

MA90



Reliable, stable, high quality machining with extended tool life

Unique tangential 90° end mill design provides a large variety of machining operations

Newly designed inserts with grade PR18 series coating technology

High quality surface finish and
excellent wall accuracy

Supports multi-functional machining
such as 3D milling



Economical
multi-purpose
M-class insert



**KEEPS YOU
AHEAD**



Tangential 90° end mill with 4-edge inserts

MA90

Original tangential 90° end mill with economical 4-edge inserts.
New grade PR18 Series and unique insert cutting edge design creates high-quality machining with longer tool life.

1

The tangential MA90 provide a large variety of machining operations

Challenges

Conventional end mill

- Sudden fractures can cause damage to the holder
- Insert defects preventing use of all four corners

Tangential end mill

- Premature tool wear can quickly deteriorate the surface finish quality
- Poor wall accuracy

SOLUTION

Kyocera's MA90 tangential end mill solves these problems with a unique insert shape and PR18 Series grade technology.

Large web thickness

High rigidity

Peripheral grinding specifications (G-class insert)

Excellent wall accuracy

Special wiper edge

Large relief angle suppresses wear
High-quality surface finish



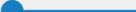


Reliable tooling
brings peace of
mind to
machinists.



Multifunctional

Supports three-dimensional machining



Unique cutting edge design

Excellent fracture resistance and low cutting force design



Newly developed insert grade

MEGACOAT NANO EX

PR18 Series delivers longer tool life

2

New insert grade PR18 Series provides a significantly longer tool life



Next-generation insert grade for milling

PR18 Series

Kyocera NANO layer coating technology

Longer tool life with next-generation coating for 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 × Multilayer lamination

NANO-Layer

AlCr-based coating
with excellent abrasion resistance

High toughness
suppresses crack growth

NANO-Layer

AlTi-based coating
with excellent heat resistance

High toughness
suppresses crack growth

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

CG Image

Extensive line-up of insert grades covers a variety of machining materials and applications

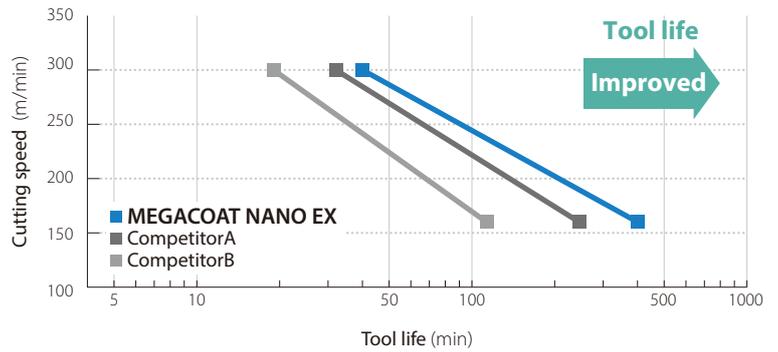
Workpiece material	P Steel					M Stainless steel					K Cast iron				
	01	10	20	30	40	01	10	20	30	40	01	10	20	30	40
Line-up	1st recommendation PR1825					1st recommendation PR1835					1st recommendation PR1810				
	Wet PR1835					High-speed machining CA6535									

H Hardened material	PR015S (GH)	S Heat-resistant alloy	CA6535 (PR1835)	Titanium alloy	PR1835
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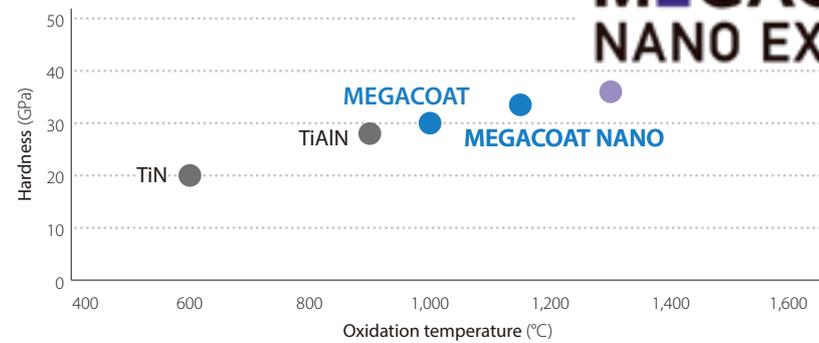
PR1825 wear resistance comparison (Internal evaluation) V-T graph

Life criteria:
Flank face wear = 0.10 mm

Cutting conditions:
Vc = **160 / 300** m/min.
ap × ae = 2.0 × 110 mm, fz = 0.12 mm/t
SCM440 Dry
PNMU1205ANER-GM (MFPN)



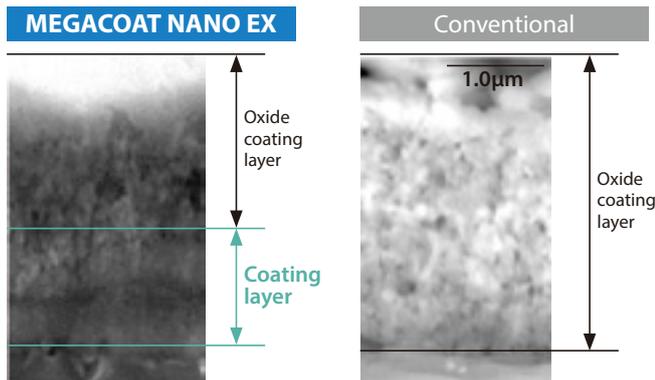
Coating characteristics (Internal evaluation)



MEGACOAT NANO EX | Milling

Oxidation progression comparison (Internal evaluation)

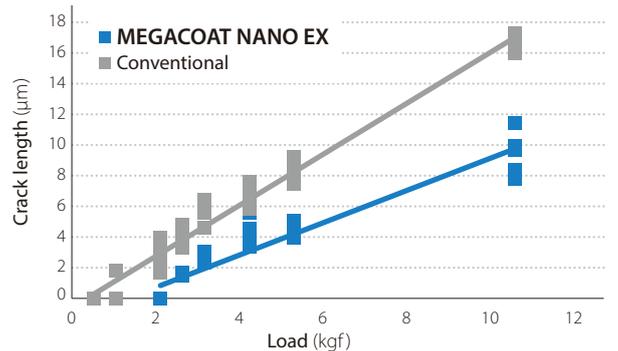
Suppresses oxidation progression with excellent oxidation resistance



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

Coating layer toughness evaluation (Internal evaluation)

Excellent coating toughness with small crack length



*Micro-Vickers measurement.

3

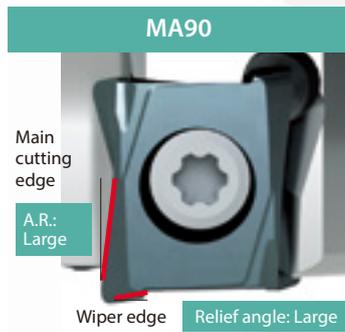
Achieve reliable results with an insert shape designed for high quality machining and long tool life

Unique cutting edge design delivers high fracture resistance and low cutting forces

Special wiper edge and peripheral grinding specifications provide high quality finish and long tool life

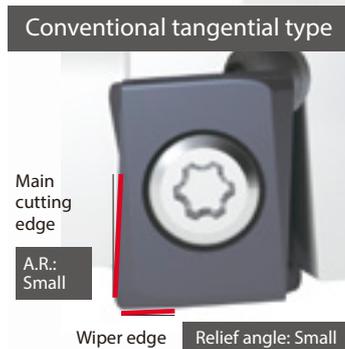
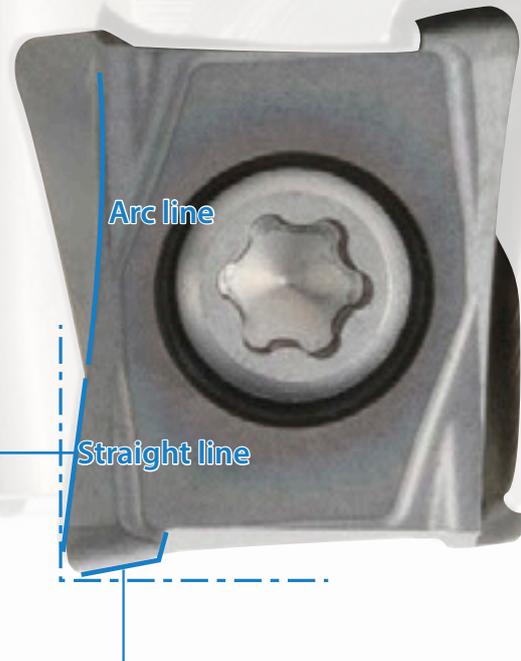
Advantage

Both the A.R. and the relief angle of the wiper edge are large.
Low resistance and excellent surface finish



Unique cutting edge design

Superior fracture resistance and low cutting force.



Special wiper edge

Large relief angle: Excellent surface finish and wear suppression.
Stepped corners: Designed to prevent seat damage.

Excellent surface finish

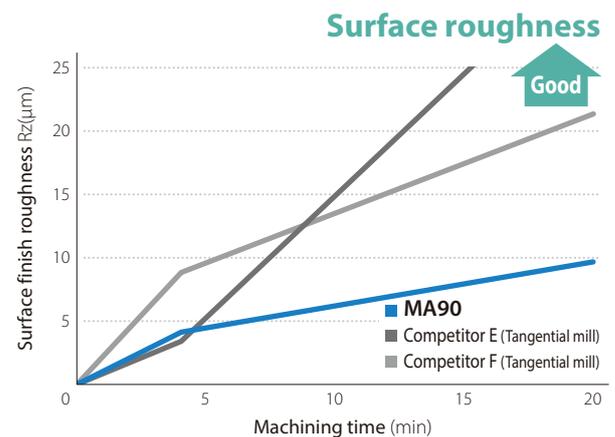
Special wiper edge design suppresses abrasion progress of the edge. Maintains high-quality finished surface

Wear and Surface Finish Comparison (Internal evaluation)

Wiper edge wear



Surface finish roughness (Bottom surface)



Cutting conditions: $V_c = 200$ m/min., $a_p \times a_e = 1 \times 37.5$ mm, $f_z = 0.1/0.12$ mm/t, Dry S50C $\varnothing 50$ (6/7 inserts) BT50.

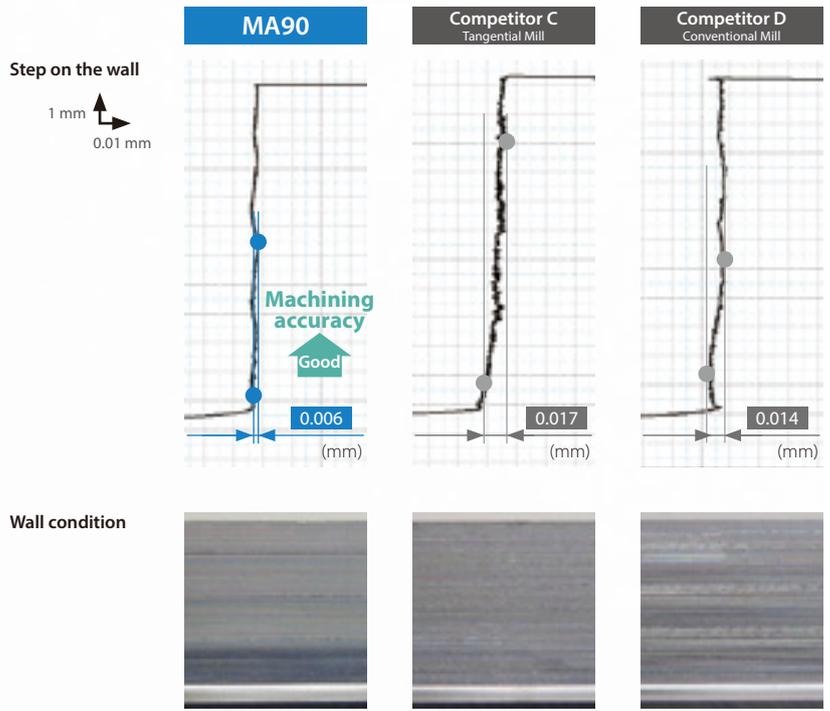
Excellent wall accuracy

Peripheral grinding specifications (G-class insert)

Unique, sloped, edge shape.
Grounded peripheral provides higher precision.



Wall accuracy comparison (Internal evaluation)



Cutting conditions: $V_c = 150$ m/min., $a_p \times a_e = 3 \times 5$ mm 4 passes, $f_z = 0.1$ mm/t. Dry, S50C. Diameter = 20 (3 inserts) BT50.

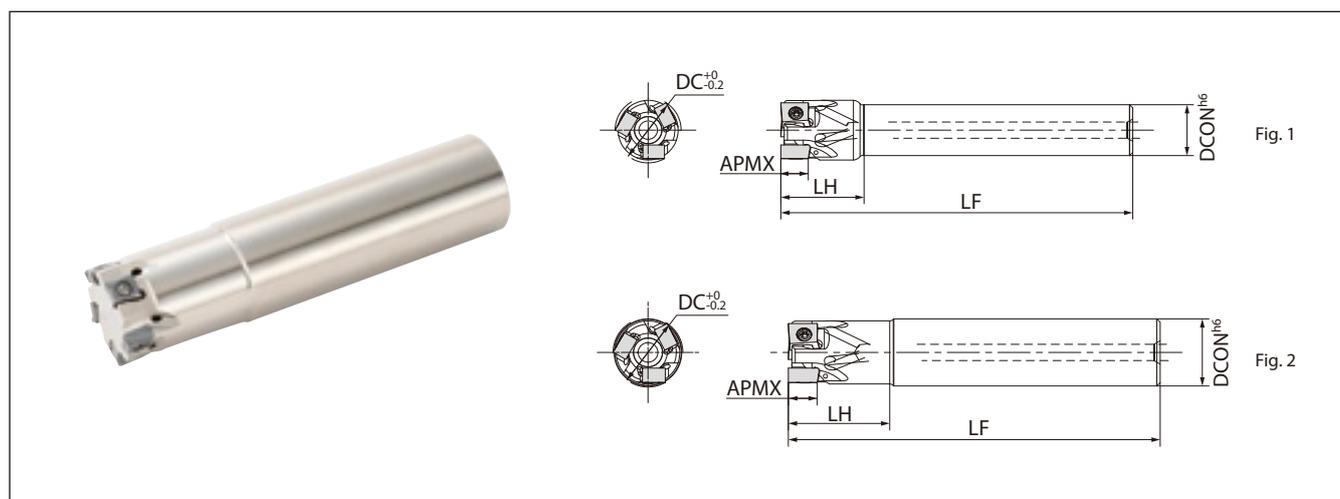
Long tool life and high-speed machining

Test 1 Even if the main cutting edge is in good condition, the tool reached the end of life due to deterioration of the finished surface.

Test 2 Machined with reduced cutting speed because the surface finish deteriorated early.

Edge condition and finished surface

		MA90	Competitor E Tangential	Competitor F Tangential
Wiper edge	After 3.8 min.			
	After 6.5 min.			
Main cutting edge		Abrasion progress: Small Good	Wear progress: Large Spark generation Good	Wear progress: Large Spark generation Good
Finished surface	After 13.1 min.			
		Good Rz: 8.0 µm (Ra: 1.3 µm)	Cloudy finish Rz: 20.6 µm (Ra: 2.2 µm)	Surface finish deteriorating Rz: 14.9 µm (Ra: 3.0 µm)
Results		Main cutting edge: Good Wiper edge wear: Small wear Good finished surface and can continue to use!	Main cutting edge: Good Wiper edge wear: Progressive Worse finished surface.	Main cutting edge: Good Wiper edge wear: Progressive Worse finished surface.



Toolholder dimensions • 09 size (LOGU09 ...)

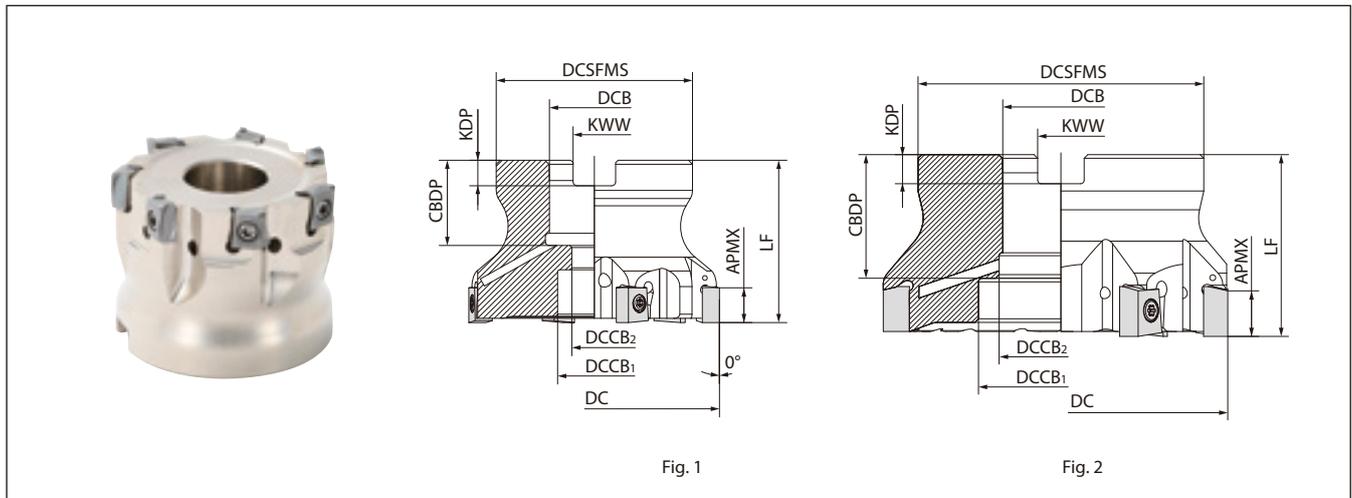
Description	Availability	Number of Inserts	Dimensions (mm)					Coolant hole	Shape	Weight	Maximum number of revolutions (min ⁻¹)					
			DC	DCON	LF	LH	APMX									
Standard shank	●	2	16	12	100	23	8	Yes	Fig. 1	0.1	29,500					
			18	16							27,900					
		3	20	20	110	26				0.2	26,600					
			22	20	120	29					25,400					
			25	25	120	29					0.3	23,900				
		28	25	130	32	22,600										
		4	30	32	130	32				0.5	21,900					
			32	32	130	32					21,200					
		5	35	32	150	50				0.9	20,300					
			40	32	150	50					1.0	19,000				
		6	40	32	120	40				0.9		17,000				
			50	50	120	40										
		Same size shank	●	2	16	16				100	26	8	Yes	Fig. 2	0.1	29,500
					20	20				110	30					0.2
				3	25	25				120	32				0.4	23,900
32	32				130	40	0.7	21,200								
32	32				130	40										
Long shank	●			2	20	18	150	30	8	Yes	Fig. 1				0.3	26,600
						20		40								Fig. 2
		25	25	170	50	1.1	21,200									
		32	32	200	65											

Maximum number of revolutions

Set the number of revolutions per minute within the recommended cutting speed specified by the workpiece on page 16-17.

Do not use the end mill or cutter at the maximum revolution or higher since the centrifugal force may cause chips and parts to scatter even under no load.

●: Available



Toolholder dimensions • 09 size (LOGU09...)

Description	Availability	Number of inserts	Dimensions (mm)										Coolant hole	Shape	Weight (kg)	Maximum number of revolutions (min ⁻¹)
			DC	DCSFMS	DCB	DCCB1	DCCB2	LF	CBDP	KDP	KWW	APMX				
MA90 - 040R-09T4C-M	●	4	40	38	16	15	9	40	19	5.6	8.4	8	Yes	Fig. 1	0.2	26,600
MA90 - 040R-09T6C-M	●	6														
MA90 - 050R-09T5C-M	●	5	50	48	22	18	11	40	21	6.3	10.4	8	Yes	Fig. 1	0.4	23,900
MA90 - 050R-09T7C-M	●	7														
MA90 - 063R-09T6C-M	●	6	63	48	22	18	11	40	21	6.3	10.4	8	Yes	Fig. 1	0.5	21,200
MA90 - 063R-09T9C-M	●	9														

Maximum number of revolutions

Set the number of revolutions per minute within the recommended cutting speed specified by the workpiece on page 16-17. Do not use the end mill or cutter at the maximum revolution or higher since the centrifugal force may cause chips and parts to scatter even under no load.

●: Available

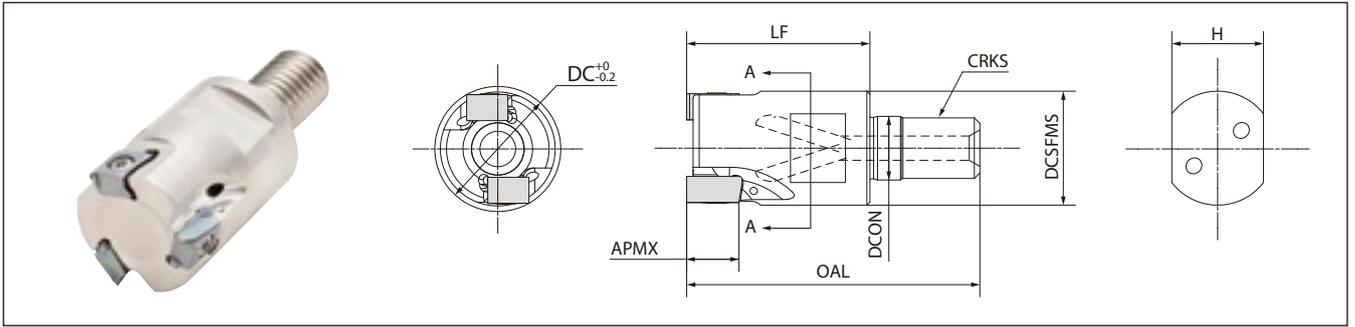
Toolholder dimensions • 12 size (LOGU12...)

Description	Availability	Number of inserts	Dimensions (mm)										Coolant hole	Shape	Weight (kg)	Maximum number of revolutions (min ⁻¹)
			DC	DCSFMS	DCB	DCCB1	DCCB2	LF	CBDP	KDP	KWW	APMX				
MA90 - 040R-12T3C-M	●	3	40	38	16	14	9	40	19	5.6	8.4	12	Yes	Fig. 1	0.2	14,600
MA90 - 040R-12T4C-M	●	4														
MA90 - 050R-12T4C-M	●	5	50	48	22	18	11	40	21	6.3	10.4	12	Yes	Fig. 1	0.3	13,100
MA90 - 050R-12T6C-M	●	6														
MA90 - 063R-12T6C-M	●	6	63	48	22	18	11	40	21	6.3	10.4	12	Yes	Fig. 1	0.4	11,700
MA90 - 063R-12T8C-M	●	8														
MA90 - 080R-12T7C-M	●	7	80	70	27	20	13	50	24	7	12.4	12	Yes	Fig. 1	1.2	10,400
MA90 - 080R-12T10C-M	●	10														
MA90 - 100R-12T9C-M	●	9	100	78	32	45	50	50	30	8	14.4	12	Yes	Fig. 2	1.5	9,300
MA90 - 100R-12T13C-M	●	13														
MA90 - 125R-12T12C-M	●	12	125	89	40	55	63	63	33	9	16.4	12	Yes	Fig. 2	2.5	8,300
MA90 - 125R-12T16C-M	●	16														

Maximum number of revolutions

Set the number of revolutions per minute within the recommended cutting speed specified by the workpiece on page 16-17. Do not use the end mill or cutter at the maximum revolution or higher since the centrifugal force may cause chips and parts to scatter even under no load.

●: Available



Toolholder dimensions • 09 size (LOGU09...)

Description	Availability	Number of inserts	Dimensions (mm)								Coolant hole	Maximum number of revolutions (min ⁻¹)
			DC	DCSFMS	DCON	OAL	LF	CRKS	H	APMX		
MA90 -	●	20M10-09T2C	20	18.8	10.5	48	30	M10×P1.5	15	8	Yes	19,000
		20M10-09T3C										
		25M12-09T3C	25	23	12.5	56	35	M12×P1.75	19			17,000
		25M12-09T4C										
		32M16-09T4C	32	30	17	62	40	M16×P2.0	24			15,100
		32M16-09T5C										

● : Available

Toolholder dimensions • 12 size (LOGU12...)

Description	Availability	Number of inserts	Dimensions (mm)								Coolant hole	Maximum number of revolutions (min ⁻¹)
			DC	DCSFMS	DCON	OAL	LF	CRKS	H	APMX		
MA90 -	●	2	25	23	12.5	56	35	M12×P1.75	19	12	Yes	18,300
			32M16-12T2C	32	30	17	62	40	M16×P2.0			24
		32M16-12T3C	3									

Maximum number of revolutions

Set the number of revolutions per minute within the recommended cutting speed specified by the workpiece on Page 16-17.

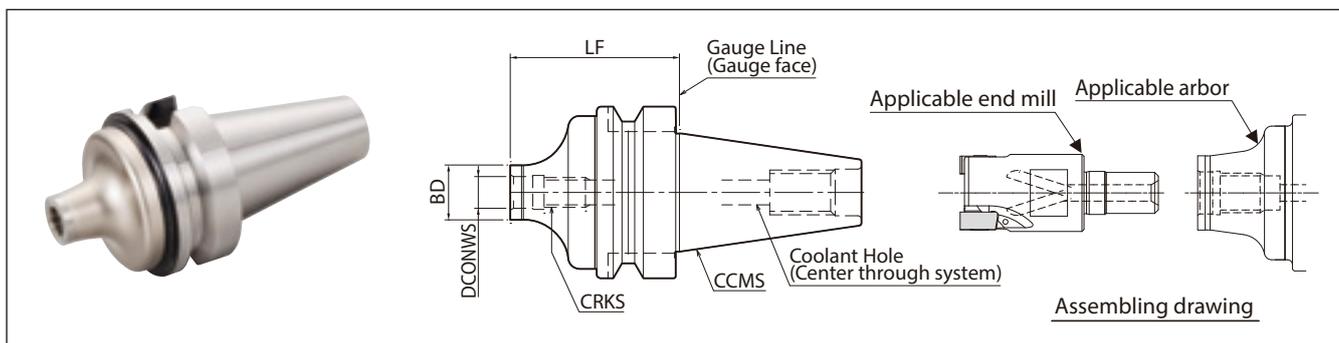
Do not use the end mill or cutter at the maximum revolution or higher since the centrifugal force may cause chips and parts to scatter even under no load.

● : Available

Parts / Applicable inserts

Description			Clamp screw	Wrench	Anti-seizure compound	Arbor bolt
						
09 Size (LOGU09...)	Screw on type	MA90-16...-09...	SB-44865UTRP	DTPM-8	P-37	-
		MA90-18...-09...	Tightening torque for clamping insert 1.2 N.m			-
		MA90-20~50...-09...				-
	Face mill	MA90-040R-09...	SB-44880UTRP	DTPM-8		HH8×25
		MA90-050R-09...	Tightening torque for clamping insert 1.2 N.m			HH10×30
		MA90-063R-09...				
12 Size (LOGU12...)	Screw on type	MA90-...-12...			P-37	-
		MA90-040R-12...-M				HH8×25
	MA90-050R-12...-M			HH10×30		
	MA90-063R-12...-M			HH12×35		
	Face mill	MA90-080R-12...-M	SB-40104TRP	DTPM-15		
		MA90-100R-12...-M	Tightening torque for clamping insert 3.5 N/m			-
		MA90-125R-12...-M				
		MA90-080R-12...				HH12×35
		MA90-100R-12...				
		MA90-125R-12...				-

BT arbor for exchangeable head (Two face contact)



Dimensions

Description	Availability	Dimensions (mm)				Coolant hole	Arbor (Two-face clamping)	Applicable end mill (Head)
		LF	BD	DCONWS	CRKS			
BT30K-	M10-45	●	45	18.7	10.5	Yes	BT30	MA90-...M10-..
	M12-45	●	45	23	12.5			MA90-...M12-..
BT40K-	M10-60	●	60	18.7	10.5	Yes	BT40	MA90-...M10-..
	M12-55	●	55	23	12.5			MA90-...M12-..
	M16-65	●	65	30	17			MA90-...M16-..

● : Available

Actual end mill depth

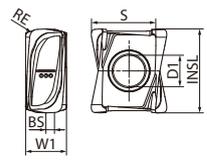
Arbor description	Applicable end mill (Head)			Actual end mill depth (mm)
	Description	Cutting dia. (mm)	Dimensions (mm)	
		DC	LF	
BT30K- M10-45	MA90-20M10-...	20	30	36.8
	MA90-25M12-...	25	35	42.8
BT40K-	M10-60 MA90-20M10-...	20	30	38.7
	M12-55 MA90-25M12-...	25	35	44.6
	M16-65 MA90-32M16-...	32	40	51.2



MA90

Tangential 90° end mill with 4-edge inserts

Usage Classification	P	Carbon steel / Alloy steel		★	☆							Applicable toolholder	
		Mould steel		★	☆								
★ : 1st recommendation ☆ : 2nd recommendation	M Stainless steel	Austenitic			★	☆							
		Martensitic			☆					★			
		Precipitation hardening system			★								
		K		Gray cast iron					★				
	Ductile cast iron							★					
	S		Heat-resistant alloys			☆					★		
	Titanium alloy					★							
H		Hardened material (50 HRC)								★			
Shape	Description	No. of edges	Dimensions (mm)						MEGACOAT (PVD coating)				CVD coating
			W1	S	D1	INSL	BS	RE	PR1825	PR1835	PR1810	PR0155	
 General purpose (G-class)	LOGU 090404ER-GM	4	4.3	6.77	3.33	8.89	1.29	0.4	●	●	●	-	●
	090408ER-GM								●	●	●	-	●
	090412ER-GM								●	●	●	-	●
	090416ER-GM								●	●	●	-	●
 Low Cutting force (G-class)	LOGU 090404ER-SM	4	4.3	6.77	3.33	8.89	1.29	0.4	●	●	-	-	●
	090408ER-SM								●	●	-	-	●
	090412ER-SM								●	●	-	-	●
	090416ER-SM								●	●	-	-	●
 Tough edge (G-class)	LOGU 090408ER-GH	4	4.3	6.71	3.33	8.89	0.90	0.8	●	●	●	●	-



Unmarked : GM
△ : SM
□ : GH

● : Available

Case studies

Brake parts FCD500

Vc = 135 m/min.
n = 535 min⁻¹
ap × ae = 3.4 × 25 mm
fz = 0.15 mm/t
Vf = 560 mm/min.
Wet
MA90-080R-12T7C-M
LOGU120616ER-GM (PR1810)



Number of workpieces

MA90 (7 inserts) **1,000 pcs**

Competitor G (7 inserts) **600 pcs**

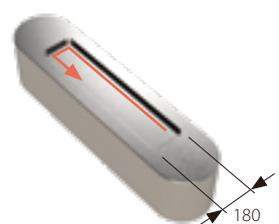
Tool life
↑
x1.6

MA90 showed good cutting edge condition and stable machining. Achieved 1.6 times longer tool life.

(User evaluation)

Mould parts Stainless steel

Vc = 125 m/min.
n = 1,600 min⁻¹
ap × ae = 1.0 × 25 mm
fz = 0.12 mm/t
Vf = 570 mm/min.
Dry
MA90-25S20-09T3C
LOGU090408ER-GM (PR1835)



Machining efficiency

MA90 (3 inserts) **Q = 14.5 cc/min**

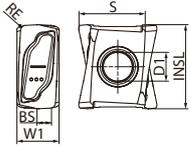
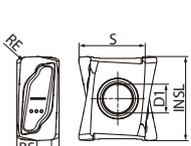
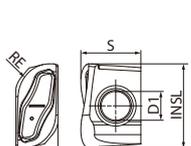
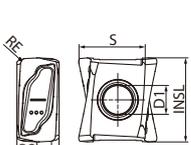
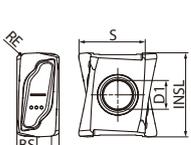
Competitor H (3 inserts) **Q = 9.5 cc/min**

Machining efficiency
↑
x1.5

MA90 showed 1.5 times higher machining efficiency than its competitors. Improved tool life (3 to 4 pcs)

(User evaluation)

Applicable insert 12 size

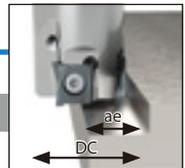
Usage classification		P	Carbon steel / Alloy steel				★	☆					Applicable toolholder	
			Mold steel				★	☆						
★ : 1st recommendation ☆ : 2nd recommendation		M Stainless steel	Austenitic					★	☆					
			Martensitic					☆				★		
			Precipitation hardening system					★						
		K		Gray cast iron							★			
				Ductile cast iron							★			
		S		Heat-resistant alloys					☆				★	
Titanium alloy					★									
H		Hardened material (50 HRC)									★			
Shape		Description	No. of edges	Dimensions (mm)				MEGACOAT (PVD coating)				CVD coating		
				W1	S	D1	INSL	BS	RE	PR1825	PR1835	PR1810	PRO155	CA6535
 <p>General purpose (M-class)</p>	 <p>Unmarked : GM</p>	LOMU 120604ER-GM	4	6.6	10.09	4.55	13.19	2.50	0.4	●	●	●	-	●
		120608ER-GM			10.04			2.14	0.8	●	●	●	-	●
		120612ER-GM			9.97			1.79	1.2	●	●	●	-	●
		120616ER-GM			9.92			1.44	1.6	●	●	●	-	●
		120620ER-GM			9.84			1.08	2.0	●	●	●	-	●
		120624ER-GM			9.78			0.72	2.4	●	●	●	-	●
		120630ER-GM			9.66			0.20	3.0	●	●	●	-	●
 <p>General purpose (G-class)</p>	 <p>Unmarked : GM</p>	LOGU 120604ER-GM	4	6.6	10.10	4.55	13.28	2.50	0.4	●	●	●	-	●
		120608ER-GM			10.04			2.14	0.8	●	●	●	-	●
		120612ER-GM			9.97			1.79	1.2	●	●	●	-	●
		120616ER-GM			9.92			1.44	1.6	●	●	●	-	●
		120620ER-GM			9.85			1.08	2.0	●	●	●	-	●
		120624ER-GM			9.79			0.72	2.4	●	●	●	-	●
		120630ER-GM			9.69			0.20	3.0	●	●	●	-	●
 <p>Single-sided General purpose (G-class)</p>	 <p>Unmarked : GM</p>	LOGT 120640ER-GM	2	6.6	9.56	4.55	13.28	1.69	4.0	●	●	●	-	●
		120650ER-GM			9.40			0.63	5.0	●	●	●	-	●
		120660ER-GM			9.24			0.37	6.0	●	●	●	-	●
 <p>Low cutting force (G-class)</p>	 <p>△ : SM</p>	LOGU 120604ER-SM	4	6.6	10.10	4.55	13.28	2.50	0.4	●	●	-	-	●
		120608ER-SM			10.04			2.14	0.8	●	●	-	-	●
		120612ER-SM			9.97			1.79	1.2	●	●	-	-	●
		120616ER-SM			9.92			1.44	1.6	●	●	-	-	●
		120620ER-SM			9.85			1.08	2.0	●	●	-	-	●
		120624ER-SM			9.79			0.72	2.4	●	●	-	-	●
		120630ER-SM			9.69			0.20	3.0	●	●	-	-	●
 <p>Tough edge (G-class)</p>	 <p>□ : GH</p>	LOGU 120608ER-GH	4	6.6	10.16	4.55	13.25	2.26	0.8	●	●	●	●	-

● : Available

Insert shape	Workpiece material	Toolholder description and feed rate (fz: mm/t)				Recommended insert grade (Cutting speed Vc: m/min.)				
		09 size (LOGU09...)		12 size (LOGU12...)		MEGACOAT NANO EX			MEGACOAT HARD	CVD coating
		MA90-16~MA90-18	MA90-20~MA90-50 MA90-040~MA90-063	MA90-25~MA90-30	MA90-32~MA90-50 MA90-040~MA90-125	PR1825	PR1835	PR1810	PR015S	CA653S
General GM	Carbon steel (SxxC)	0.05 - 0.1 - 0.14	0.05 - 0.1 - 0.16	0.05 - 0.1 - 0.18 (0.14)	0.06 - 0.15 - 0.23 (0.21)	★ 120 - 180 - 250	☆ 120 - 180 - 250	-	-	-
	Alloy steel (SCM, etc.)	0.05 - 0.08 - 0.12	0.05 - 0.1 - 0.14	0.05 - 0.1 - 0.16 (0.13)	0.06 - 0.13 - 0.2 (0.18)	★ 100 - 160 - 220	☆ 100 - 160 - 220	-	-	-
	Mold steel (SKD, etc.)	0.05 - 0.08 - 0.1	0.05 - 0.1 - 0.12	0.05 - 0.1 - 0.14 (0.13)	0.06 - 0.12 - 0.18 (0.16)	★ 80 - 140 - 180	☆ 80 - 140 - 180	-	-	-
	Austenitic stainless steel (SUS 304, etc.)	0.05 - 0.08 - 0.1	0.05 - 0.1 - 0.12	0.05 - 0.1 - 0.14 (0.13)	0.06 - 0.12 - 0.18 (0.16)	☆ 100 - 160 - 200	★ 100 - 160 - 200	-	-	-
	Martensitic stainless steel (SUS 403, etc.)	0.05 - 0.08 - 0.1	0.05 - 0.1 - 0.12	0.05 - 0.1 - 0.14 (0.13)	0.06 - 0.12 - 0.18 (0.16)	-	☆ 150 - 200 - 250	-	-	★ 180 - 240 - 300
	Precipitation hardened stainless steel (SUS 630, etc.)	0.05 - 0.08 - 0.1	0.05 - 0.1 - 0.12	0.05 - 0.1 - 0.14 (0.13)	0.06 - 0.12 - 0.18 (0.16)	-	★ 90 - 120 - 150	-	-	-
	Grey cast iron (FC)	0.05 - 0.1 - 0.14	0.05 - 0.1 - 0.16	0.05 - 0.1 - 0.18 (0.16)	0.06 - 0.15 - 0.23 (0.21)	-	-	☆ 120 - 180 - 250	-	-
	Ductile cast iron (FCD)	0.05 - 0.08 - 0.1	0.05 - 0.1 - 0.12	0.05 - 0.1 - 0.14 (0.13)	0.06 - 0.12 - 0.18 (0.16)	-	-	☆ 100 - 150 - 200	-	-
	Ni-based heat resistant alloys	0.05 - 0.06 - 0.08	0.05 - 0.08 - 0.1	0.05 - 0.08 - 0.12 (0.11)	0.06 - 0.1 - 0.15 (0.14)	-	☆ 20 - 30 - 50	-	-	★ 20 - 30 - 50
Titanium alloy (Ti-6Al-4V)	0.05 - 0.08 - 0.1	0.05 - 0.09 - 0.12	0.05 - 0.09 - 0.12 (0.11)	0.06 - 0.1 - 0.15 (0.14)	-	☆ 30 - 50 - 70	-	-	-	

The number in bold font is recommended starting conditions. Adjust the cutting speed and the feed rate within the above conditions according to the actual machining situation. Machining with coolant is recommended for Ni-base heat-resistant alloys and titanium alloys. When choosing wet machining for other workpieces, reduce the cutting speed to 70% or less. Face milling does not recommend slotting or pocketing. We recommend setting the ae to 75% or less. We recommend the small number insert type for ae of 30% or more. Working above recommended conditions or long-term use can damage the screws. It is recommended to replace the screws regularly. Ramping and Helical milling are not recommended if the corner R is R4.0/R5.0/R6.0.

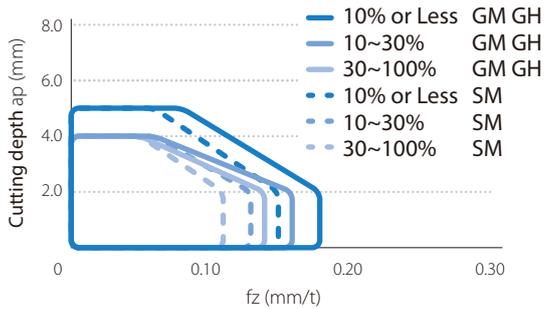
Cutting performance



09 Size (LOGU09...) • Machining for steel (Dry)

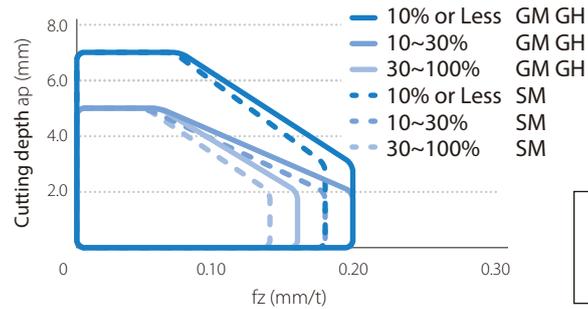
Cutting diameter DC: Ø16 – 18 mm

ae/DC



Cutting diameter DC: Ø20 – 63 mm

ae/DC

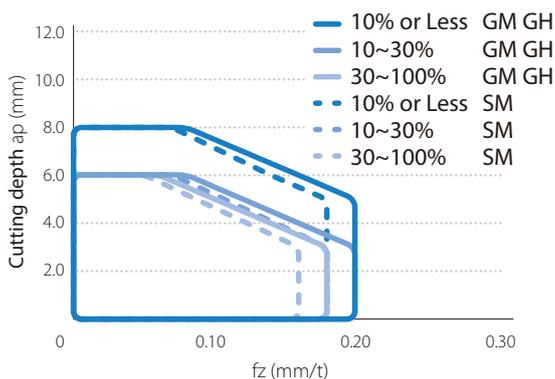


For other workpiece material, set ap and fz appropriately for each ae.

12 Size (LOGU12...) • Machining for steel (Dry)

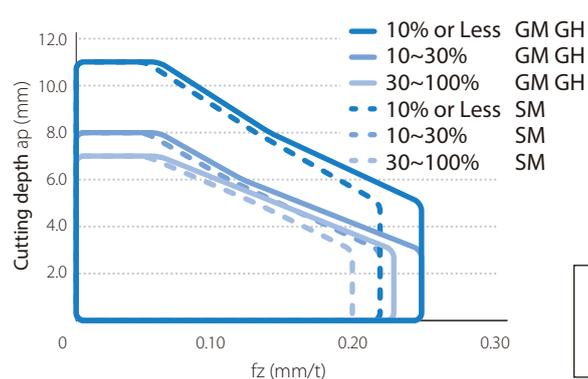
Cutting diameter DC: Ø25 – 30 mm

ae/DC



Cutting diameter DC: Ø32 – 125 mm

ae/DC



For other workpiece material, set ap and fz appropriately for each ae.

Recommended cutting conditions

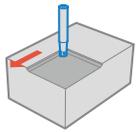
★ 1st recommendation ☆ 2nd recommendation

Insert shape	Workpiece material	Toolholder description and feed rate (fz: mm/t)				Recommended insert grade (Cutting speed Vc: m/min.)				
		09 size (LOGU09...)		12 size (LOGU12...)		MEGACOAT NANO EX			MEGACOAT HARD	CVD coating
		MA90-16~ MA90-18	MA90-20~MA90-50 MA90-040~MA90-063	MA90-25~ MA90-30	MA90-32~MA90-50 MA90-040~MA90-125	PR1825	PR1835	PR1810	PR0155	CA6535
Low cutting force SM	Carbon steel (SxxC)	0.05 – 0.08 – 0.11	0.05 – 0.1 – 0.14	0.05 – 0.1 – 0.14	0.06 – 0.1 – 0.18	★ 120 – 180 – 250	☆ 120 – 180 – 250	–	–	–
	Alloy steel (SCM, etc.)	0.05 – 0.07 – 0.1	0.05 – 0.08 – 0.12	0.05 – 0.08 – 0.12	0.06 – 0.1 – 0.14	★ 100 – 160 – 220	☆ 100 – 160 – 220	–	–	–
	Mold steel (SKD, etc.)	0.05 – 0.07 – 0.1	0.05 – 0.08 – 0.1	0.05 – 0.08 – 0.12	0.06 – 0.1 – 0.14	★ 80 – 140 – 180	☆ 80 – 140 – 180	–	–	–
	Austenitic stainless steel (SUS304, etc.)	0.05 – 0.08 – 0.11	0.05 – 0.08 – 0.12	0.05 – 0.08 – 0.12	0.06 – 0.1 – 0.14	☆ 100 – 160 – 200	★ 100 – 160 – 200	–	–	–
	Martensitic stainless steel (SUS403, etc.)	0.05 – 0.08 – 0.11	0.05 – 0.08 – 0.12	0.05 – 0.08 – 0.12	0.06 – 0.1 – 0.14	–	☆ 150 – 200 – 250	–	–	★ 180 – 240 – 300
	Precipitation hardened stainless steel (SUS630, etc.)	0.05 – 0.08 – 0.11	0.05 – 0.08 – 0.12	0.05 – 0.08 – 0.12	0.06 – 0.1 – 0.14	–	★ 90 – 120 – 150	–	–	–
	Ni-based heat resistant alloys	0.05 – 0.06 – 0.08	0.05 – 0.08 – 0.1	0.05 – 0.08 – 0.1	0.06 – 0.08 – 0.12	–	☆ 20 – 30 – 50	–	–	★ 20 – 30 – 50
	Titanium alloy (Ti-6 Al-4V)	0.05 – 0.08 – 0.1	0.05 – 0.08 – 0.12	0.05 – 0.08 – 0.12	0.06 – 0.09 – 0.12	–	★ 30 – 50 – 70	–	–	–
Tough edge GH	Carbon steel (SxxC)	0.05 – 0.1 – 0.14	0.05 – 0.1 – 0.16	0.05 – 0.1 – 0.18	0.06 – 0.15 – 0.23	★ 120 – 180 – 250	☆ 120 – 180 – 250	–	–	–
	Alloy steel (SCM, etc.)	0.05 – 0.08 – 0.12	0.05 – 0.1 – 0.14	0.05 – 0.1 – 0.16	0.06 – 0.13 – 0.2	★ 100 – 160 – 220	☆ 100 – 160 – 220	–	–	–
	Mold steel (SKD, etc.)	0.05 – 0.08 – 0.1	0.05 – 0.1 – 0.12	0.05 – 0.1 – 0.14	0.06 – 0.12 – 0.18	★ 80 – 140 – 180	☆ 80 – 140 – 180	–	–	–
	Austenitic stainless steel (SUS304, etc.)	0.05 – 0.08 – 0.1	0.05 – 0.1 – 0.12	0.05 – 0.1 – 0.14	0.06 – 0.12 – 0.18	☆ 100 – 160 – 200	☆ 100 – 160 – 200	–	–	–
	Martensitic stainless steel (SUS403, etc.)	0.05 – 0.08 – 0.1	0.05 – 0.1 – 0.12	0.05 – 0.1 – 0.14	0.06 – 0.12 – 0.18	–	☆ 150 – 200 – 250	–	–	–
	Precipitation hardened stainless steel (SUS630, etc.)	0.05 – 0.08 – 0.1	0.05 – 0.1 – 0.12	0.05 – 0.1 – 0.14	0.06 – 0.12 – 0.18	–	☆ 90 – 120 – 150	–	–	–
	Grey cast iron (FC)	0.05 – 0.1 – 0.14	0.05 – 0.1 – 0.16	0.05 – 0.1 – 0.18	0.06 – 0.15 – 0.23	–	–	★ 120 – 180 – 250	–	–
	Ductile cast iron (FCD) 0	0.05 – 0.08 – 0.1	0.05 – 0.1 – 0.12	0.05 – 0.1 – 0.14	0.06 – 0.12 – 0.18	–	–	★ 100 – 150 – 200	–	–
	Ni-based heat resistant alloys	0.05 – 0.06 – 0.08	0.05 – 0.08 – 0.1	0.05 – 0.08 – 0.12	0.06 – 0.1 – 0.15	–	☆ 20 – 30 – 50	–	–	–
	Titanium alloy (Ti-6 Al-4V)	0.05 – 0.08 – 0.1	0.05 – 0.09 – 0.12	0.05 – 0.09 – 0.12	0.06 – 0.1 – 0.15	–	☆ 30 – 50 – 70	–	–	–
	Hardened material (50HRC)	0.05 – 0.07 – 0.1	0.05 – 0.07 – 0.1	0.05 – 0.07 – 0.1	0.05 – 0.07 – 0.1	–	–	–	★ 60 – 80 – 100	–

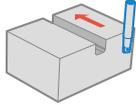
The number in bold font is recommended starting conditions. Adjust the cutting speed and the feed rate within the above conditions according to the actual machining situation. Machining with coolant is recommended for Ni-base heat-resistant alloys and titanium alloys. When choosing wet machining for other workpieces, reduce the cutting speed to 70% or less. Face milling does not recommend slotting or pocketing. We recommend setting the ae to 75% or less. We recommend the small number insert type for ae of 30% or more. Working above recommended conditions or long-term use can damage the screws. It is recommended to replace the screws regularly. Ramping and Helical milling are not recommended if the corner R is R4.0/R5.0/R6.0.

Notes

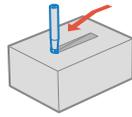
Applications



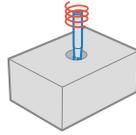
Face milling / Shouldering



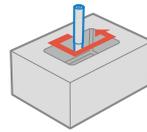
Slotting



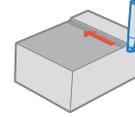
Ramping



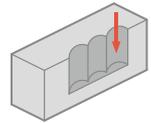
Helical milling



Pocketing



Contouring



Plunging

Ramping reference table

Description	Cutter Diameter DC (mm)	16	20	25	32	40	50
MA... - 09 - ...	Max. Ramping Angle RMPX	1.16°	0.97°	0.64°	0.4°	0.23°	0.11°
	tan RMPX	0.020	0.017	0.011	0.007	0.004	0.002
Description	Cutter Diameter DC (mm)	25	28	30	32	35	40
MA... - 12 - ...	Max. Ramping Angle RMPX	2°	1.7°	1.6°	1.5°	1.2°	1°
	tan RMPX	0.034	0.030	0.027	0.026	0.021	0.017

When using M-class inserts, RMPX (tan RMPX) should be used at 90% in the table above.
Ramping is not recommended if the corner R is R4.0/R5.0/R6.0.
Decrease the angle of inclination when the chips extend longer.

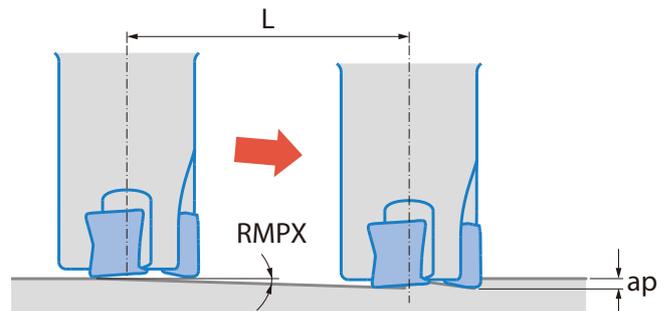
Ramping tips

Ramping angle should be under RMPX.
Reduce recommended feed rate by 70%

Formula for minimum cutting length (L) at max. ramping angle

$$L = \frac{ap}{\tan RMPX}$$

Ramping is not recommended if the corner R is R4.0/R5.0/R6.0.

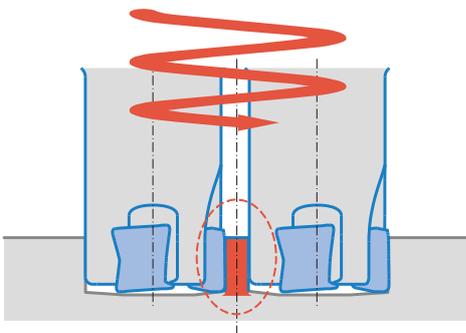


Helical milling tips

For helical milling, use between minimum and maximum cutting diameter.

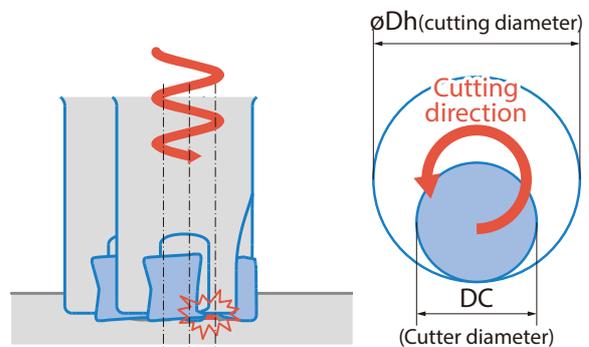
⊘ Exceeding maximum cutting diameter

Center core remains after machining



⊘ Less than minimum cutting diameter

Center core hits holder body



Units: mm

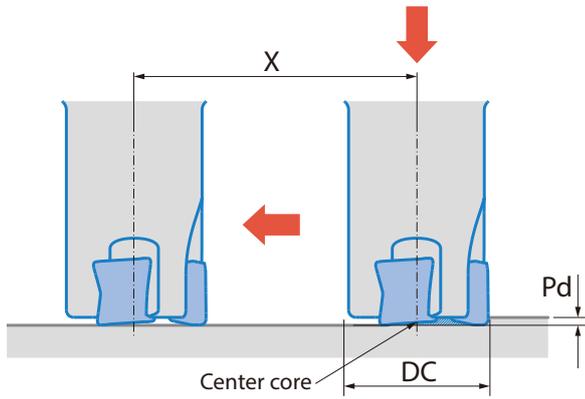
Description	Minimum cutting diameter Ø/Dh1	Maximum cutting diameter Ø/Dh2
MA... - 09 - ...	2×DC-4	2×DC-2
MA... - 12 - ...	2×DC-6	2×DC-2

Helical milling is not recommended if the corner R is R4.0/R5.0/R6.0.

For helical milling, use between minimum cutting diameter and maximum cutting diameter. The cutter direction should be counter-clockwise (down cut) (see above). Please machining in a safe environment as long chips may be produced.

Notes

■ Drilling tips



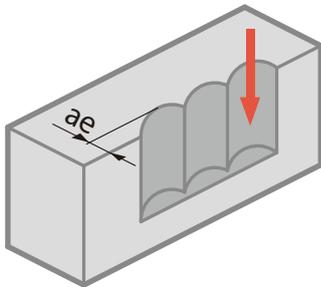
Units: mm

Description	Maximum drilling depth Pd	Minimum cutting length X for flat bottom surface
MA... - 09 - ...	0.25	DC-3
MA... - 12 - ...	0.5	DC-5

It is recommended to reduce feed by 25% of recommendation until the center core is removed when traversing after drilling.

Axial feed rate recommendation per revolution is $f = 0.1 \text{ mm/rev}$ or less when drilling.

■ Plunging tips



Available for vertical milling (plunging).
Feed should be set within $f_z = 0.1 \text{ (mm/t)}$ when plunging.

Units: mm

Description	Maximum width of cut (ae)
09 size (LOGU09...)	2
12 size (LOGU12...)	3

C
Chemical Vapor Deposition
V
D

CVD
TECHNOLOGY



Achieving Unprecedented Tool Life



P
Physical Vapor Deposition
V
D

MEGACOAT
NANO EX | Milling |



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