KYOCERA



# MFK

## High Efficiency

*Multi-Edge Cutter for Cast Iron*

- ***Excellent Surface Finish***
  High axial rake leads to chatter resistance
- ***Tough & Reliable Inserts***
  Dual angle edge design reduces fracturing
- ***Maximum Cost Savings***
  10 usable cutting edges per insert for stable and economical machining

NEW ***NEW DEVELOPMENT IN CVD COATING TECHNOLOGY***

*Unique Crystal Control & Advanced Film Adhesion will revolutionize your productivity!*

# MFK

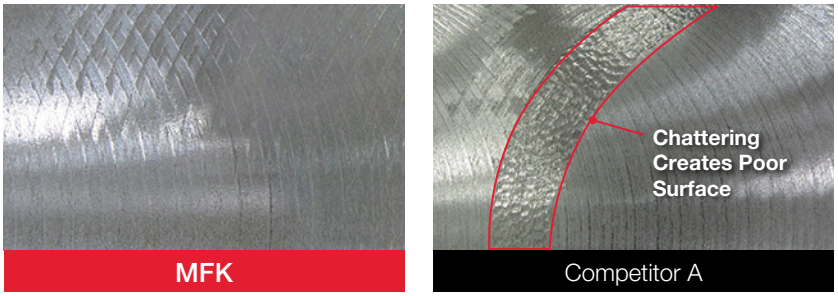
Multi-edge cutter for cast iron with unique innovations in CVD coating technology brings your cast iron machining to new levels of ***perfection*** and ***efficiency***.

## *BALANCED DESIGN*

MAXIMUM TOOL LIFE

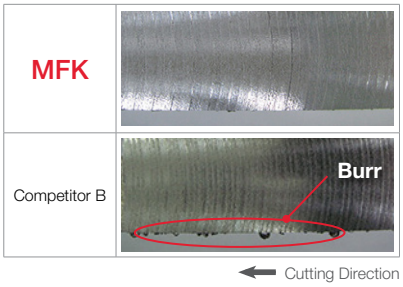
### EXCEPTIONAL SURFACE FINISH QUALITY

#### Surface Finish Comparison




Cutting Conditions
Workpiece : Nodular Cast Iron (80-60-03), Dry, Vc=591sfm, f=0.012ipt, D.O.C.×ae=0.118"×3.071"

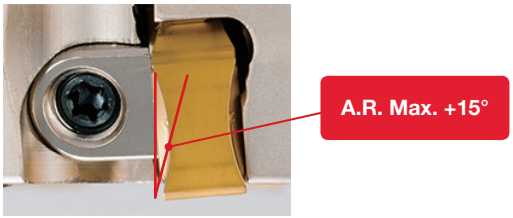
#### Burr Comparison



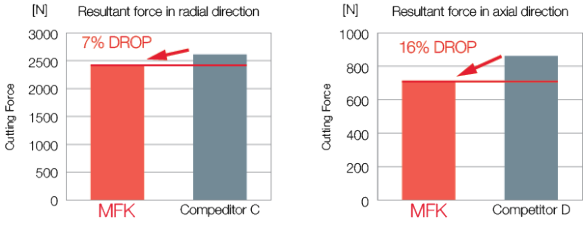

*Sharp Cutting Prevents Burr Formation*

### TOUGH & RELIABLE INSERT CONSTRUCTION

#### Low Cutting Forces with Helical Cutting Edge Design

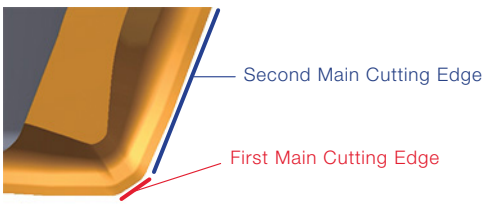



#### Cutting Force Comparison

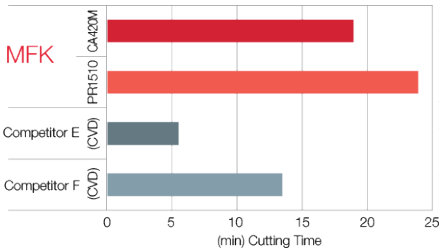



Cutting Conditions
Workpiece : Nodular Cast Iron (80-60-03), Dry, Ø4.921"
Vc=590sfm, f=0.012ipt, D.O.C.×ae=0.118"×2.441"

#### Tough & Reliable Dual Angle Edge Design




#### Fracture Resistance Comparison

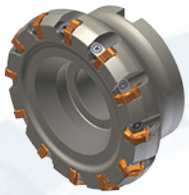



Cutting Conditions
Workpiece : Nodular Cast Iron (65-45-12) with 4 bores
Vc=980sfm
f=0.020ipt
D.O.C.=0.079"
Wet

*Reduced Impact Load During Initial Contact*

Recommended for

## UNSTABLE SETUPS



### Fine Pitch

(Example : 5000R-11-12T = 12 Inserts)

- **General purpose for wider application ranges**

Recommended for

## RIGID SETUPS

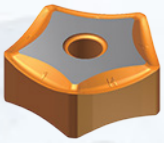
### Extra Fine Pitch

(Example : 5000R-11-18T = 18 Inserts)

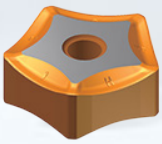
- **Finer pitch for higher efficiency**

By Application

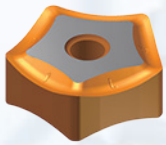
## CHIPBREAKER LINEUP



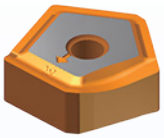
General Purpose:
GM Chipbreaker



Heavy Duty:
GH Chipbreaker



Finishing:
GL Ground
Chipbreaker



Wiper Edge:
W Ground
Wiper Edge

## NEW Newly Developed CVD Coating Technology

**Kyocera's unique crystal control technology and advanced film adhesion will revolutionize your productivity!**

### Longer Tool Life

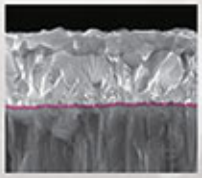
Controlled α-$Al_2O_3$ crystal growth for wear and fracture resistance

**CA420M**

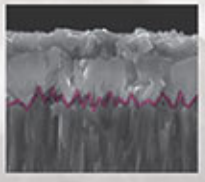
Conventional

### Prevents Film Peeling

40% improved film adhesion by optimized interface



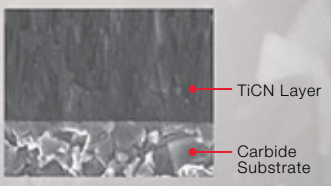
**CA420M**



Conventional

### Increased Edge Strength

Higher film strength and fracture resistance with high aspect ratio TiCN

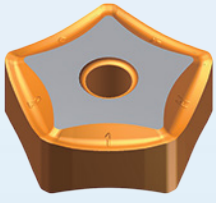



**CA420M**

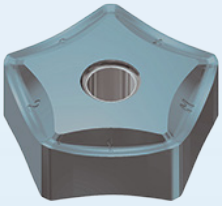
Insert

## GRADE LINEUP

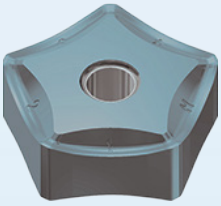
***1st Recommendation***



Long Tool Life
**CA420M**

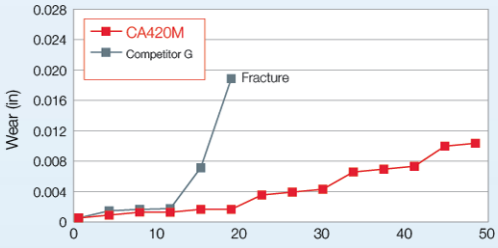


Stable Machining
**PR1510**



Fracture Resistance
**PR1525**

**Wear Resistance Comparison**




Cutting Conditions
Workpiece : Nodular Cast Iron (65-45-12), Dry
Vc=656sfm, f=0.012ipt, D.O.C.×ae=0.079"×3.150"

(Fine Pitch Type Shown)

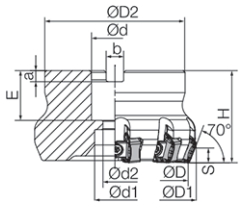



Fig.1

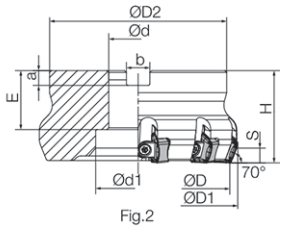



Fig.2

| Rake Angle ( ° ) | | |
|---|---|---|
| Part Number | A.R. | R.R. |
| MFK3000R... | (MAX.) +15° | -7° |
| MFK4000R... | | -6° |
| MFK5000R... | | -5° |
| MFK6000R... | | |

## MFK Face Mill (Inch Sizes)

| Bore Dia. | | Part Number | Stock | No. of Inserts | Dimensions (in) ØD | ØD1 | ØD2 | Ød | Ød1 | Ød2 | H | E | a | b | S | Drawing | Weight (Kg) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Inch Spec | Fine pitch | MFK 3000R-11-8T | ● | 8 | 3.000 | 3.340 | 2.750 | 1.000 | 0.866 | 0.551 | 2.480 | 1.063 | 0.240 | 0.382 | 0.236 | Fig.1 | 1.610 |
| | | 4000R-11-10T | ● | 10 | 4.000 | 4.340 | 3.750 | 1.500 | 1.299 | 0.866 | 2.480 | 1.181 | 0.390 | 0.626 | 0.236 | Fig.1 | 2.860 |
| | | 5000R-11-12T | ● | 12 | 5.000 | 5.340 | 3.750 | 1.500 | 2.047 | - | 2.480 | 1.496 | 0.390 | 0.626 | 0.236 | Fig.2 | 3.670 |
| | | 6000R-11-16T | ● | 16 | 6.000 | 6.340 | 4.880 | 2.000 | 2.835 | - | 2.480 | 1.496 | 0.430 | 0.752 | 0.236 | Fig.2 | 4.940 |
| | Extra Fine pitch | MFK 3000R-11-10T | ● | 10 | 3.000 | 3.340 | 2.750 | 1.000 | 0.866 | 0.551 | 2.480 | 1.063 | 0.240 | 0.382 | 0.236 | Fig.1 | 1.550 |
| | | 4000R-11-14T | ● | 14 | 4.000 | 4.340 | 3.750 | 1.500 | 1.299 | 0.866 | 2.480 | 1.181 | 0.390 | 0.626 | 0.236 | Fig.1 | 2.740 |
| | | 5000R-11-18T | ● | 18 | 5.000 | 5.340 | 3.750 | 1.500 | 2.047 | - | 2.480 | 1.496 | 0.390 | 0.626 | 0.236 | Fig.2 | 3.480 |
| | | 6000R-11-22T | ● | 22 | 6.000 | 6.340 | 4.880 | 2.000 | 2.835 | - | 2.480 | 1.496 | 0.430 | 0.752 | 0.236 | Fig.2 | 4.760 |

## MFK Face Mill (Inch)

| Part Number | Wedge | Wedge Screw | Wrench | Mounting Bolt | Applicable Inserts P6 |
|---|---|---|---|---|---|
| MFK 3000R-11-8T | C09N | W6X18N | TT-15 | HH1/2-1.25 | PNMG1106XNEN-GM<br>PNMG1106XNEN-GH<br>PNEG1106XNEN-GL<br>PNEG1106XNER-W |
| 4000R-11-10T | | | | HH3/4-2.3 | |
| 5000R-11-12T | | | | - | |
| 6000R-11-16T | | | | | |
| MFK 3000R-11-10T | C09N | W6X18N | TT-15 | HH1/2-1.25 | PNMG1106XNEN-GM<br>PNMG1106XNEN-GH<br>PNEG1106XNEN-GL<br>PNEG1106XNER-W |
| 4000R-11-14T | | | | HH3/4-2.3 | |
| 5000R-11-18T | | | | - | |
| 6000R-11-22T | | | | | |

Recommended Cutting Conditions P6

● : U.S. Stock

(Fine Pitch Type Shown)

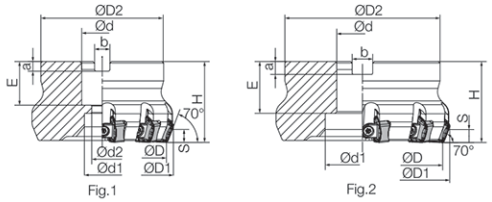



Fig.1 Fig.2

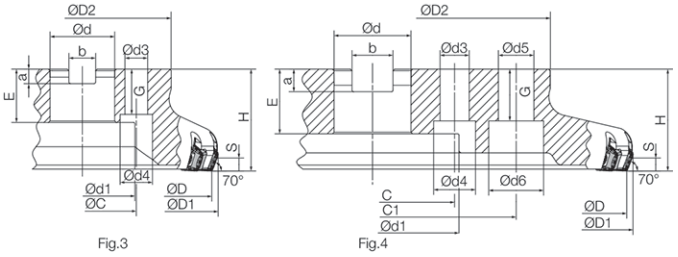



Fig.3 Fig.4

| Rake Angle ( ° ) | | |
|---|---|---|
| Part Number | A.R. | R.R. |
| MFK080R... | (MAX.) +15° | -7° |
| MFK100R... | | -6° |
| MFK125R... ~ MFK315R... | | -5° |

## MFK Face Mill (Metric Sizes)

| Bore Dia. | | Part Number | Stock | No. of Inserts | Dimensions (mm) | | | | | | | | | | | | | | | | | | | Drawing | Weight (Kg) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | ØD | ØD1 | ØD2 | Ød | Ød1 | Ø | H | E | a | b | S | Ød3 | Ød4 | Ød5 | Ød6 | ØC | ØC1 | G | | |
| Inch Spec | Fine Pitch | MFK 080R-11-8T | ○ | 8 | 80 | 89 | 76 | 31.750" | 26 | 17 | 63 | 32 | 8 | 12.7 | 6 | – | – | – | – | – | – | – | Fig.1 | 1.76 |
| | | 100R-11-10T | ○ | 10 | 100 | 109 | 96 | 31.750" | 26 | 17 | 63 | 32 | 8 | 12.7 | 6 | – | – | – | – | – | – | – | Fig.1 | 2.98 |
| | | 125R-11-12T | ○ | 12 | 125 | 134 | 100 | 38.100" | 55 | – | 63 | 38 | 10 | 15.9 | 6 | – | – | – | – | – | – | – | Fig.2 | 3.65 |
| | | 160R-11-16T | ○ | 16 | 160 | 169 | 100 | 50.800" | 70 | – | 63 | 38 | 11 | 19.1 | 6 | – | – | – | – | – | – | – | Fig.2 | 4.62 |
| | | 200R-11-20T | ○ | 20 | 200 | 209 | 142 | 47.625" | 110 | – | 63 | 40 | 14 | 25.4 | 6 | 18 | 26 | – | – | 101.6 | – | 32 | Fig.3 | 7.65 |
| | | 250R-11-24T | ○ | 24 | 250 | 259 | 142 | 47.625" | 110 | – | 63 | 40 | 14 | 25.4 | 6 | 18 | 26 | – | – | 101.6 | – | 32 | Fig.3 | 10.73 |
| | | 315R-11-28T | □ | 28 | 315 | 324 | 220 | 47.625" | 110 | – | 63 | 40 | 14 | 25.4 | 6 | 18 | 26 | 22 | 32 | 101.6 | 177.8 | 32 | Fig.4 | 19.71 |
| | Extra Fine Pitch | MFK 080R-11-10T | ○ | 10 | 80 | 89 | 76 | 31.750" | 26 | 17 | 63 | 32 | 8 | 12.7 | 6 | – | – | – | – | – | – | – | Fig.1 | 1.70 |
| | | 100R-11-14T | ○ | 14 | 100 | 109 | 96 | 31.750" | 26 | 17 | 63 | 32 | 8 | 12.7 | 6 | – | – | – | – | – | – | – | Fig.1 | 2.85 |
| | | 125R-11-18T | ○ | 18 | 125 | 134 | 100 | 38.100" | 55 | – | 63 | 38 | 10 | 15.9 | 6 | – | – | – | – | – | – | – | Fig.2 | 3.44 |
| | | 160R-11-22T | ○ | 22 | 160 | 169 | 100 | 50.800" | 70 | – | 63 | 38 | 11 | 19.1 | 6 | – | – | – | – | – | – | – | Fig.2 | 4.44 |
| | | 200R-11-28T | ○ | 28 | 200 | 209 | 142 | 47.625" | 110 | – | 63 | 40 | 14 | 25.4 | 6 | 18 | 26 | – | – | 101.6 | – | 32 | Fig.3 | 7.40 |
| | | 250R-11-36T | ○ | 36 | 250 | 259 | 142 | 47.625" | 110 | – | 63 | 40 | 14 | 25.4 | 6 | 18 | 26 | – | – | 101.6 | – | 32 | Fig.3 | 10.36 |
| | | 315R-11-44T | □ | 44 | 315 | 324 | 220 | 47.625" | 110 | – | 63 | 40 | 14 | 25.4 | 6 | 18 | 26 | 22 | 32 | 101.6 | 177.8 | 32 | Fig.4 | 19.21 |
| Metric Spec | Fine Pitch | MFK 080R-11-8T-M | ○ | 8 | 80 | 89 | 76 | 27 | 20 | 13 | 63 | 24 | 7 | 12.4 | 6 | – | – | – | – | – | – | – | Fig.1 | 1.87 |
| | | 100R-11-10T-M | ○ | 10 | 100 | 109 | 96 | 32 | 26 | 17 | 63 | 28 | 8 | 14.4 | 6 | – | – | – | – | – | – | – | Fig.1 | 2.99 |
| | | 125R-11-12T-M | ○ | 12 | 125 | 134 | 100 | 40 | 55 | – | 63 | 33 | 9 | 16.4 | 6 | – | – | – | – | – | – | – | Fig.2 | 3.56 |
| | | 160R-11-16T-M | ○ | 16 | 160 | 169 | 100 | 40 | 70 | – | 63 | 33 | 9 | 16.4 | 6 | 14 | 20 | – | – | 66.7 | – | 28 | Fig.3 | 4.51 |
| | | 200R-11-20T-M | ○ | 20 | 200 | 209 | 142 | 60 | 110 | – | 63 | 40 | 14 | 25.7 | 6 | 18 | 26 | – | – | 101.6 | – | 32 | Fig.3 | 7.35 |
| | | 250R-11-24T-M | ○ | 24 | 250 | 259 | 142 | 60 | 110 | – | 63 | 40 | 14 | 25.7 | 6 | 18 | 26 | – | – | 101.6 | – | 32 | Fig.3 | 10.43 |
| | | 315R-11-28T-M | □ | 28 | 315 | 324 | 220 | 60 | 110 | – | 63 | 40 | 14 | 25.7 | 6 | 18 | 26 | 22 | 32 | 101.6 | 177.8 | 32 | Fig.4 | 19.41 |
| | Extra Fine Pitch | MFK 080R-11-10T-M | ○ | 10 | 80 | 89 | 76 | 27 | 20 | 13 | 63 | 24 | 7 | 12.4 | 6 | – | – | – | – | – | – | – | Fig.1 | 1.81 |
| | | 100R-11-14T-M | ○ | 14 | 100 | 109 | 96 | 32 | 26 | 17 | 63 | 28 | 8 | 14.4 | 6 | – | – | – | – | – | – | – | Fig.1 | 2.86 |
| | | 125R-11-18T-M | ○ | 18 | 125 | 134 | 100 | 40 | 55 | – | 63 | 33 | 9 | 16.4 | 6 | – | – | – | – | – | – | – | Fig.2 | 3.38 |
| | | 160R-11-22T-M | ○ | 22 | 160 | 169 | 100 | 40 | 70 | – | 63 | 33 | 9 | 16.4 | 6 | 14 | 20 | – | – | 66.7 | – | 28 | Fig.3 | 4.32 |
| | | 200R-11-28T-M | ○ | 28 | 200 | 209 | 142 | 60 | 110 | – | 63 | 40 | 14 | 25.7 | 6 | 18 | 26 | – | – | 101.6 | – | 32 | Fig.3 | 7.10 |
| | | 250R-11-36T-M | ○ | 36 | 250 | 259 | 142 | 60 | 110 | – | 63 | 40 | 14 | 25.7 | 6 | 18 | 26 | – | – | 101.6 | – | 32 | Fig.3 | 10.07 |
| | | 315R-11-44T-M | □ | 44 | 315 | 324 | 220 | 60 | 110 | – | 63 | 40 | 14 | 25.7 | 6 | 18 | 26 | 22 | 32 | 101.6 | 177.8 | 32 | Fig.4 | 18.92 |

## MFK Face Mill (Metric) Spare Parts & Applicable Inserts

| Part Number | Wedge | Wedge Screw | Wrench | Mounting Bolt | Applicable Inserts ➡ P6 |
|---|---|---|---|---|---|
| MFK 080R-11-8T | C09N | W6X18N | TT-15 | HH16X40 | PNMG1106XNEN-GM<br>PNMG1106XNEN-GH<br>PNEG1106XNEN-GL<br>PNEG1106XNER-W |
| 100R-11-10T | | | | | |
| 125R-11-12T | C09N | W6X18N | TT-15 | – | |
| 160R-11-16T | | | | | |
| 200R-11-20T | | | | | |
| 250R-11-24T | | | | | |
| 315R-11-28T | | | | | |
| MFK 080R-11-10T | C09N | W6X18N | TT-15 | HH16X40 | PNMG1106XNEN-GM<br>PNMG1106XNEN-GH<br>PNEG1106XNEN-GL<br>PNEG1106XNER-W |
| 100R-11-14T | | | | | |
| 125R-11-18T | C09N | W6X18N | TT-15 | – | |
| 160R-11-22T | | | | | |
| 200R-11-28T | | | | | |
| 250R-11-36T | | | | | |
| 315R-11-44T | | | | | |

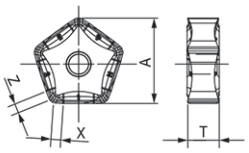
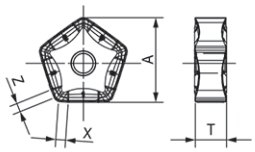
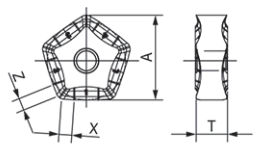
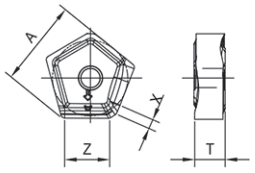
## MFK Face Mill (Metric) Spare Parts & Applicable Inserts

| Part Number | Wedge | Wedge Screw | Wrench | Mounting Bolt | Applicable Inserts ➡ P6 |
|---|---|---|---|---|---|
| MFK 080R-11-8T-M | C09N | W6X18N | TT-15 | HH12X35 | PNMG1106XNEN-GM<br>PNMG1106XNEN-GH<br>PNEG1106XNEN-GL<br>PNEG1106XNER-W |
| 100R-11-10T-M | C09N | W6X18N | TT-15 | HH16X40 | |
| 125R-11-12T-M | C09N | W6X18N | TT-15 | – | |
| 160R-11-16T-M | | | | | |
| 200R-11-20T-M | | | | | |
| 250R-11-24T-M | | | | | |
| 315R-11-28T-M | | | | | |
| MFK 080R-11-10T-M | C09N | W6X18N | TT-15 | HH12X35 | PNMG1106XNEN-GM<br>PNMG1106XNEN-GH<br>PNEG1106XNEN-GL<br>PNEG1106XNER-W |
| 100R-11-14T-M | C09N | W6X18N | TT-15 | HH16X40 | |
| 125R-11-18T-M | C09N | W6X18N | TT-15 | – | |
| 160R-11-22T-M | | | | | |
| 200R-11-28T-M | | | | | |
| 250R-11-36T-M | | | | | |
| 315R-11-44T-M | | | | | |

Recommended Cutting Conditions ➡ P6

○ : World Express (Shipping : 10 Business Days) □ : Made to Order (Call for Delivery)

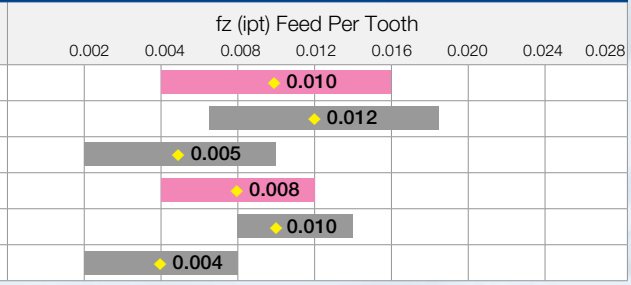
## Applicable Inserts

| Insert | Drawing | Part Number | Dimensions (in) A | T | X | Z | CVD Coated Carbide CA420M | MEGACOAT NANO PR1510 | PR1525 |
|---|---|---|---|---|---|---|---|---|---|
|  General |  | **PNMG1106XNEN-GM** | 0.678 | 0.250 | 0.079 | 0.079 | ● | ● | ● |
|  Tough Edge |  | **PNMG1106XNEN-GH** | 0.678 | 0.250 | 0.079 | 0.079 | ● | ● | ● |
|  Surface Finish Oriented |  | **PNEG1106XNEN-GL** | 0.676 | 0.250 | 0.102 | 0.102 | ● | ● | ● |
|  Wiper Insert (2-Edges) |  | **PNEG1106XNER-W** | 0.709 | 0.250 | 0.079 | 0.394 | ● | ● | ● |

● : U.S. Stock

## Recommended Conditions

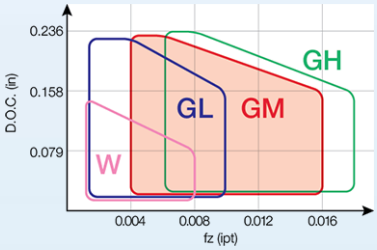
| Workpiece Material | Insert Grade | Cutting Speed (sfm) | Chipbreakers |
|---|---|---|---|
| *Gray Cast Iron (FC)* | **CA420M** | 560~750~980 | GM★ |
| | **PR1510** | 390~590~820 | GH☆ |
| | **PR1525** | 390~590~820 | GL |
| *Nodular Cast Iron (FCD)* | **CA420M** | 490~660~820 | GM★ |
| | **PR1510** | 330~490~660 | GH☆ |
| | **PR1525** | 330~490~660 | GL |



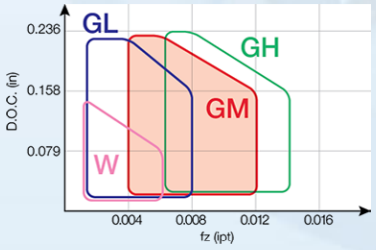

★ : 1st Recommendation ☆ : 2nd Recommendation

## Recommended Application Range

**Workpiece : Gray Cast Iron (FC)**



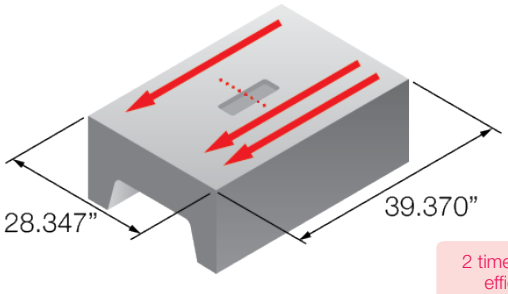

**Workpiece : Nodular Cast Iron (FCD)**




Note:
When using **W** (wiper), please use together with **GM** or **GH**. (Not recommended for use with **GL**)
When using wiper, do not exceed fz=0.008ipt or insert corner may be damaged.

## Case Studies

### Gray Cast Iron NO.45




2 times more efficient

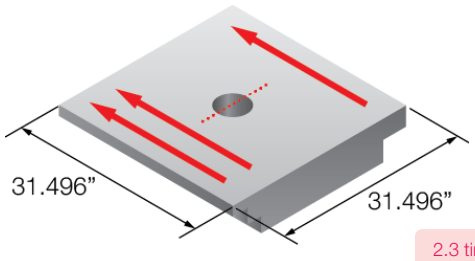
- Machine base • Vc=525sfm • f=0.006ipt (Vf=30.787"/min)
- D.O.C.×ae=0.118"×3.937" • Dry
- MFK125R-11-12T (12 inserts) • PNMG1106XNEN-GM (PR1510)

| | |
|---|---|
| PR1510 | Chip Removal Rate = 235cc/min |
| Competitor A (12 inserts) | Chip Removal Rate = 125cc/min |

Little noise and vibration with increased cutting speed and feed rate.

(User Evaluation)

### Gray Cast Iron NO.45




2.3 times more efficient

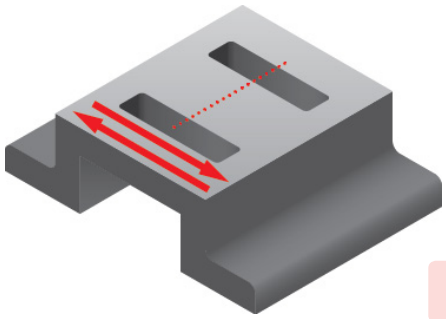
- Base • Vc=525sfm • f=0.0071ipt (Vf=36.102"/min)
- D.O.C.×ae=0.118"×5.512" • Dry
- MFK200R-11-20T (20 inserts) • PNMG1106XNEN-GM (CA420M)

| | |
|---|---|
| CA420M | Chip Removal Rate = 385cc/min |
| Competitor B (12 inserts) | Chip Removal Rate = 167cc/min |

CA420M performed at 2.3 times the efficiency of Competitor B.
Little noise and stable machining.

(User Evaluation)

### Nodular Cast Iron (80-60-03)



3 times longer tool life

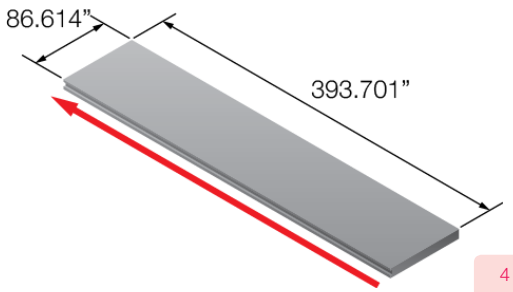
- Mold Part • Vc=300sfm • f=0.013ipt (Vf=38.346"/min)
- D.O.C.×ae=0.079"×~2.362" • Dry
- MFK080R-11-8T (8 inserts) • PNMG1106XNEN-GM (PR1525)

| | |
|---|---|
| PR1525 | Machining efficiency: 3 pcs/edge |
| Competitor C (8 inserts) | Machining efficiency: 1 pcs/edge |

Competitor C caused chipping after machining 1pc. PR1525 maintained better edge condition and stable machining after 3 pcs.

(User Evaluation)

### Gray Cast Iron (NO.50)




4 times more efficient

- Bed • Vc=492sfm • f=0.010 (Vf=48.898"/min)
- D.O.C.×ae=0.118"×3.937" • Dry
- MFK160R-11-16T (16 inserts) • PNMG1106XNEN-GM (CA420M)

| | |
|---|---|
| CA420M | Chip Removal Rate = 372cc/min |
| Competitor D (8 inserts) | Chip Removal Rate = 93cc/min |

CA420M improved the efficiency by 4 times compared with Competitor D.

(User Evaluation)

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