510000R-16T | SB-50140TR | TTW-15 (TT-15) | - | - | - | - | P-37 | - HH3/8-1.25 HH1/2-1.25 | XNS610* ² |
| | Recommended Torque for Insert Screw 4.2 Nm | | | | | - | | | |
| | | | | | | - | | - | |
| | | | | | | - | | - | |
| Extra-Fine Pitch MFPN 452500R-6T 453000R-8T 454000R-10T ~ 4510000R-20T | SB-40140TRN | - | DTM-15 | - | - | - | P-37 | HH3/8-1.25 HH1/2-1.25 | - |
| | Recommended Torque for Insert Screw 3.5 Nm | | | | | - | | | |
| | | | | | | - | | - | |
| | | | | | | - | | - | |

Coat Anti-Seize Compound (P-37) thinly on portion of taper and thread prior to installation.

Recommended Cutting Conditions See [Page 9](#)

*¹ TTW-15 wrenches will replace older TT-15 wrenches. Either model is compatible. *² Differential screw (3/8-24UNF)

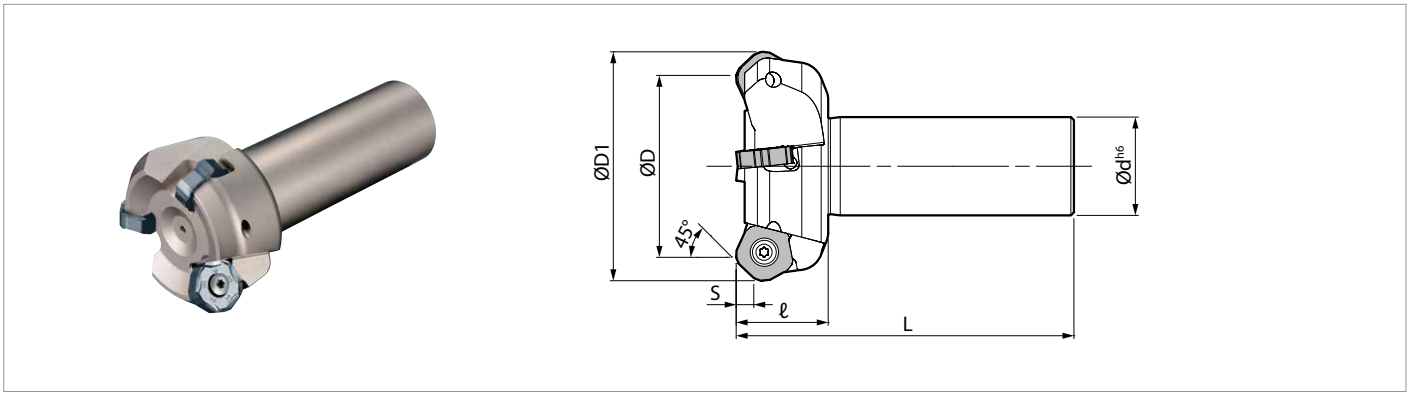
Metric Size Face Mill Spare Parts

| Part Number | Insert Screw | Wrench | | Shim | Shim Screw | Wrench | Anti-Seize Compound | Arbor Bolt | Mounting Screw |
|---|--|-------------------|--|---------|------------|--------|---------------------|------------------------|----------------|
| | | TTW* ¹ | DTM | | | | | | |
| Coarse Pitch MFPN 45063R-4T-M 45080 ^{PH} -5T-(M) 45100 ^{PH} -6T-(M) ~ 45315R-14T-(M) | SB-50140TR | TTW-15 (TT-15) | - | MFPN-45 | SPW-7050 | LW-5 | P-37 | HH10 × 30 HH12 × 35 | - |
| | Recommended Torque for Insert Screw 4.2 Nm | | Recommended Torque for Shim Screw 6.0 Nm | | | - | | | |
| | | | | | | - | | - | |
| | | | | | | - | | - | |
| Fine Pitch MFPN 45063R-5T-M 45080R-6T-(M) 45100R-8T-(M) ~ 45315R-18T-(M) | SB-50140TR | TTW-15 (TT-15) | - | - | - | - | P-37 | HH10 × 30 HH12 × 35 | - |
| | Recommended Torque for Insert Screw 4.2 Nm | | | | | - | | | |
| | | | | | | - | | - | |
| | | | | | | - | | - | |
| Extra-Fine Pitch MFPN 45063R-6T-M 45080R-8T-(M) 45100R-10T-(M) ~ 45250R-20T-(M) | SB-40140TRN | - | DTM-15 | - | - | - | P-37 | HH10 × 30 HH12 × 35 | - |
| | Recommended Torque for Insert Screw 3.5 Nm | | | | | - | | | |
| | | | | | | - | | - | |
| | | | | | | - | | - | |

Coat Anti-Seize Compound (P-37) thinly on portion of taper and thread prior to installation.

Recommended Cutting Conditions See [Page 9](#)

*¹ TTW-15 wrenches will replace older TT-15 wrenches. Either model is compatible.



End Mill Dimensions

| Part Number | Stock | Unit | No. of Inserts | Dimensions | | | | | | Rake Angle (°) | | Spare Parts | | |
|---|----------------------|------|----------------|------------|------|------|------|------|-------------|----------------|------|--------------|----------------|---------------------|
| | | | | ØD | ØD1 | Ød | L | ℓ | S | A.R. (Max) | R.R. | Insert Screw | Wrench*1 | Anti-Seize Compound |
| Weldon Shank MFPN 452000R-W125-3T | ● | inch | 3 | 2.00 | 2.31 | 1.25 | 3.60 | 1.18 | 0.23 (0.19) | +10° | -12° | SB-50140TR | TTW-15 (TT-15) | P-37 |
| | MFPN 452500R-W125-4T | | 4 | 2.50 | 2.81 | | | | | | -10° | | | |
| | MFPN 453000R-W125-5T | | 5 | 3.00 | 3.31 | | | | | | -8° | | | |
| Cylindrical Shank MFPN 45050R-S32-3T | ○ | mm | 3 | 50 | 63 | 32 | 110 | 30 | 6 (5) | +10° | -12° | SB-50140TR | TTW-15 (TT-15) | P-37 |
| | MFPN 45063R-S32-4T | | 4 | 63 | 76 | | | | | | -10° | | | |
| | MFPN 45080R-S32-5T | | 5 | 80 | 93 | | | | | | -8° | | | |

● : U.S. Stock ○ : World Express (Shipping: 7-10 Business Days)

Coat Anti-Seize Compound (P-37) thinly on portion of taper and thread prior to installation.


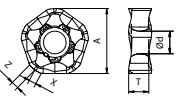

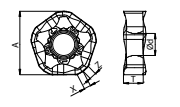

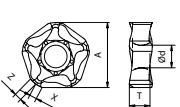

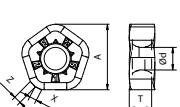

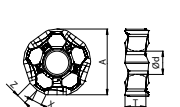

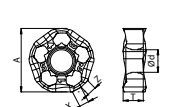

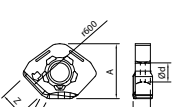
Dimension S is 0.236" (6mm) for GM, SM, GH Chipbreakers, 0.197" (5mm) for GL Chipbreaker, and 0.118" (3mm) for W Chipbreaker: PR15 Series

*1 TTW-15 wrenches will replace older TT-15 wrenches. Either model is compatible.

Applicable Inserts See [Page 8](#)

Recommended Cutting Conditions See [Page 9](#)

Applicable Inserts

| Usage Classification | | P | Carbon Steel / Alloy Steel | | | | | ■ | | ☆ | ★ | | ☆ | |
|--|---|------------------|--|-------|-------|-------|-------|------------------|------------------------------------|---------------|--------|--------|----------|--------|
| | | | Mold Steel | | | | | | ■ | | ☆ | ★ | | ☆ |
| ★ Roughing / 1st Choice ☆ Roughing / 2nd Choice ■ Finishing / 1st Choice □ Finishing / 2nd Choice (When hardness is under 45HRC) | | M | Austenitic Stainless Steel | | | | | | | ★ | ☆ | | ☆ | |
| | | | Martensitic Stainless Steel | | | | | | | ★ | ☆ | | | |
| | | | Precipitation Hardened Stainless Steel | | | | | | | | | ★ | | |
| | | K | Gray Cast Iron | | | | | | | | | | ★ | ☆ |
| | | | Ductile Cast Iron | | | | | | | | | | | ★ |
| | | S | Heat Resistant Alloy (Ni-base) | | | | | | ★ | ☆ | | | | ☆ |
| | | | Titanium Alloy (Ti-6Al-4V) | | | | | | | | ★ | | | |
| | | H | Hardened Materials | | | | | | | | | □ | | |
| Insert | | Description | Dimensions (in) | | | | | Cermet TN100M | CVD Coated Carbide CA6535 | MEGACOAT NANO | | | MEGACOAT | |
| | | | A | T | Ød | X | Z | | | PR1535 | PR1525 | PR1510 | PR1225 | PR1210 |
|  |  | PNMU 1205ANER-GM | | | | | | | ● | ● | ● | ● | ● | ● |
|  |  | PNMU 1205ANEL-GM | 0.704 | 0.219 | | | | | ○ | ● | ● | ● | | |
|  |  | PNMU 1205ANER-SM | | | | 0.079 | 0.079 | | ● | ● | ● | ● | ● | ○ |
|  |  | PNMU 1205ANER-GH | 0.708 | 0.243 | 0.244 | | | | ○ | ● | ● | ● | ● | ● |
|  |  | PNEU 1205ANER-GL | | | | 0.689 | | | ○ | ● | ● | ● | ● | ● |
|  |  | PNEU 1205ANEL-GL | | 0.219 | | | | | ○ | ○ | ○ | ● | | |
|  |  | PNEU 1205ANER-W | 0.703 | | | | 0.091 | 0.319 | ● | ○ | ○ | ● | ● | |

● : U.S. Stock ○ : World Express (Shipping: 7-10 Business Days)
Recommended Cutting Conditions See [Page 9](#)

Recommended Cutting Conditions ★ 1st Recommendation ☆ 2nd Recommendation

| Insert | Workpiece | Recommended Feed (fz: ipt) | Recommended Insert Grade (Vc: sfm) | | | |
|-------------|--|-------------------------------|------------------------------------|--------------------------|--------------------------|--------------------------|
| | | | MEGACOAT NANO (MEGACOAT) | | | CVD Coated Carbide |
| | | | PR1535 | PR1525 (PR1225) | PR1510 (PR1210) | CA6535 |
| GM | Carbon Steel | 0.004 - 0.008 - 0.016 | ☆ 390 - 590 - 820 | ★ 390 - 590 - 820 | - | - |
| | Alloy Steel | 0.004 - 0.008 - 0.016 | ☆ 330 - 520 - 720 | ★ 330 - 520 - 720 | - | - |
| | Mold Steel | 0.004 - 0.008 - 0.014 | ★ 260 - 460 - 590 | ★ 260 - 460 - 590 | - | - |
| | Austenitic Stainless Steel | 0.004 - 0.008 - 0.016 | ☆ 330 - 520 - 660 | ☆ 330 - 520 - 660 | - | - |
| | Martensitic Stainless Steel | 0.004 - 0.008 - 0.016 | ☆ 490 - 660 - 820 | - | - | ☆ 590 - 790 - 980 |
| | Precipitation Hardened Stainless Steel | 0.004 - 0.008 - 0.012 | ★ 300 - 390 - 490 | - | - | - |
| | Gray Cast Iron | 0.004 - 0.008 - 0.016 | - | - | ★ 390 - 590 - 820 | - |
| | Nodular Cast Iron | 0.004 - 0.008 - 0.014 | - | - | ★ 330 - 490 - 660 | - |
| | Ni-base Heat-Resistant Alloy (Inconel®718, etc.) | 0.004 - 0.005 - 0.008 | ☆ 70 - 100 - 160 | - | - | ★ 70 - 100 - 160 |
| SM *(GL) | Carbon Steel | 0.002 - 0.005 - 0.010 | ☆ 390 - 590 - 820 | ☆ 390 - 590 - 820 | - | - |
| | Alloy Steel | 0.002 - 0.005 - 0.010 | ☆ 330 - 520 - 720 | ☆ 330 - 520 - 720 | - | - |
| | Mold Steel | 0.002 - 0.004 - 0.008 | ☆ 260 - 460 - 590 | ☆ 260 - 460 - 590 | - | - |
| | Austenitic Stainless Steel | 0.002 - 0.005 - 0.010 | ★ 330 - 520 - 660 | ☆ 330 - 520 - 660 | - | - |
| | Martensitic Stainless Steel | 0.002 - 0.005 - 0.010 | ☆ 490 - 660 - 820 | - | - | ★ 590 - 790 - 980 |
| | Precipitation Hardened Stainless Steel | 0.002 - 0.005 - 0.010 | ☆ 300 - 390 - 490 | - | - | - |
| | Gray Cast Iron | 0.002 - 0.005 - 0.010 | - | - | ☆ 390 - 590 - 820 | - |
| | Nodular Cast Iron | 0.002 - 0.004 - 0.008 | - | - | ☆ 330 - 490 - 660 | - |
| | Ni-base Heat-Resistant Alloy (Inconel®718, etc.) | 0.002 - 0.004 - 0.006 | ☆ 70 - 100 - 160 | - | - | ☆ 70 - 100 - 160 |
| | Titanium Alloy | 0.002 - 0.003 - 0.006 | ★ 130 - 200 - 260 | - | - | - |
| GH | Carbon Steel | 0.008 - 0.016 - 0.028 | ☆ 390 - 590 - 820 | ☆ 390 - 590 - 820 | - | - |
| | Alloy Steel | 0.008 - 0.016 - 0.024 | ☆ 330 - 520 - 720 | ☆ 330 - 520 - 720 | - | - |
| | Mold Steel | 0.008 - 0.014 - 0.020 | ☆ 260 - 460 - 590 | ☆ 260 - 460 - 590 | - | - |
| | Austenitic Stainless Steel | 0.008 - 0.012 - 0.016 | ☆ 330 - 520 - 660 | ☆ 330 - 520 - 660 | - | - |
| | Martensitic Stainless Steel | 0.008 - 0.012 - 0.016 | ☆ 490 - 660 - 820 | - | - | ☆ 590 - 790 - 980 |
| | Precipitation Hardened Stainless Steel | 0.008 - 0.012 - 0.016 | ☆ 300 - 390 - 490 | - | - | - |
| | Gray Cast Iron | 0.008 - 0.016 - 0.028 | - | - | ☆ 390 - 590 - 820 | - |
| | Nodular Cast Iron | 0.008 - 0.014 - 0.020 | - | - | ☆ 330 - 490 - 660 | - |
| | Ni-base Heat-Resistant Alloy (Inconel®718, etc.) | 0.008 - 0.012 - 0.016 | ☆ 70 - 100 - 160 | - | - | ☆ 70 - 100 - 160 |

The numbers in bold font represent the center value of the recommended cutting conditions.
Adjust the cutting speed and the feed rate within the above conditions according to the actual machining situation.

When using GH chipbreaker for fine pitch cutters, recommended feed is $fz \leq 0.016$ ipt
GH chipbreaker is not recommended for extra fine pitch cutter.

Applicable Chipbreaker

| Cutter | Chipbreaker | | |
|---------------------------------|-------------|---------|--------------------------------|
| | GM | SM (GL) | GH |
| Coarse Pitch (with Shim) | ✓ | ✓ | ✓ |
| Fine Pitch (without Shim) | ✓ | ✓ | ✓ (fz ≤ 0.016 ipt Recommended) |
| Extra Fine Pitch (without Shim) | ✓ | ✓ | Not Recommended |

Face Mill and Insert Selection Guide

| Purpose | Cutter | | | Chipbreaker | | | | |
|--|--------------|------------|------------------|-------------|----|----|----|---|
| | Coarse Pitch | Fine Pitch | Extra-Fine Pitch | GM | SM | GH | GL | W |
| General Milling for Steel and Alloy Steel | | ✓ | | ✓ | | | | |
| Steel and Alloy Steel (to prevent chattering due to low rigidity machine or poor clamping power) | ✓ | | | | ✓ | | | |
| Productivity Oriented (D.O.C. ≥ 0.158" fz ≥ 0.014 ipt) | ✓ | | | | | ✓ | | |
| Surface Roughness Oriented | ✓ | ✓ | | | | | ✓ | ✓ |
| General Milling for Stainless Steel | | ✓ | | | ✓ | | | |
| Stainless Steel (to prevent chattering due to low rigidity machine or poor clamping power) | ✓ | | | | ✓ | | | |
| Cast Iron Milling (Improved Efficiency) | | | ✓ | ✓ | | | | |
| Cast Iron (D.O.C. ≥ 0.158" fz ≥ 0.014 ipt) | ✓ | | | | | ✓ | | |
| Improved Surface Finish in High Efficiency Milling | | ✓ | ✓ | | | | | ✓ |

How to Use Wiper Inserts

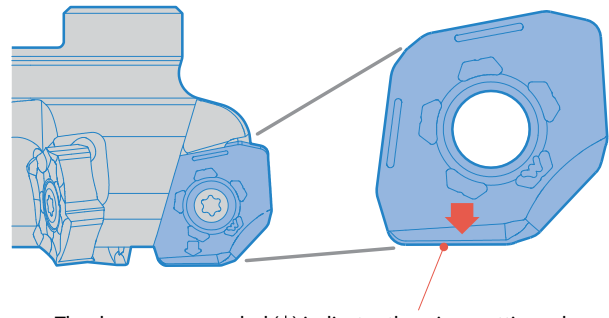
1. Please only use one wiper insert per cutter
(If you use more than 2 wiper inserts on one cutter, the workpiece surface may become smeared)
2. Combination of Wiper Insert with Other Chipbreakers

| Chipbreaker Combination | GM | SM | W |
|----------------------------|----|----|---|
| Recommended Combination | ✓ | | ✓ |
| Recommended Combination | | ✓ | ✓ |

Using GH + W and GL + W are NOT recommended.

3. Use tool presetter for measuring protrusion amount of wiper edge. (Recommended protrusion amount: 0.1 mm)

How to Mount Wiper Insert on MFPN Cutter



The down arrow symbol (↓) indicates the wiper cutting edge. When mounting inserts, make sure that the arrow points downward.

Improved Surface Finish with Wiper Insert

| Chipbreaker Combination | Insert | Surface Finish | Workpiece Surface |
|---|--------|-------------------------------|-------------------|
| MFPN Wiper Insert PR1525 (PNMU-GM...9 Inserts) (PNEU-W...1 Inserts) | | Ra = 0.48 μm Rz = 3.39 μm | Shiny Surface |
| MFPN GL Chipbreaker PR1225 (PNEU-GL...10 Inserts) | | Ra = 2.50 μm Rz = 11.41 μm | Shiny Surface |

MFPN45125R-10T (10 Inserts)

Cutting Conditions: Vc = 660 sfm (n = 510 rpm), fz = 0.008 ipt (Vf = 40.157 ipm), D.O.C. × ae = 0.118" × 3.937", Dry Workpiece: Structural Steel

Results above are from an internal evaluation. The surface roughness also depends on the workpiece, cutting conditions, or situation of each user. When the surface roughness is unstable, please set the cutting speed higher, the feed rate lower, or use a wiper insert (TN100M).

How to Mount Inserts

1. Be sure to remove dust and chips from the insert mounting pocket.
2. After applying anti-seize compound on portion of taper and thread, while pressing the insert against the pocket wall, insert the screw into the hole of the insert and tighten the screw with appropriate torque. See Fig. 1 and Fig. 2.

The recommended torque for coarse pitch and fine pitch (using M5 screw) is 4.2 Nm. The recommended torque for extra fine pitch (using M4 screw) is 3.5 Nm.



Fig. 1



Fig. 2



Fig. 3

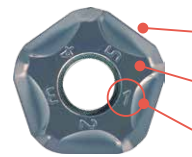


Fig. 4

Side Surface of Insert

Top Surface of Insert

Insert Corner Identification Number

3. After tightening the screw, make sure that there is no clearance between the insert seat surface and the bearing surface of the holder and between the insert side surfaces and the pocket wall of the holder.
4. To change the cutting edge of the insert, turn the insert counterclockwise (see Fig. 3) Insert corner identification number is stamped on the top surface of insert with the exception of the SM chipbreaker (Fig. 4).

How to Replace Shim (for Coarse Pitch)

1. Be sure to remove dust and chips from the insert mounting pocket.
2. The shim must be mounted in the proper direction. While aligning the surface of the shim with the mark on it to the corresponding pocket wall (see Fig. 5) and lightly pressing the shim toward the pocket wall, insert the screw into the hole of the shim and tighten it (see Fig. 6). When tightening the screw, make sure that the screw is vertical to the bearing surface. Recommended torque is 6.0Nm.

3. After tightening the screw, make sure that there is no clearance between the shim seat surface and the bearing surface. If there is any clearance, remove the shim and mount it again according to the above steps.



Fig. 5

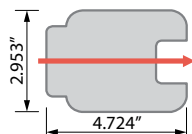


Fig. 6

Case Studies

Construction Machine Part 4140H

Vc = 820 sfm
 D.O.C. x ae = 0.079" ~ 0.118" x 2.953"
 fz = 0.006 ipt
 (Vf = 35.433 ipm)
 Dry
 MFPN453000R-6T (6 Inserts)
 PNMU1205ANER-SM (PR1225)



Chip Removal Rate

PR1225

202 cc/min

Machining Efficiency
2.1x

Competitor G

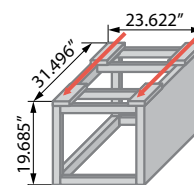
94 cc/min

MFPN cutter improved machining efficiency 2.1 times that of Competitor E without changing spindle load. MFPN cutter was very stable at the entrance and exit of the workpiece. It remained stable even with a low rigidity machine.

(User Evaluation)

Case 304

Vc = 300 sfm
 D.O.C. x ae = 0.016" x 1.969"
 fz = 0.008 ipt
 (Vf = 16.142 ipm)
 Dry
 MFPN453000R-6T (6 Inserts)
 PNMU1205ANER-SM (PR1225)



Machining Efficiency

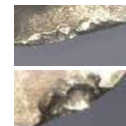
PR1225

1.5 pcs/corner

Tool Life
1.5x

Competitor H
 (for Roughing)

1 pcs/corner



Even when the cutting depth, cutting speed, and feed rate could not be raised due to the low rigidity of the workpiece, MFPN face mill achieved stable milling without chattering and also has an improved tool life of 1.5 times.

(User Evaluation)



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