## Next-generation PVD coating for milling

# PR18 Series

NEW

## Longer tool life with next-generation coating for milling

**MEGACOAT NANO EX coating technology**
**Exceptional tool life**

MEGACOAT NANO EX | Milling |

**3 new grades for 16 different milling series**

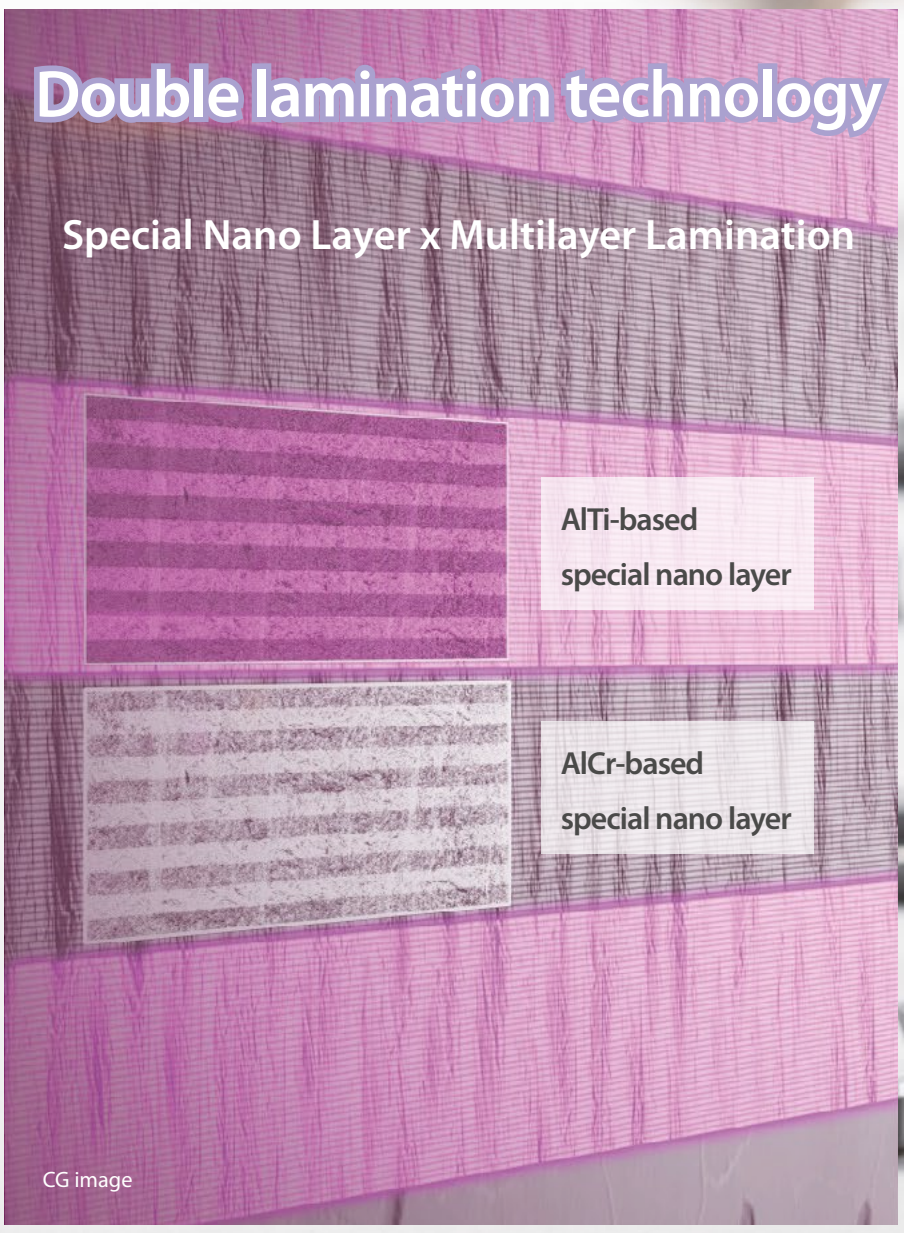
**PR1825** for steel (Wear resistance oriented)
**PR1835** for steel (Stability oriented)
for stainless steel
**PR1810** for cast iron

Next-generation PVD coating for milling

# PR18 Series

**Double lamination technology with special nano layer**
**MEGACOAT NANO EX provides longer tool life**
**Features 3 grades: PR1825/PR1835/PR1810. Available for various machining environments**

MEGACOAT NANO EX | Milling |



# Kyocera's nano layer coating technology

# Longer tool life with next-generation coating for milling

## 1 New PVD coating MEGACOAT NANO EX provides long tool life

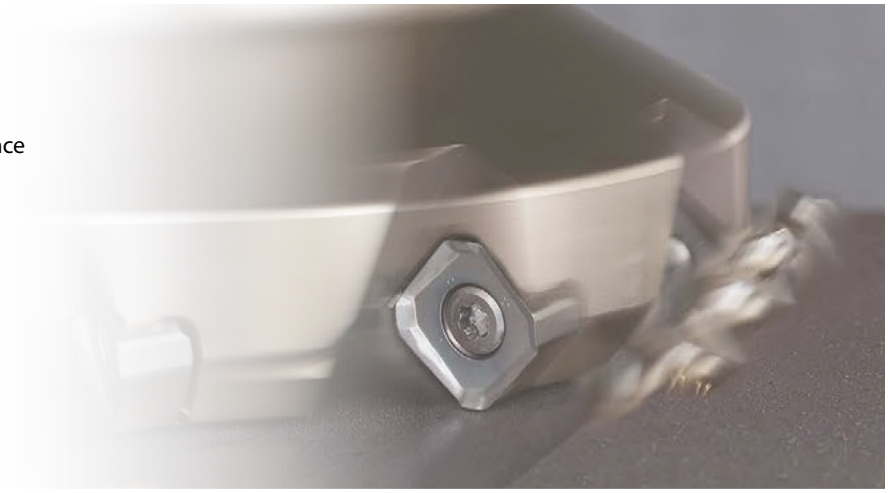
**Kyocera's nano layer coating technology**

### MEGACOAT NANO

Special nano-laminated coating
with excellent abrasion and oxidation resistance

MEGACOAT-based
Laminated structure

- High hardness
- Excellent oxidation resistance

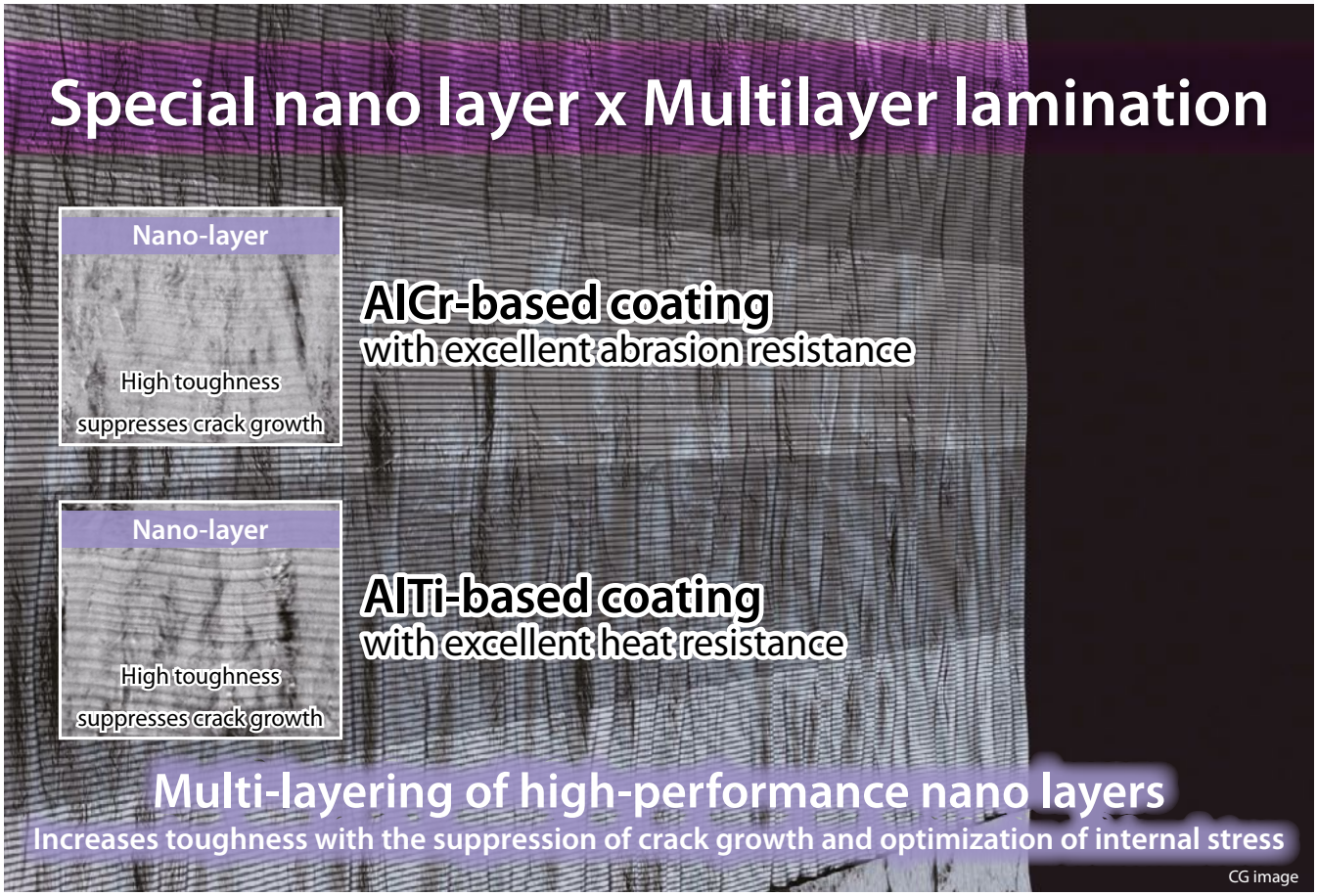


## MEGACOAT NANO EX
## New coating property improvements

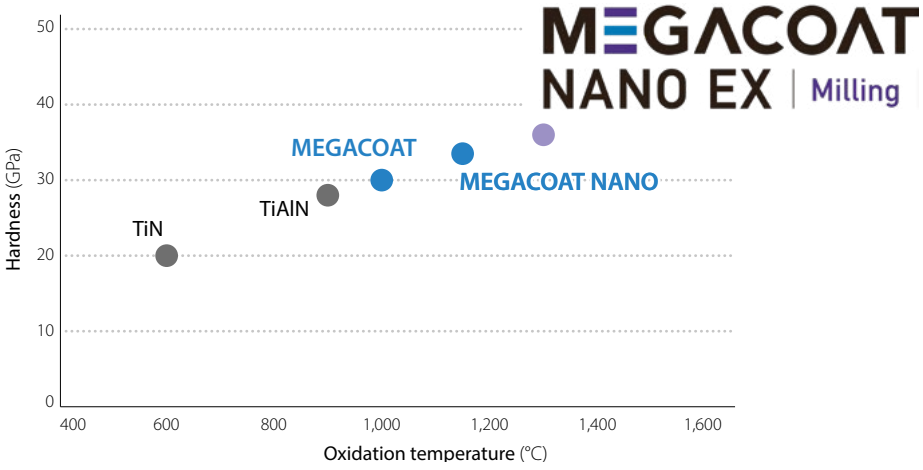
MEGACOAT NANO EX | Milling

### Double lamination technology maintains longer tool life

Multi-layer structure with two unique nano layers
Superior abrasion resistance and fracture resistance



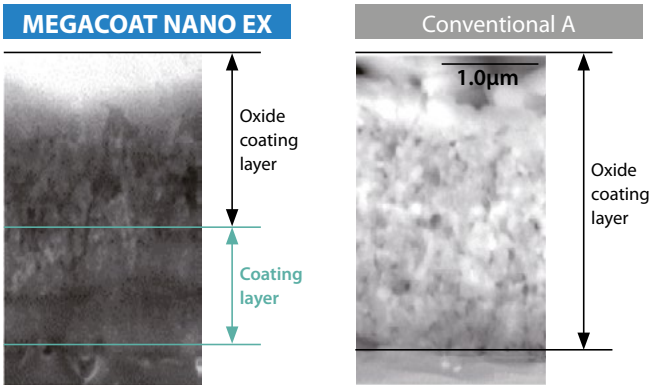
Coating characteristics (Internal evaluation)




## Excellent oxidation resistance

Oxidation progression comparison (Internal evaluation)

**Suppresses oxidation progression with excellent oxidation resistance**

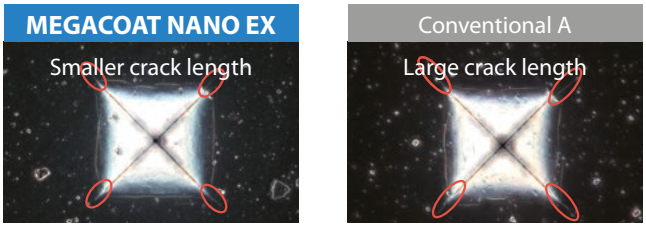


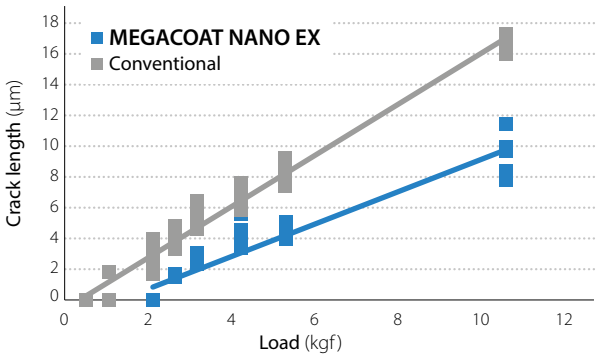

*Section after holding at 1,200 degrees for 30 minutes in air

## High coating toughness

Coating layer toughness evaluation (Internal evaluation)

**Excellent coating toughness with small crack length**

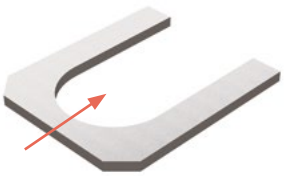



*Micro-Vickers measurement

Case study

## 2x longer tool life. Cutting edge remains in good condition.



**Guides S50C**

Edge condition


**MEGACOAT NANO EX has 2x longer tool life than conventional coating. The cutting edge remains in good condition.**
**Quiet cutting noise**

Cutting conditions: Vc = 200 m/min, ap = 2.0 mm, fz = 0.13 mm/t, Dry BDMT170408ER-JT (PR1825) MEC ø25 (2 Inserts) (User evaluation)

# 2 Compatible with various machining environments. Substantial lineup

**PR1825** **P** for steel (Wear resistance oriented)

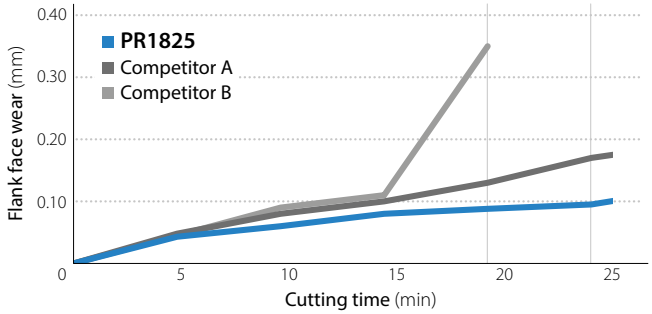
**PR1835** **M** for steel (Stability oriented)
for stainless steel (1st recommendation)

**PR1810** **K** for cast iron

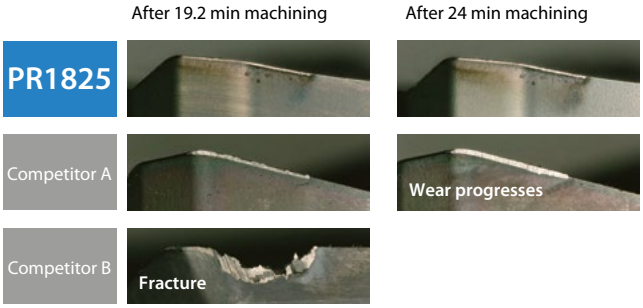
| Workpiece material | P Steel | | | | | M Stainless steel | | | | | K Cast iron | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ISO | 01 | 10 | 20 | 30 | 40 | 01 | 10 | 20 | 30 | 40 | 01 | 10 | 20 | 30 | 40 |
| Lineup | | Wear resistance oriented PR1825 | | | | | 1st recommendation PR1835 | | | | | 1st recommendation PR1810 | | | |
| | | Stability oriented PR1835 | | | | | | | | | | | | | |

## PR1825 Carbide base material with an excellent balance of hardness, toughness and versatility

### Wear resistance comparison (Internal evaluation)




### Edge condition

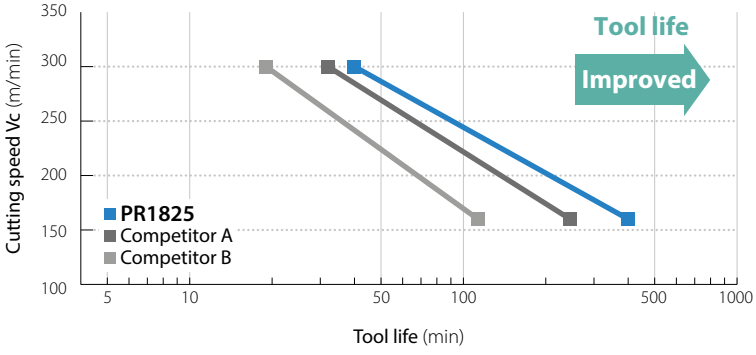


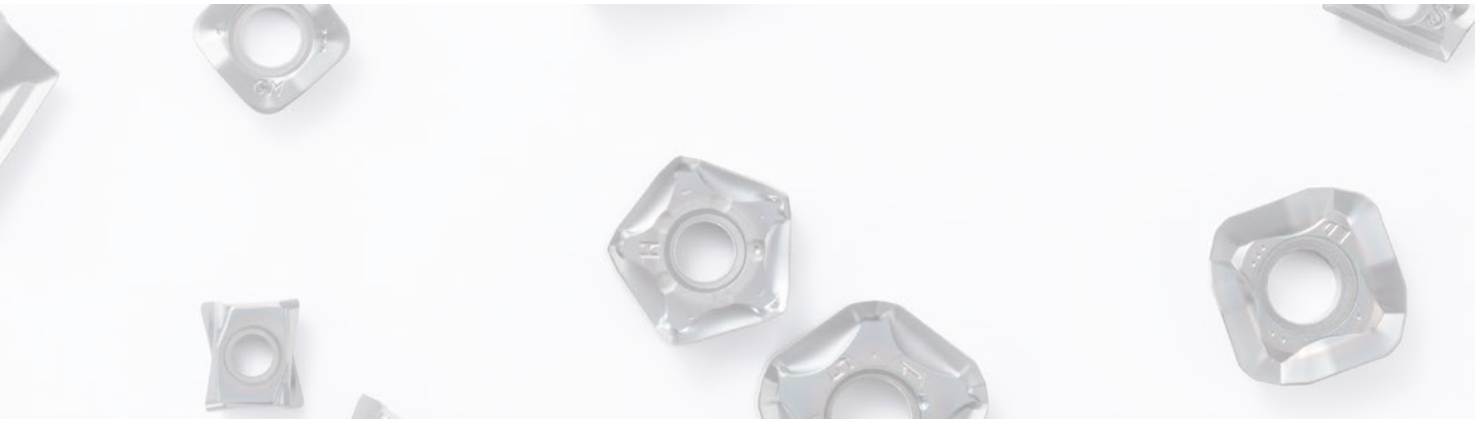

Cutting Conditions : Vc = 150 m/min, ap x ae = 2 mm x 65 mm, fz = 0.12 mm/t, SKD11, Dry PNMU1205ANER-GM (MFPN45)

### V-T graph (Internal evaluation)

Life criteria :
Flank face wear = 0.10 mm

Cutting Conditions :
Vc = **160 / 300** m/min
ap x ae = 2 x 110 mm, fz = 0.12 mm/t
SCM440 Dry
PNMU1205ANER-GM (MFPN45)





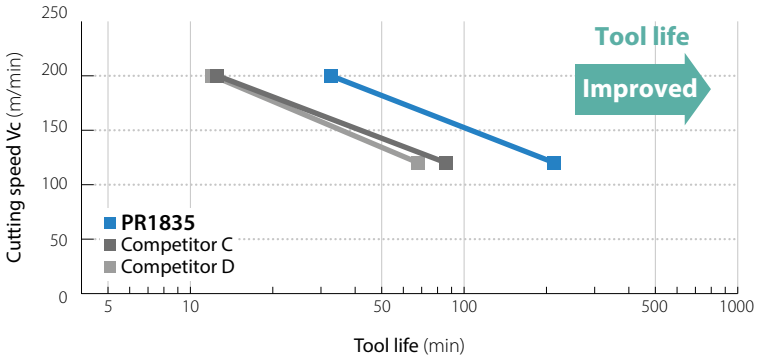
## PR1835

Carbide base material with superior impact resistance and stability oriented
Improves the toughness of the base material by optimizing the particle shape and homogenizing the structure.

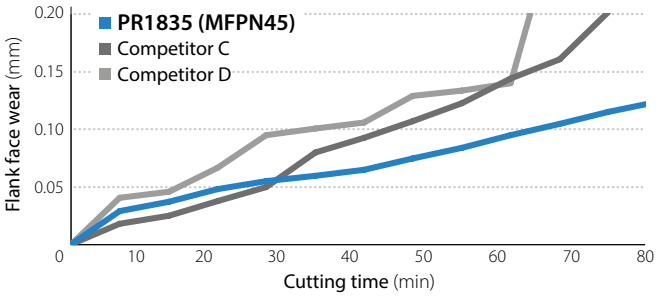
### V-T graph (Internal evaluation)

Life criteria :
Flank face wear = 0.10 mm

Cutting Conditions :
Vc = **120 / 200** m/min
ap x ae = 2 x 110 mm, fz = 0.12 mm/t
SUS304 Dry
PNMU1205ANER-SM (MFPN45)

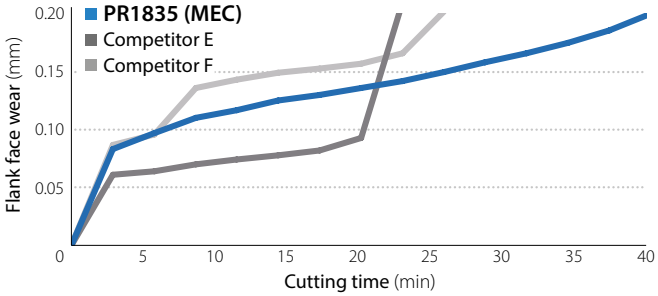



### Wear resistance comparison (Internal evaluation)




Cutting Conditions : Vc = 150 m/min, ap x ae = 2 x 80 mm, fz = 0.1 mm/t
SUS304, Dry PNMU1205ANER-SM

### Wear resistance comparison (Internal evaluation)

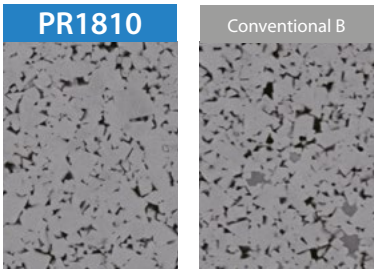



Cutting Conditions : Vc = 120 m/min, ap x ae = 2 x 15 mm, fz = 0.1 mm/t
SUS304, Dry BDMT11T308ER-JS

## PR1810

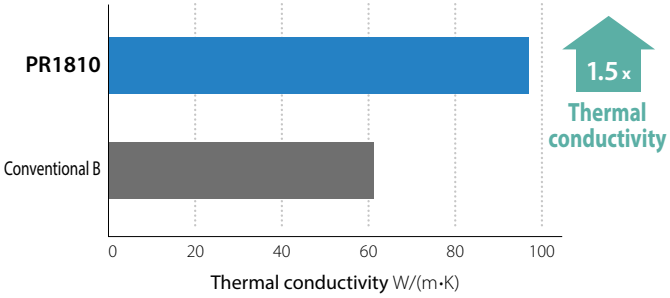
Uses a proprietary base material with excellent thermal conductivity.
Achieving stable processing of cast iron

### Carbide Substrate



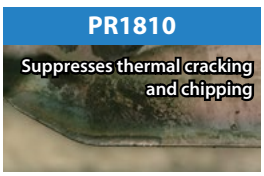

Coarse fine granules | Fine grain

### Thermal conductivity comparison (Internal evaluation)




### Cutting edge condition (Internal evaluation)

After about 60 min machining




Cutting Conditions :
Vc = 200 m/min
ap x ae = 2 x 85 mm
fz = 0.2 mm/t
FCD450, Wet
PNMU1205ANER-GM (MFPN45)

PR1810 uses a mixture of coarse and fine grains. Improved thermal conductivity and reduced thermal cracking and chipping

## Product lineup

**PR18 series for various applications**

### 90°/88° cutting edge angle type P9

Tangential 90° end mill with 4-edge inserts

**MA90** NEW

Original tangential 90° end mill
with economical 4-edge inserts

90° end mill with double sided 4-edge inserts

**MEW**

High-efficiency end mill

**MEC**

High-efficiency helical end mill

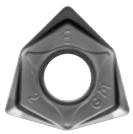
**MECH**

High-efficiency and low cutting force end mill

**MECX**

Double-sided 6-edge insert, low cutting force cutter

**MFWN**



Double-sided 6-edge insert, low cutting force cutter

**MFWN Mini**

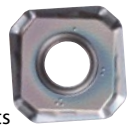
Highly efficient cutter with a 88° cutting edge angle

**MFSN88**

### 45°/66° cutting edge Angle Type P12

New 45° General Purpose Cutter

**MB45** NEW



Delivers the "low cutting force" benefits of positive inserts and the "fracture resistance" benefits of negative inserts. Excellent surface finish

45° face mill with double-sided 10-edge inserts

**MFPN45**

Highly efficient cutter with a 66° cutting edge angle

**MFPN66**

### High feed cutter P13

High efficiency and high feed cutter

**MFH Series**

High feed and large depth of cut milling

**MFH Boost**

Micro dia. cutter for high feed machining

**MFH Micro**

Small dia. cutter for high feed machining

**MFH Mini**

Highly efficiency and high feed cutter

**MFH Harrier**

### Radius cutter P14

Low-cutting-force and high-efficiency radius cutter

**MRX**

**Up to 2.5 times longer tool life than conventional tools**
**Delivers excellent performance with a wide variety of cutters**

MEGACOAT NANO EX | Milling |

## Case studies

### Mechanical parts S45C

Vc = 160 m/min
ap = 1.0 mm
fz = 0.15 mm/t
Wet
MA90-25S20-09T3C
LOGU090408ER-GM

MA90

**Number of parts**

PR1825 **15** pcs/corner — 2.5x Tool life

Conventional C **6** pcs/corner

Proprietary insert shape suppresses wear progression of main cutting edge and wiper edge
Provides superior surface finish and 2.5x longer tool life

(User evaluation)

### Housing SUS316

Vc = 90 m/min
ap = 2.0 mm
fz = 0.18 mm/t
Dry
MB45-063R-14T5C-M
SNMU1406ANER-GM

MB45

**Number of parts**

PR1825 **30** pcs/corner — 1.6x Tool life

Conventional D **18** pcs/corner

Unique low cutting force wiper edge design reduces chattering
Shows 1.6x longer tool life

(User evaluation)

### General machine parts FCD450

Vc = 120 m/min
ap = 1.0 mm
fz = 0.19 mm/t
Dry
MFWN90080R-S32-5T
WNMU080608EN-GM

MFWN

**Number of parts**

PR1825 **65** pcs/corner — 1.6x Tool life

Conventional E **40** pcs/corner

Shows stable machining without insert fracture
Shows 1.6x longer tool life

(User evaluation)

### Mechanical parts SCM420

Vc = 130 m/min
ap = 13.0 mm
fz = 0.07 mm/t
Wet
MECH025-S25-11-4-2T
BDMT11T308ER-N2/N3

MECH

**Number of parts**

PR1825 **6** pcs/corner (Cutting distance : 38.1 m) — 1.5x Tool life

Conventional F **4** pcs/corner (Cutting distance : 25.4 m)

Good cutting edge condition in heavy machining with large D.O.C.
1.5x longer tool life

(User evaluation)

### Mold parts Plastic mold steel

Vc = 120 m/min
ap = 0.3 mm
fz = 1.3 mm/t
Wet
MFH25-S25-03-5T
LOGU030310ER-GM

MFH Mini

**Number of parts**

PR1835 **150** pcs/corner — 2.5x Tool life

Conventional G **60** pcs/corner

Stable machining without chatter even in high-feed machining
Maintains good cutting edge condition and achieves 2.5x longer tool life

(User evaluation)

### Body parts FC250

Vc = 360 m/min
ap = 0.35 mm
fz = 0.08 mm/t
Wet
MFPN45100R-8T
PNMU1205ANER-GH

MFPN45

**Number of parts**

PR1810 **200** pcs/corner — 2x Tool life

Conventional H **100** pcs/corner

Improved tool life and 10 corners on both sides for significant cost savings

(User evaluation)

# 90°/88° cutting edge angle type

Tangential 90° end mill with 4-edge inserts

## MA90

NEW

**Original tangential 90° end mill with economical 4-edge inserts**

| Shape | Description | | MEGACOAT NANO EX | | |
|---|---|---|---|---|---|
| | | | PR1825 | PR1835 | PR1810 |
|  General purpose (G-Class) | LOGU | 090404ER-GM | ● | ● | ● |
| | | 090408ER-GM | ● | ● | ● |
| | | 090412ER-GM | ● | ● | ● |
| | | 090416ER-GM | ● | ● | ● |
|  Low cutting force (G-Class) | LOGU | 090404ER-SM | ● | ● | – |
| | | 090408ER-SM | ● | ● | – |
| | | 090412ER-SM | ● | ● | – |
| | | 090416ER-SM | ● | ● | – |
|  Tough edge (G-class) | LOGU | 090408ER-GH | ● | ● | ● |
|  General purpose (G-Class) | LOGU | 120604ER-GM | ● | ● | ● |
| | | 120608ER-GM | ● | ● | ● |
| | | 120612ER-GM | ● | ● | ● |
| | | 120616ER-GM | ● | ● | ● |
| | | 120620ER-GM | ● | ● | ● |
| | | 120624ER-GM | ● | ● | ● |
| | | 120630ER-GM | ● | ● | ● |
|  Low cutting force (G-Class) | LOGU | 120604ER-SM | ● | ● | – |
| | | 120608ER-SM | ● | ● | – |
| | | 120612ER-SM | ● | ● | – |
| | | 120616ER-SM | ● | ● | – |
| | | 120620ER-SM | ● | ● | – |
| | | 120624ER-SM | ● | ● | – |
| | | 120630ER-SM | ● | ● | – |
|  Tough edge (G-class) | LOGU | 120608ER-GH | ● | ● | ● |

Right-handed insert shown

● : Standard stock

90° end mill with double sided 4-edge inserts

## MEW

**Reduces cutting force equivalent to positive inserts**
**Excellent surface finish**

| Shape | Description | | MEGACOAT NANO EX | | |
|---|---|---|---|---|---|
| | | | PR1825 | PR1835 | PR1810 |
|  General purpose | LOMU | 100404ER-GM | ● | ● | ● |
| | | 100408ER-GM | ● | ● | ● |
| | | 100412ER-GM | ● | ● | ● |
| | | 100416ER-GM | ● | ● | ● |
| | | 100420ER-GM | ● | ● | ● |
| | LOMU | 150504ER-GM | ● | ● | ● |
| | | 150508ER-GM | ● | ● | ● |
| | | 150510ER-GM | ● | – | – |
| | | 150512ER-GM | ● | ● | ● |
| | | 150516ER-GM | ● | ● | ● |
| | | 150520ER-GM | ● | ● | ● |
|  Low cutting force | LOMU | 100408ER-SM | ● | ● | ● |
| | LOMU | 150508ER-SM | ● | ● | ● |
|  Tough edge (for heavy cutting) | LOMU | 100408ER-GH | ● | ● | ● |
| | LOMU | 150508ER-GH | ● | ● | ● |

Right-handed insert shown

● : Standard stock

# 90°/88° cutting edge angle type

High-efficiency end mill

## MEC

**Excellent surface finish with low cutting forces**
**Large lineup for various applications**

| Shape | Description | | MEGACOAT NANO EX | | |
|---|---|---|---|---|---|
| | | | PR1825 | PR1835 | PR1810 |
|  | BDMT | 110302ER-JT | ● | ● | ● |
| | | 110304ER-JT | ● | ● | ● |
| | | 110308ER-JT | ● | ● | ● |
| | BDMT | 11T302ER-JT | ● | ● | ● |
| | | 11T304ER-JT | ● | ● | ● |
| | | 11T308ER-JT | ● | ● | ● |
| | | 11T312ER-JT | ● | ● | ● |
| | | 11T316ER-JT | ● | ● | ● |
| | | 11T320ER-JT | ● | ● | ● |
| | | 11T324ER-JT | ● | ● | ● |
| | | 11T331ER-JT | ● | ● | ● |
| | BDMT | 170404ER-JT | ● | ● | ● |
| | | 170408ER-JT | ● | ● | ● |
| | | 170412ER-JT | ● | ● | ● |
| | | 170416ER-JT | ● | ● | ● |
| | | 170420ER-JT | ● | ● | ● |
| | | 170424ER-JT | ● | ● | ● |
| | | 170431ER-JT | ● | ● | ● |
| | | 170440ER-JT | ● | ● | ● |
|  Low cutting force/ for stainless steel | BDMT | 110302ER-JS | ● | ● | – |
| | | 110304ER-JS | ● | ● | – |
| | | 110308ER-JS | ● | ● | – |
| | BDMT | 11T302ER-JS | ● | ● | – |
| | | 11T304ER-JS | ● | ● | – |
| | | 11T308ER-JS | ● | ● | – |
| | BDMT | 170404ER-JS | ● | ● | – |
| | | 170408ER-JS | ● | ● | – |

Right-handed insert shown

● : Standard Stock

High-efficiency end mill

## MECH

**Notched inserts reduce chattering**
**High efficiency heavy machining with large D.O.C.**

| Shape | Description | | MEGACOAT NANO EX | | |
|---|---|---|---|---|---|
| | | | PR1825 | PR1835 | PR1810 |
|  2-Notched | BDMT | 11T308ER-N2 | ● | ● | ● |
|  3-Notched | BDMT | 11T308ER-N3 | ● | ● | ● |
|  3-Notched | BDMT | 170408ER-N3 | ● | ● | ● |
|  4-Notched | BDMT | 170408ER-N4 | ● | ● | ● |

Right-handed insert shown

● : Standard Stock

High-efficiency end mill

## MECX

**High-efficiency machining with fine pitch styles**
**Compatible with low-rigidity facilities**

| Shape | Description | | MEGACOAT NANO EX | | |
|---|---|---|---|---|---|
| | | | PR1825 | PR1835 | PR1810 |
|  | BDMT | 070302ER-JT | ● | ● | ● |
| | | 070304ER-JT | ● | ● | ● |
| | | 070308ER-JT | ● | ● | ● |
|  Low cutting force/ for stainless steel | BDMT | 070302ER-JS | ● | ● | – |
| | | 070304ER-JS | ● | ● | – |
| | | 070308ER-JS | ● | ● | – |

Right-handed insert shown

● : Standard stock

## 90°/88° cutting edge angle type

Double-sided 6-edge insert, low cutting force cutter

# MFWN Mini

**MFWN's superior performance remains intact**
**Economical small diameter milling cutter**

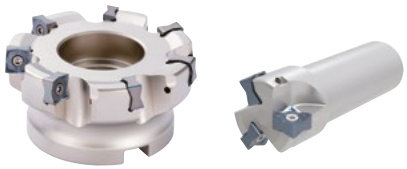
| Shape | Description | | MEGACOAT NANO EX | | |
|---|---|---|---|---|---|
| | | | PR1825 | PR1835 | PR1810 |
|  General purpose | WNMU | 050408EN-GM | ● | ● | ● |
|  Low cutting force | WNMU | 050408EN-SM | ● | ● | ● |
|  Tough edge (for heavy cutting) | WNMU | 050408EN-GH | ● | ● | ● |

● : Standard stock

Highly efficient cutter with a 88° cutting edge angle

# MFSN88

**Economical inserts with 8 cutting edges. Reduces chattering with low cutting force design. Suitable for shoulder roughing**



| Shape | Description | | MEGACOAT NANO EX | | |
|---|---|---|---|---|---|
| | | | PR1825 | PR1835 | PR1810 |
|  General purpose | SNMU | 130508EN-GM | ● | ● | ● |
|  Low cutting force | SNMU | 130508EN-SM | ● | ● | ● |
|  Tough edge (for heavy cutting) | SNMU | 130508EN-GH | ● | ● | ● |

● : Standard stock

Double-sided 6-edge insert, low cutting force cutter

# MFWN

**Economical double-sided 6-edge insert**
**Superior fracture resistance due to thick edge design**

| Shape | Description | | MEGACOAT NANO EX | | |
|---|---|---|---|---|---|
| | | | PR1825 | PR1835 | PR1810 |
|  Surface finish oriented (Precision class) | WNEU | 080608EN-GL | ● | ● | ● |
|  Tough edge (for heavy cutting) | WNMU | 080608EN-GH | ● | ● | ● |
|  General purpose | WNMU | 080604EN-GM | ● | ● | ● |
| | | 080608EN-GM | ● | ● | ● |
|  Low cutting force | WNMU | 080608EN-SM | ● | ● | ● |

● : Standard stock

# 45°/66° cutting edge angle type

45°Cutting edge angle - New general purpose cutter

## MB45

NEW

**Delivers the "low cutting force" benefits of positive inserts and the "fracture resistance" benefits of negative inserts. Excellent surface finish**

| Shape | Description | | MEGACOAT NANO EX | | |
|---|---|---|---|---|---|
| | | | PR1825 | PR1835 | PR1810 |
|  General purpose | SNMU | 1406ANER-GM | ● | ● | ● |
|  Tough edge | SNMU | 1406ANER-GH | ● | ● | ● |
|  General purpose | SNEU | 1406ANER-GM | ● | ● | ● |
|  Low cutting force | SNEU | 1406ANER-SM | ● | ● | – |

Right-handed insert shown

● : Standard stock

Highly efficient cutter with a 66° cutting edge angle

## MFPN66

**Economical 10-edge insert. Reduces cutting costs when machining auto parts and other general purpose machining applications**

| Shape | Description | | MEGACOAT NANO EX | | |
|---|---|---|---|---|---|
| | | | PR1825 | PR1835 | PR1810 |
|  General purpose | PNMU | 0905XNER-GM | ● | ● | ● |
|  Low cutting force | PNMU | 0905XNER-SM | ● | ● | ● |
|  Tough edge (for heavy cutting) | PNMU | 0905XNER-GH | ● | ● | ● |

Right-handed insert shown

● : Standard stock

45° Face mill with double-sided 10-edge Inserts

## MFPN45

**Reduced chattering with low cutting force design and excellent fracture resistance. Economical 10-edge insert**

| Shape | Description | | MEGACOAT NANO EX | | |
|---|---|---|---|---|---|
| | | | PR1825 | PR1835 | PR1810 |
|  General purpose | PNMU | 1205ANER-GM | ● | ● | ● |
|  General purpose | PNMU | 1205ANEL-GM | ● | ● | ● |
|  Low cutting force | PNMU | 1205ANER-SM | ● | ● | ● |
|  Tough edge (for heavy cutting) | PNMU | 1205ANER-GH | ● | ● | ● |
|  Surface finish oriented (Precision class) | PNEU | 1205ANER-GL | ● | ● | ● |
|  Surface finish oriented (Precision class) | PNEU | 1205ANEL-GL | ● | ● | ● |
|  Wiper insert (2-edge) | PNEU | 1205ANER-W | ● | ● | ● |

● : Standard stock

High feed and large depth of cut milling

# MFH Boost

**High feed milling with larger depths of cut. Excellent performance in a wide range of applications, including automotive parts, difficult-to-cut materials, and molds**

| Shape | Description | | MEGACOAT NANO EX | | |
|---|---|---|---|---|---|
| | | | PR1825 | PR1835 | PR1810 |
|  General purpose | LOMU | 040410ER-GM | ● | ● | ● |

Right-handed insert shown

● : Standard stock

Micro dia. cutter for high feed machining (Cutter dia. ø8 – ø16)

# MFH Micro

**Low resistance and durable against chatter for highly efficient machining. Maximum ap 0.5 mm. Stable high feed machining on a wide range of applications**

| Shape | Description | | MEGACOAT NANO EX | | |
|---|---|---|---|---|---|
| | | | PR1825 | PR1835 | PR1810 |
|  General purpose | LPGT | 010210ER-GM | ● | ● | – |

Right-handed insert shown

● : Standard stock

Small dia. cutter for high feed machining (Cutter dia. ø16 - ø50)

# MFH Mini

**Economical inserts with 4 cutting edges. Small Dia. fine pitch type for high efficiency and high feed machining**

| Shape | Description | | MEGACOAT NANO EX | | |
|---|---|---|---|---|---|
| | | | PR1825 | PR1835 | PR1810 |
|  General purpose | LOGU | 030310ER-GM | ● | ● | ● |
|  Tough Eege | LOGU | 030310ER-GH | ● | ● | ● |

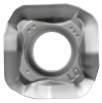
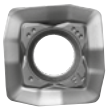
Right-handed insert shown

● : Standard stock

Highly efficiency and high feed cutter (Cutter dia. ø25 - ø160)

# MFH Harrier

**Wide range of products for high feed machining**
**Large depths of cut and low cutting forces**

| Shape | Description | | MEGACOAT NANO EX | | |
|---|---|---|---|---|---|
| | | | PR1825 | PR1835 | PR1810 |
|  General purpose | SOMT | 100420ER-GM | ● | ● | ● |
| | | 140520ER-GM | ● | ● | ● |
|  Large ap | SOMT | 100420ER-LD | ● | ● | ● |
| | | 140520ER-LD | ● | ● | ● |
|  Wiper insert | SOMT | 100420ER-FL | ● | ● | ● |
| | | 140514ER-FL | ● | ● | ● |
|  Tough edge | SOMT | 100420ER-GH | ● | ● | ● |
| | | 140520ER-GH | ● | ● | ● |

Right-handed insert shown

● : Standard stock

## Radius cutter

Low-cutting-force and high-efficiency radius cutter

# MRX

**Excellent cutting performance due to low cutting force design**
**High-efficiency radius cutter**

| Shape | Description | | MEGACOAT NANO EX | | |
|---|---|---|---|---|---|
| | | | PR1825 | PR1835 | PR1810 |
|  General purpose | RDGT | 0803M0ER-GM | ● | ● | ● |
| | RPGT | 10T3M0ER-GM | ● | ● | ● |
| | | 1204M0ER-GM | ● | ● | ● |
| | | 1605M0ER-GM | ● | ● | ● |
|  General purpose | RDMT | 0803M0ER-GM | ● | ● | ● |
| | RPMT | 10T3M0ER-GM | ● | ● | ● |
| | | 1204M0ER-GM | ● | ● | ● |
| | | 1605M0ER-GM | ● | ● | ● |
|  Low cutting force | RDGT | 0803M0ER-SM | ● | ● | – |
| | RPGT | 10T3M0ER-SM | ● | ● | – |
| | | 1204M0ER-SM | ● | ● | – |
| | | 1605M0ER-SM | ● | ● | – |
|  Tough edge (for heavy cutting) | RDMT | 0803M0EN-GH | ● | ● | ● |
| | RPMT | 10T3M0EN-GH | ● | ● | ● |
| | | 1204M0EN-GH | ● | ● | ● |
| | | 1605M0EN-GH | ● | ● | ● |

Right-handed insert shown

● : Standard stock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