

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



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-based
Laminated structure

- High hardness
- Excellent oxidation resistance

MEGACOAT NANO EX

New coating property improvements



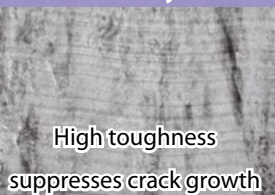
MEGACOAT
NANO EX | Milling |

**Double lamination technology
maintains longer tool life**

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

Special nano layer x Multilayer lamination

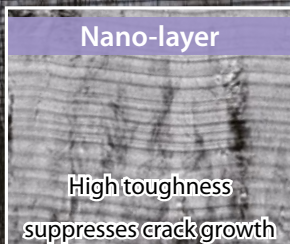
Nano-layer



High toughness
suppresses crack growth

AlCr-based coating
with excellent abrasion resistance

Nano-layer



High toughness
suppresses crack growth

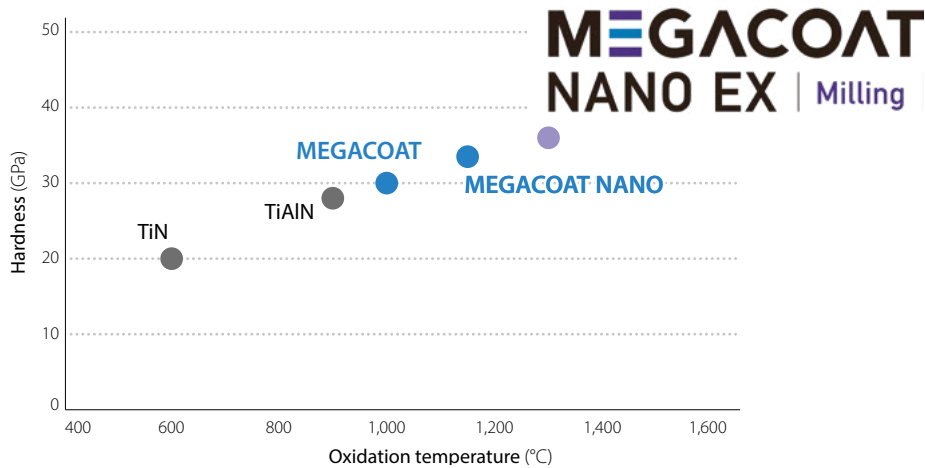
AlTi-based coating
with excellent heat resistance

Multi-layering of high-performance nano layers

Increases toughness with the suppression of crack growth and optimization of internal stress

CG image

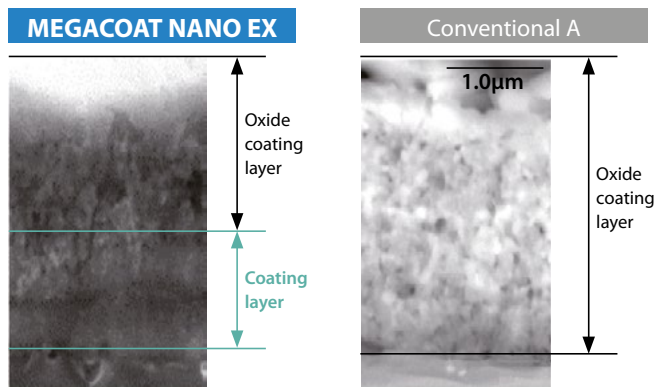
Coating characteristics (Internal evaluation)



Excellent oxidation resistance

Oxidation progression comparison (Internal evaluation)

Suppresses oxidation progression with excellent oxidation resistance

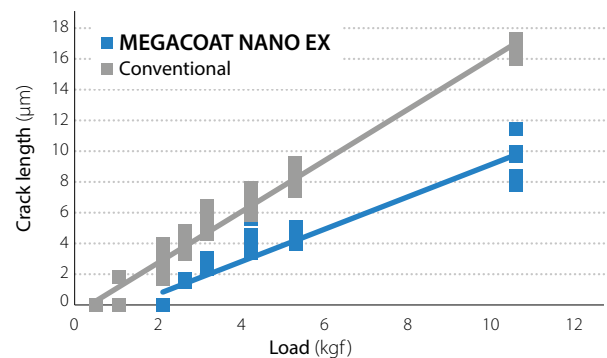
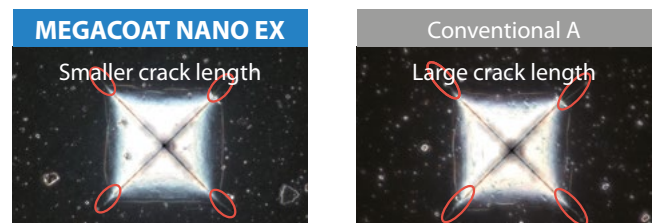


*Section after holding at 1,200 degrees for 30 minutes in air

High coating toughness

Coating layer toughness evaluation (Internal evaluation)

Excellent coating toughness with small crack length



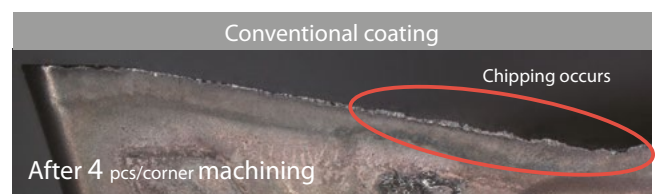
*Micro-Vickers measurement



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: $V_c = 200$ m/min, $a_p = 2.0$ mm, $f_z = 0.13$ mm/t, Dry BDMT170408ER-JT (PR1825) MEC $\phi 25$ (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

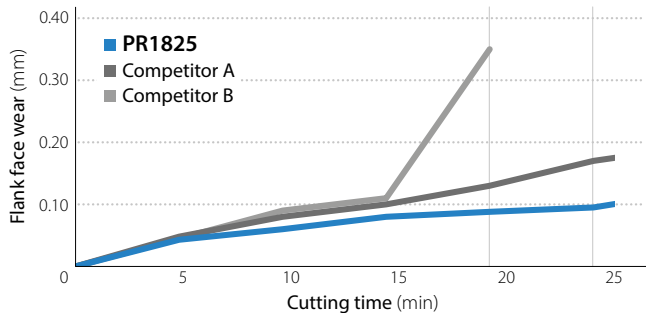
for cast iron

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					1st recommendation					1st recommendation			
		PR1825					PR1835					PR1810			
		Stability oriented													
		PR1835													

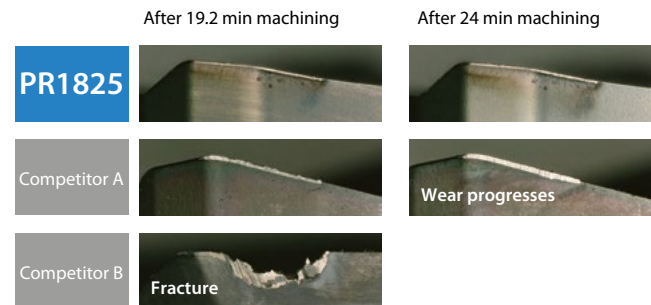
PR1825

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

Wear resistance comparison (Internal evaluation)



Edge condition

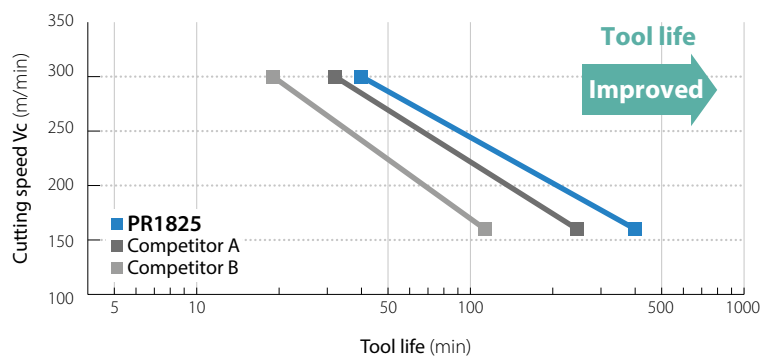


Cutting Conditions : $V_c = 150$ m/min, $a_p \times a_e = 2$ mm $\times$ 65 mm, $f_z = 0.12$ mm/t, SKD11, Dry PNMU1205ANER-GM (MFPN45)

V-T graph (Internal evaluation)

Life criteria :
Flank face wear = 0.10 mm

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





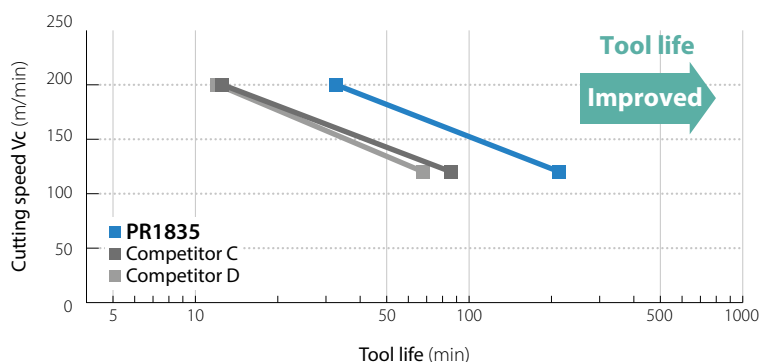
PR1835

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.

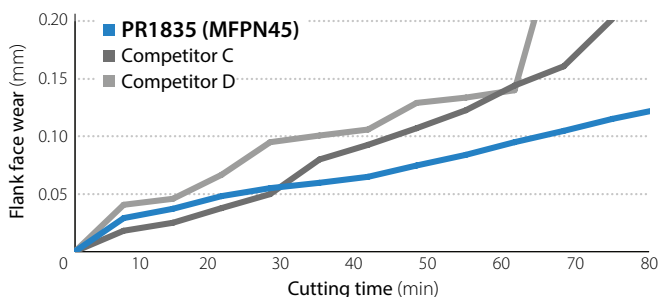
V-T graph (Internal evaluation)

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)

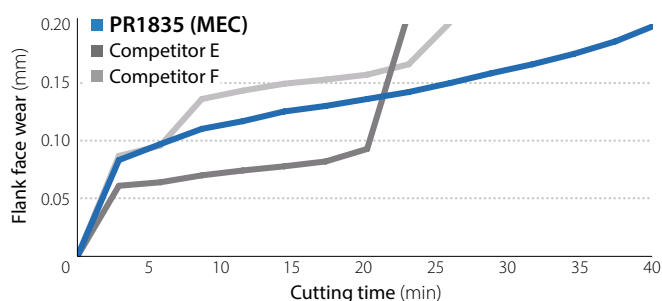


Wear resistance comparison (Internal evaluation)



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)

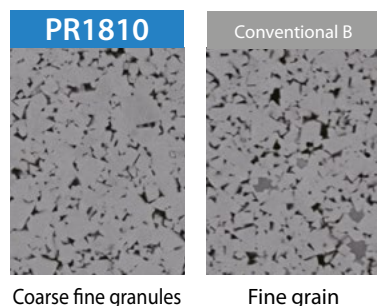


Cutting Conditions : Vc = 120 m/min, ap x ae = 2 x 15 mm, fz = 0.1 mm/t
SUS304, Dry BDMT11T308ER-JS

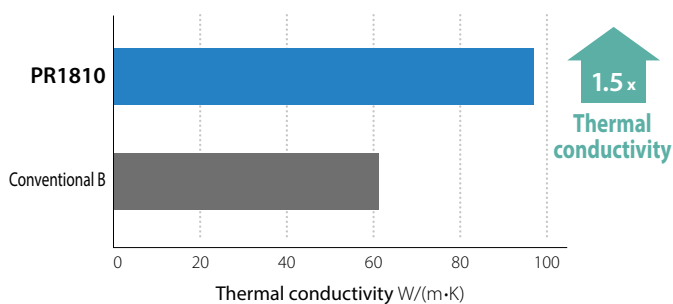
PR1810

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

Carbide Substrate

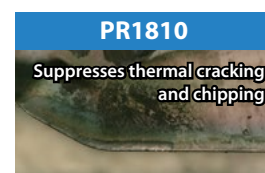


Thermal conductivity comparison (Internal evaluation)



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



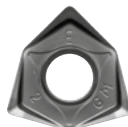
High-efficiency and low cutting force end mill

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



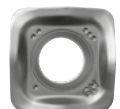
Small dia. cutter for high feed machining

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

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
WNNMU080608EN-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



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
	LOGU	090404ER-GM	●	●
		090408ER-GM	●	●
		090412ER-GM	●	●
		090416ER-GM	●	●
	LOGU	090404ER-SM	●	●
		090408ER-SM	●	●
		090412ER-SM	●	●
		090416ER-SM	●	●
	LOGU	090408ER-GH	●	●
	LOGU	120604ER-GM	●	●
		120608ER-GM	●	●
		120612ER-GM	●	●
		120616ER-GM	●	●
		120620ER-GM	●	●
		120624ER-GM	●	●
		120630ER-GM	●	●
	LOGU	120604ER-SM	●	●
		120608ER-SM	●	●
		120612ER-SM	●	●
		120616ER-SM	●	●
		120620ER-SM	●	●
		120624ER-SM	●	●
		120630ER-SM	●	●
	LOGU	120608ER-GH	●	●

Right-handed insert shown

● : Standard stock

Shape	Description	MEGACOAT NANO EX		
		PR1825	PR1835	PR1810
	LOMU	100404ER-GM	●	●
		100408ER-GM	●	●
		100412ER-GM	●	●
		100416ER-GM	●	●
		100420ER-GM	●	●
	LOMU	150504ER-GM	●	●
		150508ER-GM	●	●
		150510ER-GM	●	●
		150512ER-GM	●	●
		150516ER-GM	●	●
	LOMU	100408ER-SM	●	●
	LOMU	150508ER-SM	●	●
	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		●	●	●
	BDMT	110302ER-JS	●	●	—
		110304ER-JS	●	●	—
		110308ER-JS	●	●	—
	BDMT	11T302ER-JS	●	●	—
		11T304ER-JS	●	●	—
		11T308ER-JS	●	●	—
	BDMT	170404ER-JS	●	●	—
		170408ER-JS	●	●	—

Low cutting force/
for stainless steel

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



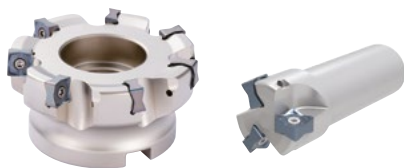
Shape	Description	MEGACOAT NANO EX		
		PR1825	PR1835	PR1810
General purpose	WNMU 050408EN-GM	●	●	●
Low cutting force	WNMU 050408EN-SM	●	●	●
Tough edge (for heavy cutting)	WNMU 050408EN-GH	●	●	●

● : 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



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 1205ANER-GH	●	●	●
 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 1205ANER-GL	●	●	●
 Wiper insert (2-edge)	PNEU 1205ANER-W	●	●	●

● : 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
V
D

Chemical Vapor Deposition

CVD
TECHNOLOGY



Achieving unprecedented tool life



MEGACOAT
NANO EX | Milling

P
V
D
Physical Vapor Deposition