

Next-generation PVD coating for milling

# PR18 Series



Longer Tool Life with Next-generation Coating for Milling

MEGACOAT NANO EX Coating Technology

Exceptional tool life



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



## Double lamination technology

Special Nano Layer x Multilayer Lamination



AlTi-based  
special nano layer



AlCr-based  
special nano layer

CG Image

# Kyocera's Nano Layer Coating Technology

## Longer Tool Life with Next-generation Coating for Milling

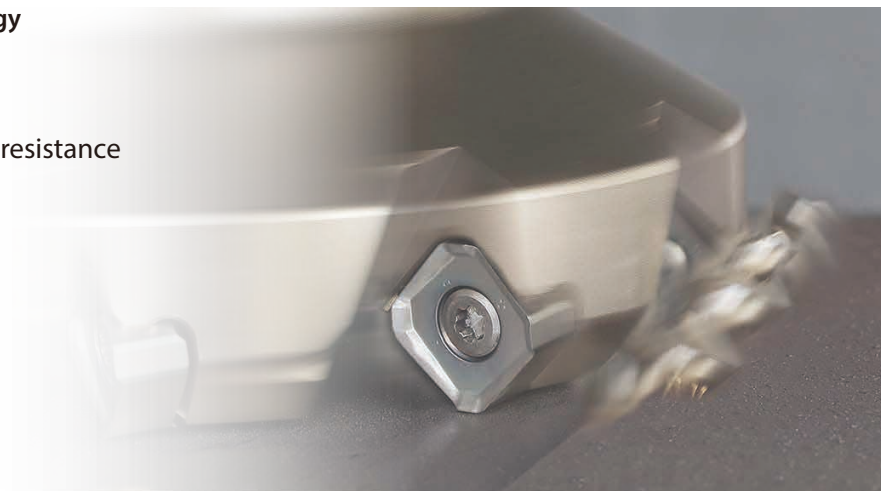
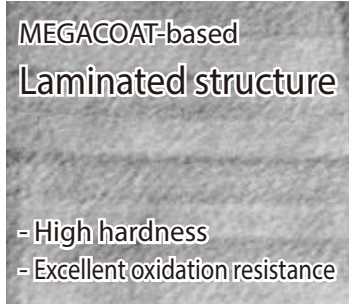


**1** New PVD coating MEGACOAT NANO EX provides long tool life

Kyocera's Nano Layer Coating Technology

**MEGACOAT NANO**

Special nano-laminated coating with excellent abrasion and oxidation resistance



**MEGACOAT NANO EX**  
New coating property improvements

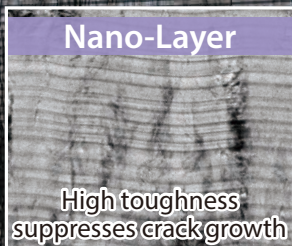
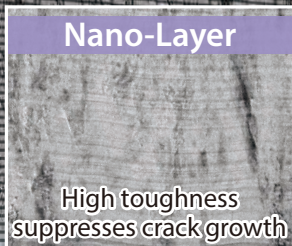


**MEGACOAT**  
**NANO EX** | Milling |

**Double Lamination Technology**  
**Maintains Longer Tool Life**

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

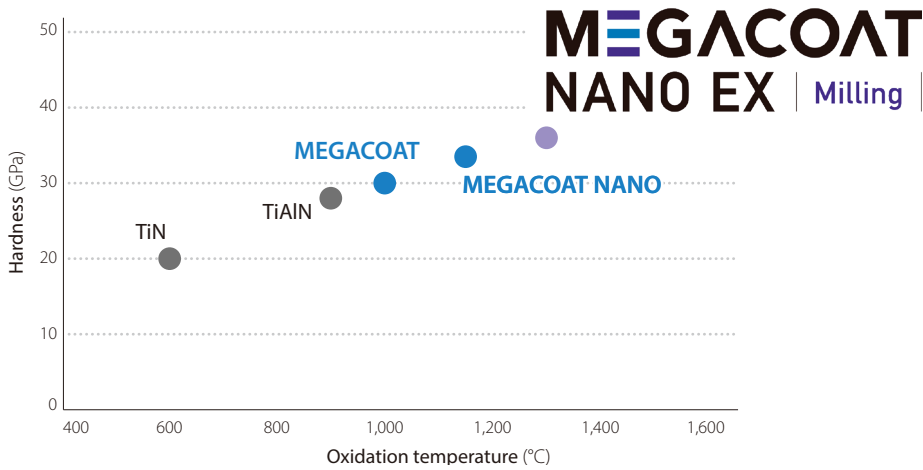
**Special Nano Layer x Multilayer Lamination**



**Multi-layering of high-performance nano layers**  
Increases toughness with the suppression of crack growth and optimization of internal stress

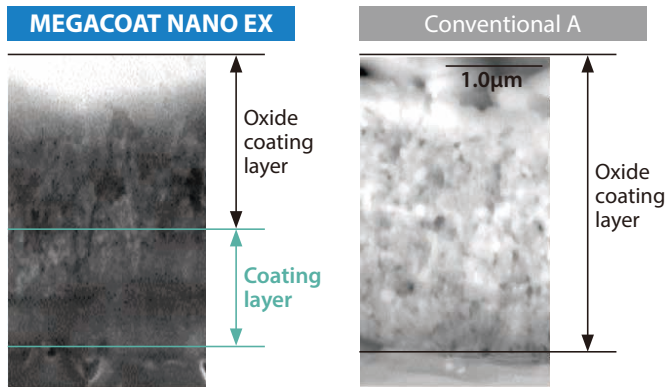
CG Image

Coating characteristics (Internal evaluation)



### Excellent oxidation resistance

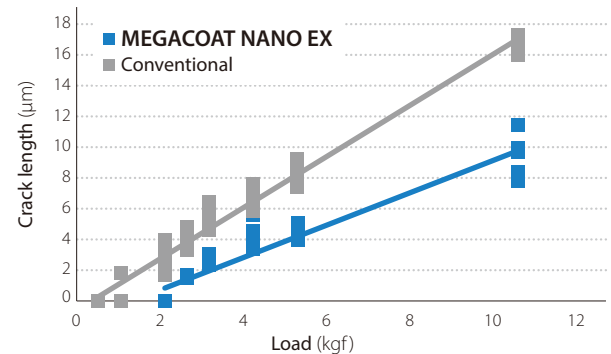
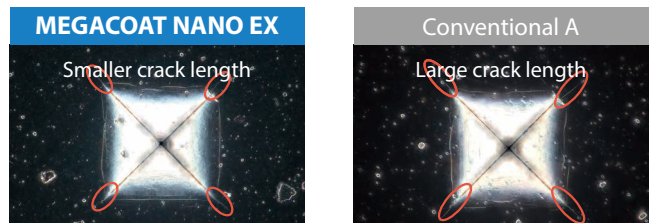
Oxidation progression comparison (Internal evaluation)  
 Suppresses oxidation progression with excellent oxidation resistance



\*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

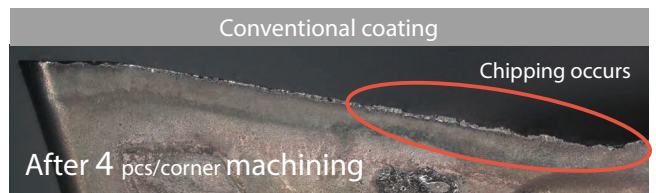
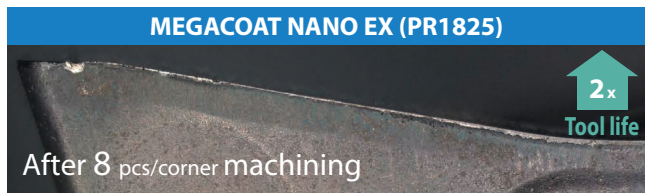


\*Micro-Vickers measurement

**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**

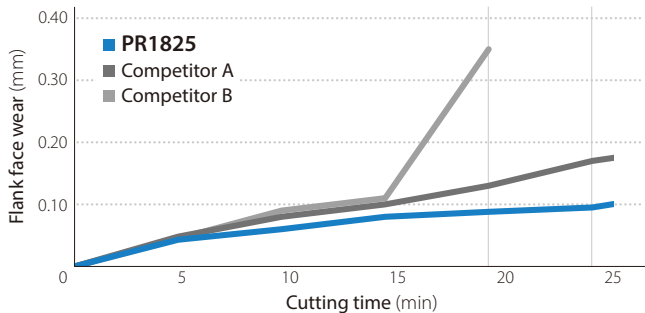
for Cast Iron

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
Lineup	Wear resistance oriented					1st recommendation					1st recommendation				
	PR1825					PR1835					PR1810				
	Stability oriented														
	PR1835														

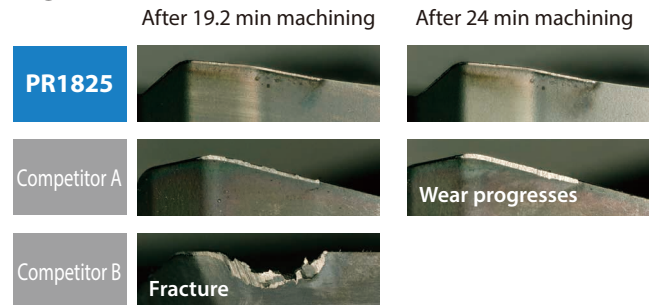
**PR1825**

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

Wear resistance comparison (Internal evaluation)



Edge condition

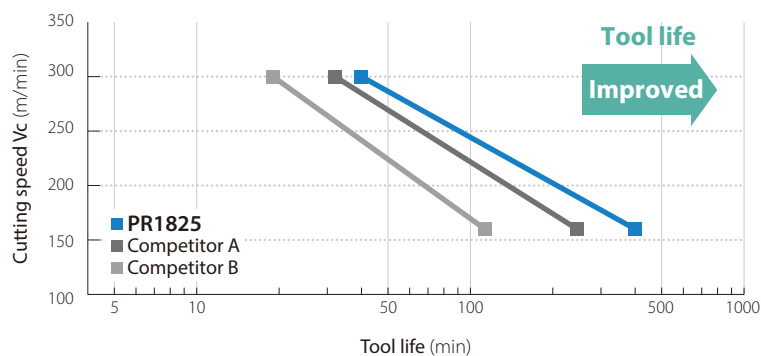


Cutting Conditions :  $V_c = 150$  m/min,  $a_p \times a_e = 2$  mm x 65 mm,  $f_z = 0.12$  mm/t, SKD11, Dry PNMU1205ANER-GM (MFPN45)

V-T graph (Internal evaluation)

Life criteria :  
Flank face wear = 0.10 mm

Cutting Conditions :  
 $V_c = 160 / 300$  m/min  
 $a_p \times a_e = 2$  x 110 mm,  $f_z = 0.12$  mm/t  
SCM440 Dry  
PNMU1205ANER-GM (MFPN45)





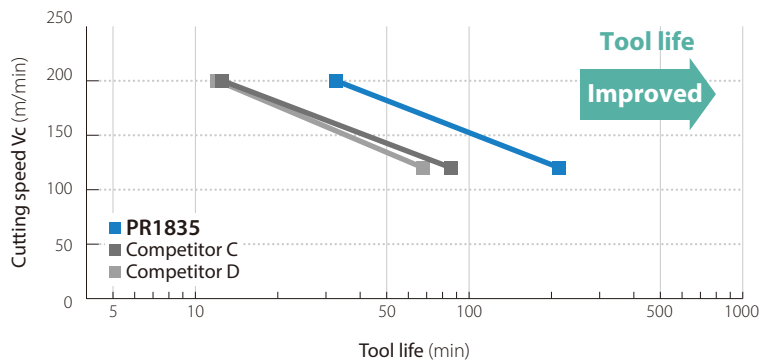
**PR1835**

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.

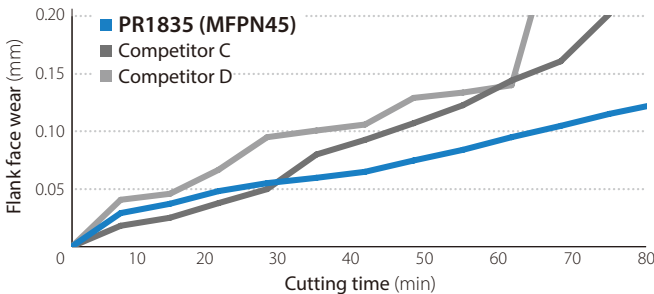
**V-T graph** (Internal evaluation)

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)

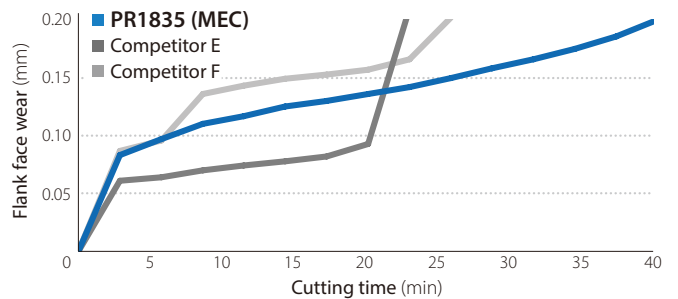


**Wear resistance comparison** (Internal evaluation)



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)

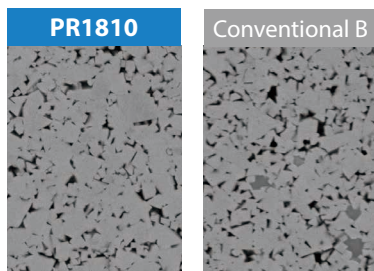


Cutting Conditions : Vc = 120 m/min, ap x ae = 2 x 15 mm, fz = 0.1 mm/t  
SUS304, Dry BDMT11T308ER-JS

**PR1810**

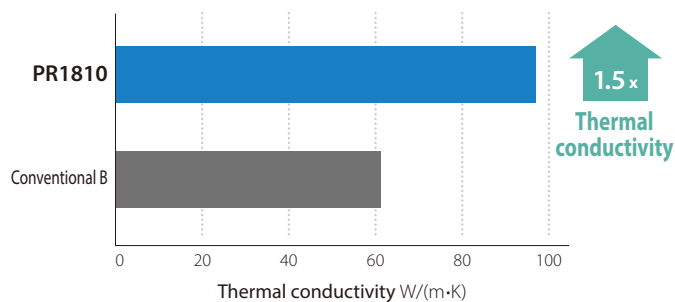
Uses a proprietary base material with excellent thermal conductivity.  
Achieving stable processing of cast iron

**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



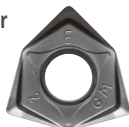
High-Efficiency and Low Cutting Force End Mill

#### 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



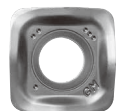
Small Dia. Cutter for High Feed Machining

#### 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



## Case Studies

### Mechanical parts S45C

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



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



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



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



Number of parts

PR1825

6 pcs/corner

1.5x  
 Tool life

(Cutting distance : 38.1 m)

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



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



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









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 (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

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	●	●	●
 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	●	●	●	
		BDMT 110304ER-JT	●	●	●
		BDMT 110308ER-JT	●	●	●
	BDMT 11T302ER-JT	BDMT 11T304ER-JT	●	●	●
		BDMT 11T308ER-JT	●	●	●
		BDMT 11T312ER-JT	●	●	●
		BDMT 11T316ER-JT	●	●	●
		BDMT 11T320ER-JT	●	●	●
		BDMT 11T324ER-JT	●	●	●
		BDMT 11T331ER-JT	●	●	●
	BDMT 170404ER-JT	BDMT 170408ER-JT	●	●	●
		BDMT 170412ER-JT	●	●	●
		BDMT 170416ER-JT	●	●	●
		BDMT 170420ER-JT	●	●	●
BDMT 170424ER-JT		●	●	●	
BDMT 170431ER-JT		●	●	●	
BDMT 170440ER-JT		●	●	●	
	BDMT 110302ER-JS	●	●	-	
		BDMT 110304ER-JS	●	●	-
		BDMT 110308ER-JS	●	●	-
	BDMT 11T302ER-JS	BDMT 11T304ER-JS	●	●	-
		BDMT 11T308ER-JS	●	●	-
		BDMT 170404ER-JS	●	●	-
	BDMT 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	●	●	●
	BDMT 070304ER-JT	●	●	●
	BDMT 070308ER-JT	●	●	●
 Low Cutting Force/ for Stainless Steel	BDMT 070302ER-JS	●	●	-
	BDMT 070304ER-JS	●	●	-
	BDMT 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



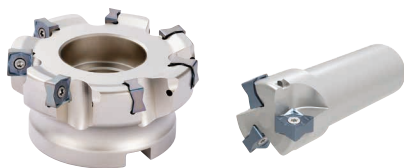
Shape	Description	MEGACOAT NANO EX		
		PR1825	PR1835	PR1810
 General Purpose	WNMU 050408EN-GM	●	●	●
 Low Cutting Force	WNMU 050408EN-SM	●	●	●
 Tough Edge (for Heavy Cutting)	WNMU 050408EN-GH	●	●	●




● : 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



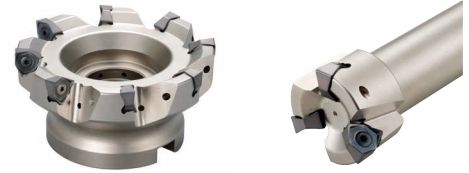
Shape	Description	MEGACOAT NANO EX		
		PR1825	PR1835	PR1810
 General Purpose	SNMU 130508EN-GM	●	●	●
 Low Cutting Force	SNMU 130508EN-SM	●	●	●
 Tough Edge (for Heavy Cutting)	SNMU 130508EN-GH	●	●	●





● : 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



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

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



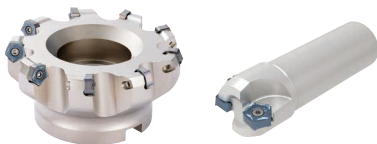
Shape	Description	MEGACOAT NANO EX		
		PR1825	PR1835	PR1810
 General Purpose	PNMU 1205ANER-GM	●	●	●
 General Purpose	PNMU 1205ANEL-GM	●	●	●
 Low Cutting Force	PNMU 1205ANER-SM	●	●	●
 Tough Edge (for Heavy Cutting)	PNMU 1205ANER-GH	●	●	●
 Surface Finish Oriented (Precision Class)	PNEU 1205ANER-GL	●	●	●
 Surface Finish Oriented (Precision Class)	PNEU 1205ANEL-GL	●	●	●
 Wiper Insert (2-edge)	PNEU 1205ANER-W	●	●	●

● : Standard Stock

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


## High Feed Cutter

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.  $\phi 8 - \phi 16$ )

### 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.  $\phi 16 - \phi 50$ )

### 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 Edge	LOGU 030310ER-GH	●	●	●

Right-Handed Insert Shown


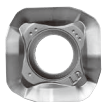

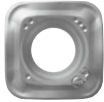
● : Standard Stock

Highly Efficiency and High Feed Cutter (Cutter Dia.  $\phi 25 - \phi 160$ )

### 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



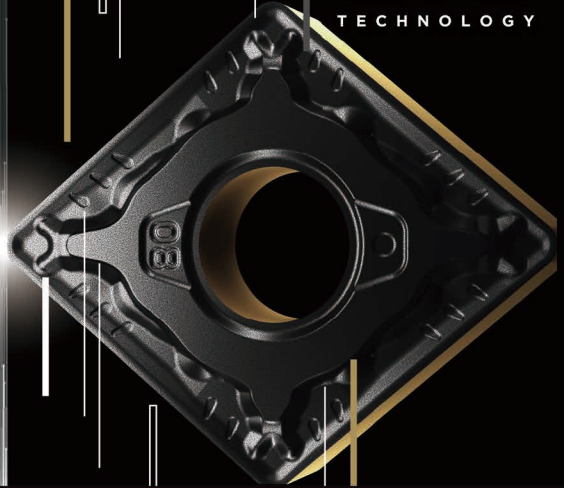
Shape	Description	MEGACOAT NANO EX		
		PR1825	PR1835	PR1810
 General Purpose	RDGT 0803M0ER-GM	●	●	●
	RPGT 10T3M0ER-GM	●	●	●
	1204M0ER-GM	●	●	●
	1605M0ER-GM	●	●	●
 General Purpose	RDMT 0803M0ER-GM	●	●	●
	RPMT 10T3M0ER-GM	●	●	●
	1204M0ER-GM	●	●	●
	1605M0ER-GM	●	●	●
 Low Cutting Force	RDGT 0803M0ER-SM	●	●	-
	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

C  
Chemical Vapor Deposition  
V  
D

CVD  
TECHNOLOGY



# Achieving Unprecedented Tool Life



MEGACOAT  
NANO EX | Milling |

P  
Physical Vapor Deposition  
V  
D