

Tangential 90° end mill with 4-Edge inserts

MA90

NEW



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



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

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The MA90 provides 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

Excellent wall accuracy

Special wiper edge

Large relief angle suppresses wear
High-quality surface finish





Multifunctional (G-class insert)

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

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New insert grade PR18 series provides a significantly longer tool life

Next-generation insert grade for milling

NEW

PR18 Series

Kyocera's 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 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 suppression of crack growth and optimization of internal stress

CG Image

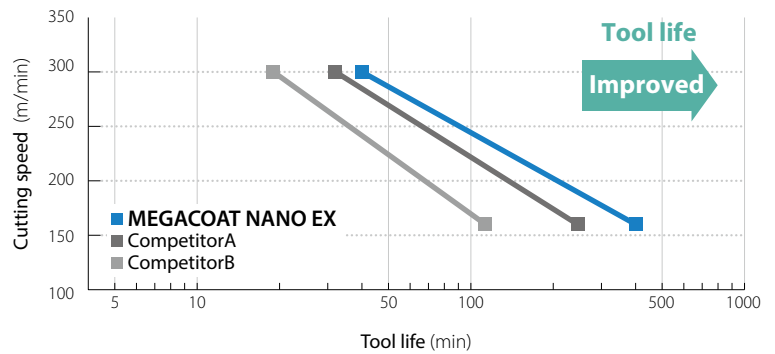
Extensive lineup of insert grades covers a variety of machining materials and applications

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	1st recommendation					1st recommendation					1st recommendation								
	PR1825					PR1835					PR1810								
	Wet					High-speed machining													
					PR1835					CA6535									
H Hardened material	PR015S (GH)					S Heat-resistant alloy					Titanium alloy								
					PR015S (GH)					CA6535 (PR1835)					PR1835				

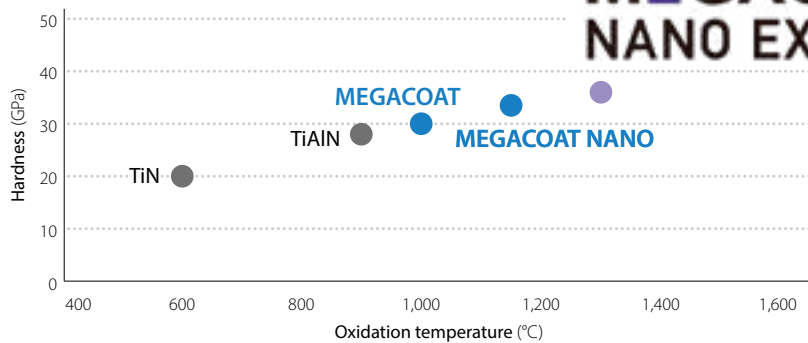
PR1825 Wear resistance comparison (Internal evaluation)
V-T graph

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)

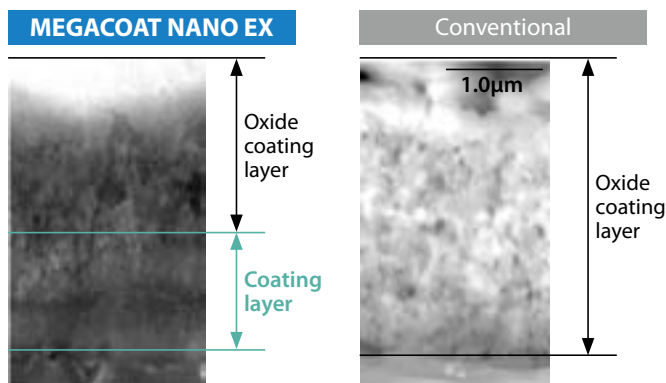


Coating characteristics (Internal evaluation)



Oxidation progression comparison (Internal evaluation)

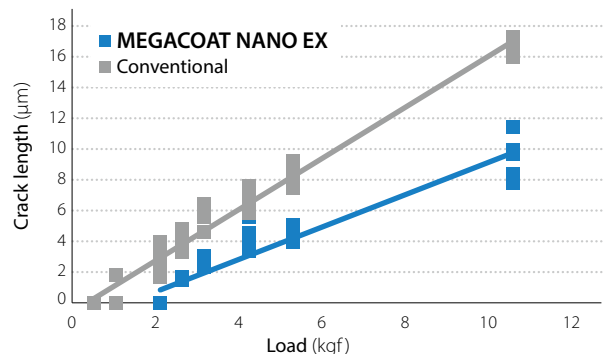
Suppresses oxidation progression with excellent oxidation resistance



*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

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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

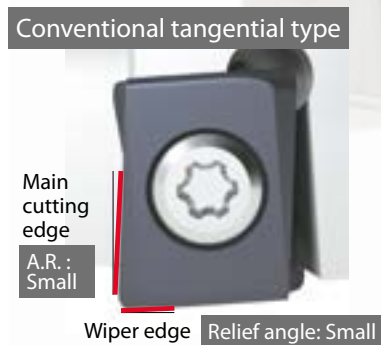
Advantage

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

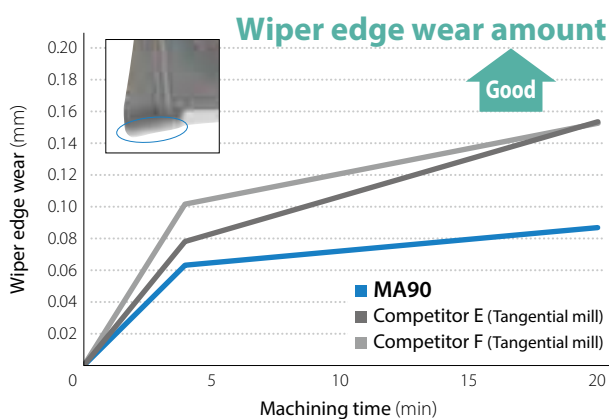
Large relief angle: Excellent surface finish and wear suppression
Stepped corners: Designed to prevent seat damage

Excellent surface finish

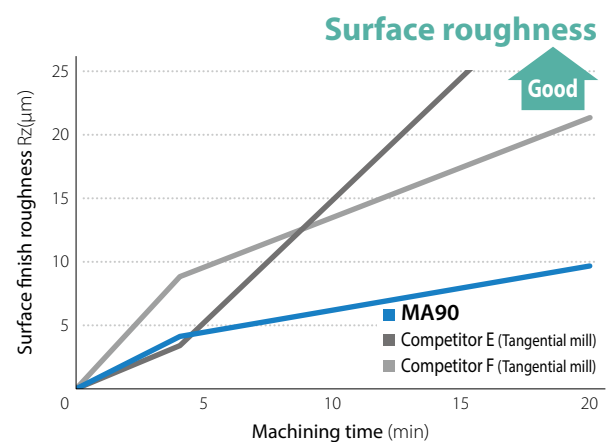
Special wiper edge design suppresses abrasion progress of the edge. Maintains high-quality finished surface

Wear and surface finish comparison (Internal evaluation)

Wiper edge wear



Surface finish roughness (Bottom surface)



Cutting conditions: Vc = 200 m/min, ap x ae = 1 x 37.5 mm, fz = 0.1/0.12 mm/t, Dry S50C ø50 (6/7 inserts) BT50

>>> Excellent wall accuracy

Peripheral grinding specifications

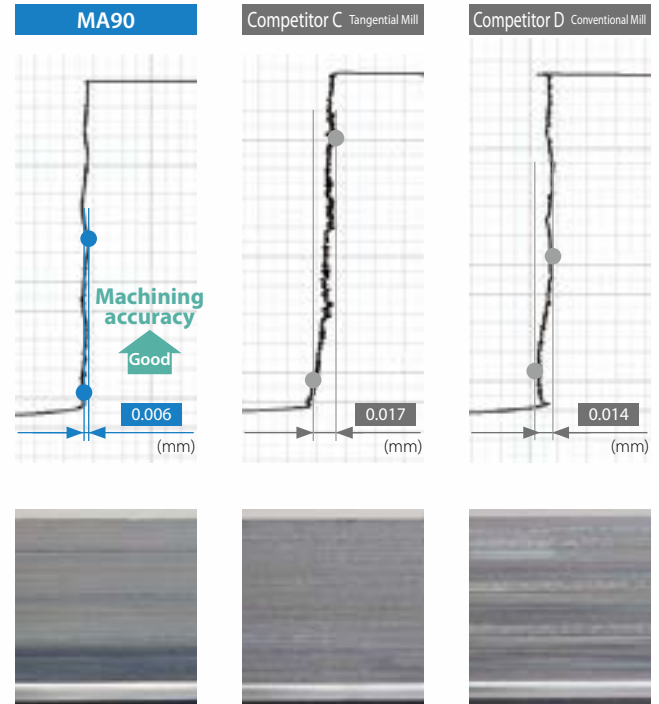
Unique, sloped, edge shape
Grounded peripheral provides higher precision



Wall accuracy comparison (Internal evaluation)

Step on the wall

1mm
0.01mm



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 Dia.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.



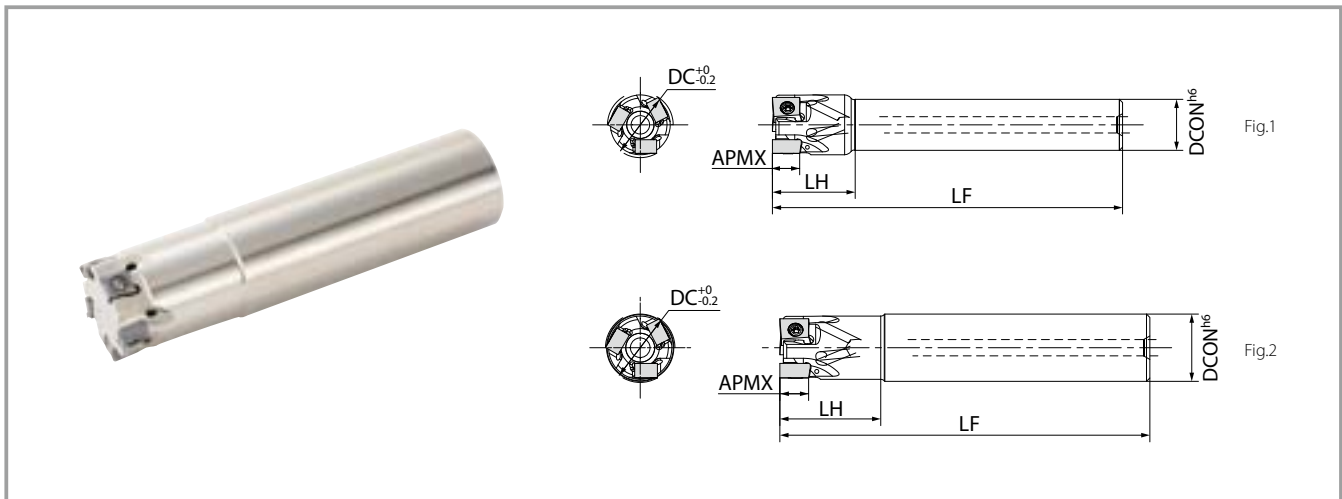
Test 2

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	Wear progress: Large	Spark generation
		Good	Good	Good
Finished surface	After 13.1 min	Good	Cloudy finish	Surface finish deteriorating
		8.0μmRz (1.3μmRa)	20.6μmRz (2.2μmRa)	14.9μmRz (3.0μmRa)
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			Avail-ability	Number of inserts	Dimensions (mm)					Coolant hole	Shape	Weight (kg)	Maximum number of revolutions (min ⁻¹)
					DC	DCON	LF	LH	APMX				
Standard shank	MA90 -	16S12-09T2C	●	2	16	12	100	23	8	Yes	Fig.1	0.1	29,500
		18S16-09T2C	●		18	16							110
		20S16-09T2C	●		20		110	26				26,600	
		20S16-09T3C	●	22		120							29
		22S20-09T3C	●		25		130	32				23,900	
		25S20-09T3C	●	28		150							50
		25S20-09T4C	●		30		120	40				21,900	
		28S25-09T3C	●	32		130							40
		30S25-09T4C	●		35		150	50				20,300	
		32S25-09T4C	●	40		120							40
		32S25-09T5C	●		50		120	40				17,000	
		35S32-09T4C	●	5		120							40
		35S32-09T5C	●		6		120	40				17,000	
		40S32-09T4C	●	7		120							40
		40S32-09T6C	●		7		120	40				17,000	
		50S32-09T5C	●	7		120							40
		50S32-09T7C	●		7		120	40				17,000	
Same size shank	MA90 -	16S16-09T2C	●	2		16			16	100	26		8
		20S20-09T2C	●		20	20	110	30	0.2	26,600			
		20S20-09T3C	●	3	25	25	120	32	0.4	23,900			
		25S25-09T3C	●		32	32	130	40	0.7	21,200			
		25S25-09T4C	●	4	32	32	130	40	0.7	21,200			
		32S32-09T4C	●		32	32	130	40	0.7	21,200			
		32S32-09T5C	●	5	32	32	130	40	0.7	21,200			
Long shank	MA90 -	20S18-09T2CL	●	2	20	18	150	30	8	Yes	Fig.1	0.3	26,600
		20S20-09T2CL	●			20		40			Fig.2		
		25S25-09T2CL	●		25	25	170	50				0.6	23,900
		32S32-09T2CL	●		32	32	200	65			1.1	21,200	

Maximum number of revolutions

Set the number of revolutions per minute within the recommended cutting speed specified by the workpiece on Page 12.

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			Avail-ability	Number of inserts	Dimensions (mm)					Coolant hole	Shape	Weight (kg)	Maximum number of revolutions (min ⁻¹)		
					DC	DCON	LF	LH	APMX						
Standard shank	MA90 -	25S20-12T2C	●	2	25	20	120	29	12	Yes	Fig.1	0.3	18,300		
		28S25-12T2C	●		28	25						130	32	0.4	17,300
		30S25-12T2C	●		30		0.5	16,800							
		30S25-12T3C	●	3				32						16,300	
		32S25-12T2C	●	2	3		35							32	150
		32S25-12T3C	●	3		40	0.9	14,600							
		35S32-12T3C	●					4				50	120		
		40S32-12T3C	●	6	0.8	13,100									
		40S32-12T4C	●				6							0.8	13,100
		50S32-12T4C	●	6	0.8	13,100									
		50S32-12T6C	●				6	0.8				13,100			
Same size shank	MA90 -	25S25-12T2C	●	2	25	25			120	32	12		Yes	Fig.2	0.4
		32S32-12T2C	●		32	32	130	40	0.7	16,300					
		32S32-12T3C	●	3											
Long shank	MA90 -	25S25-12T2CL	●	2	25	25	170	50	12	Yes	Fig.2	0.6	18,300		
		32S32-12T2CL	●		32	32	200	65				1.1	16,300		

Maximum number of revolutions

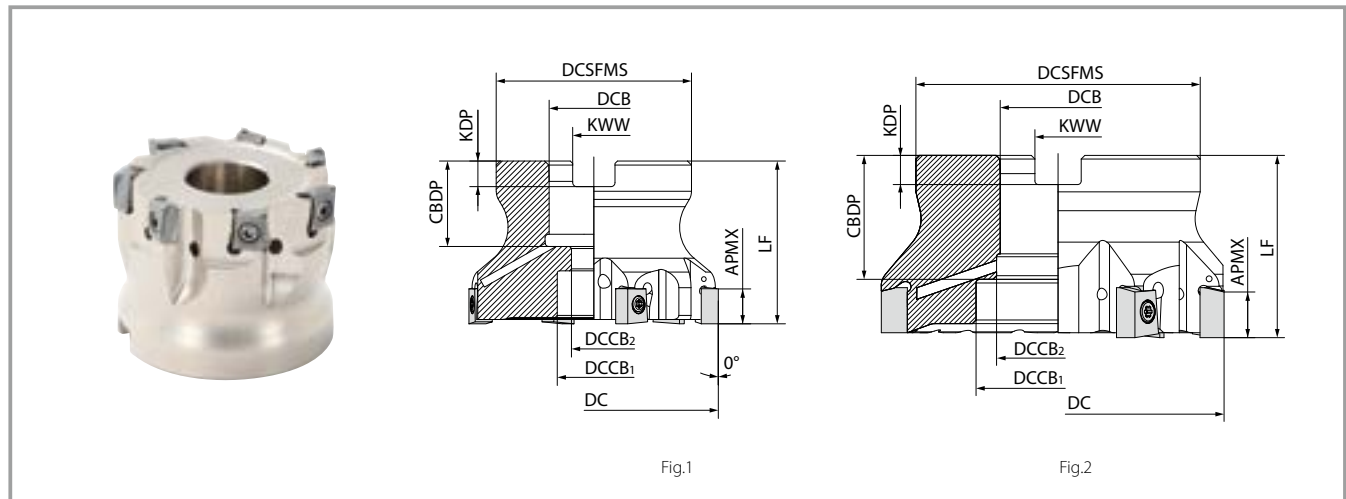
Set the number of revolutions per minute within the recommended cutting speed specified by the workpiece on Page 12.

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...)	End mill Modular	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...)	End mill Modular	MA90-...-12...			P-37	-
	Face mill	MA90-040R-12...-M				HH8×25
		MA90-050R-12...-M				HH10×30
		MA90-063R-12...-M	SB-40104TRP	DTPM-15		
		MA90-080R-12...-M	Tightening torque for clamping insert 3.5 N/m			HH12×35
		MA90-100R-12...-M				
		MA90-125R-12...-M				


Toolholder dimensions 09 size (LOGU09...)

Description	Avail-ability	Number of inserts	Dimensions (mm)									Coolant hole	Shape	Weight (kg)	Maximum number of revolutions (min ⁻¹)	
			DC	DCSFMS	DCB	DCCB ₁	DCCB ₂	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
040R-09T6C-M	●	6														
050R-09T5C-M	●	5	50	48	22	18	11	40	21	6.3	10.4	8	Yes	Fig.1	0.4	23,900
050R-09T7C-M	●	7														
063R-09T6C-M	●	6	63	48	22	18	11	40	21	6.3	10.4	8	Yes	Fig.1	0.5	21,200
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 12.

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...)

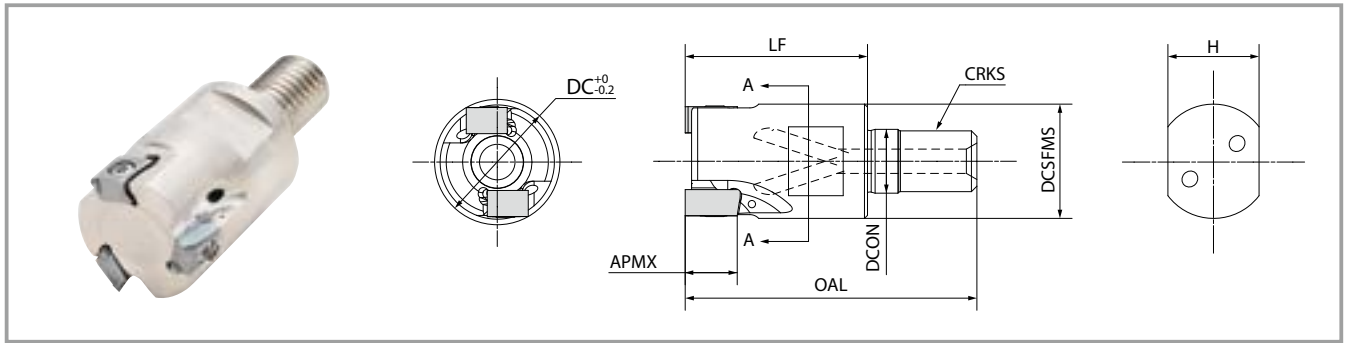
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	050R-12T6C-M	●														63	70	27			20	13	30	8	14.4	1.5	9,300																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
	063R-12T6C-M	●	80	78	32	45	-	63	33	9	16.4	2.5								8,300																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
	063R-12T8C-M	●													8	100	9	10	13		16	19	22	25	28	32	36	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320	325	330	335	340	345	350	355	360	365	370	375	380	385	390	395	400	405	410	415	420	425	430	435	440	445	450	455	460	465	470	475	480	485	490	495	500	505	510	515	520	525	530	535	540	545	550	555	560	565	570	575	580	585	590	595	600	605	610	615	620	625	630	635	640	645	650	655	660	665	670	675	680	685	690	695	700	705	710	715	720	725	730	735	740	745	750	755	760	765	770	775	780	785	790	795	800	805	810	815	820	825	830	835	840	845	850	855	860	865	870	875	880	885	890	895	900	905	910	915	920	925	930	935	940	945	950	955	960	965	970	975	980	985	990	995	1000	1005	1010	1015	1020	1025	1030	1035	1040	1045	1050	1055	1060	1065	1070	1075	1080	1085	1090	1095	1100	1105	1110	1115	1120	1125	1130	1135	1140	1145	1150	1155	1160	1165	1170	1175	1180	1185	1190	1195	1200	1205	1210	1215	1220	1225	1230	1235	1240	1245	1250	1255	1260	1265	1270	1275	1280	1285	1290	1295	1300	1305	1310	1315	1320	1325	1330	1335	1340	1345	1350	1355	1360	1365	1370	1375	1380	1385	1390	1395	1400	1405	1410	1415	1420	1425	1430	1435	1440	1445	1450	1455	1460	1465	1470	1475	1480	1485	1490	1495	1500	1505	1510	1515	1520	1525	1530	1535	1540	1545	1550	1555	1560	1565	1570	1575	1580	1585	1590	1595	1600	1605	1610	1615	1620	1625	1630	1635	1640	1645	1650	1655	1660	1665	1670	1675	1680	1685	1690	1695	1700	1705	1710	1715	1720	1725	1730	1735	1740	1745	1750	1755	1760	1765	1770	1775	1780	1785	1790	1795	1800	1805	1810	1815	1820	1825	1830	1835	1840	1845	1850	1855	1860	1865	1870	1875	1880	1885	1890	1895	1900	1905	1910	1915	1920	1925	1930	1935	1940	1945	1950	1955	1960	1965	1970	1975	1980	1985	1990	1995	2000	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050	2055	2060	2065	2070	2075	2080	2085	2090	2095	2100	2105	2110	2115	2120	2125	2130	2135	2140	2145	2150	2155	2160	2165	2170	2175	2180	2185	2190	2195	2200	2205	2210	2215	2220	2225	2230	2235	2240	2245	2250	2255	2260	2265	2270	2275	2280	2285	2290	2295	2300	2305	2310	2315	2320	2325	2330	2335	2340	2345	2350	2355	2360	2365	2370	2375	2380	2385	2390	2395	2400	2405	2410	2415	2420	2425	2430	2435	2440	2445	2450	2455	2460	2465	2470	2475	2480	2485	2490	2495	2500	2505	2510	2515	2520	2525	2530	2535	2540	2545	2550	2555	2560	2565	2570	2575	2580	2585	2590	2595	2600	2605	2610	2615	2620	2625	2630	2635	2640	2645	2650	2655	2660	2665	2670	2675	2680	2685	2690	2695	2700	2705	2710	2715	2720	2725	2730	2735	2740	2745	2750	2755	2760	2765	2770	2775	2780	2785	2790	2795	2800	2805	2810	2815	2820	2825	2830	2835	2840	2845	2850	2855	2860	2865	2870	2875	2880	2885	2890	2895	2900	2905	2910	2915	2920	2925	2930	2935	2940	2945	2950	2955	2960	2965	2970	2975	2980	2985	2990	2995	3000	3005	3010	3015	3020	3025	3030	3035	3040	3045	3050	3055	3060	3065	3070	3075	3080	3085	3090	3095	3100	3105	3110	3115	3120	3125	3130	3135	3140	3145	3150	3155	3160	3165	3170	3175	3180	3185	3190	3195	3200	3205	3210	3215	3220	3225	3230	3235	3240	3245	3250	3255	3260	3265	3270	3275	3280	3285	3290	3295	3300	3305	3310	3315	3320	3325	3330	3335	3340	3345	3350	3355	3360	3365	3370	3375	3380	3385	3390	3395	3400	3405	3410	3415	3420	3425	3430	3435	3440	3445	3450	3455	3460	3465	3470	3475	3480	3485	3490	3495	3500	3505	3510	3515	3520	3525	3530	3535	3540	3545	3550	3555	3560	3565	3570	3575	3580	3585	3590	3595	3600	3605	3610	3615	3620	3625	3630	3635	3640	3645	3650	3655	3660	3665	3670	3675	3680	3685	3690	3695	3700	3705	3710	3715	3720	3725	3730	3735	3740	3745	3750	3755	3760	3765	3770	3775	3780	3785	3790	3795	3800	3805	3810	3815	3820	3825	3830	3835	3840	3845	3850	3855	3860	3865	3870	3875	3880	3885	3890	3895	3900	3905	3910	3915	3920	3925	3930	3935	3940	3945	3950	3955	3960	3965	3970	3975	3980	3985	3990	3995	4000	4005	4010	4015	4020	4025	4030	4035	4040	4045	4050	4055	4060	4065	4070	4075	4080	4085	4090	4095	4100	4105	4110	4115	4120	4125	4130	4135	4140	4145	4150	4155	4160	4165	4170	4175	4180	4185	4190	4195	4200	4205	4210	4215	4220	4225	4230	4235	4240	4245	4250	4255	4260	4265	4270	4275	4280	4285	4290	4295	4300	4305	4310	4315	4320	4325	4330	4335	4340	4345	4350	4355	4360	4365	4370	4375	4380	4385	4390	4395	4400	4405	4410	4415	4420	4425	4430	4435	4440	4445	4450	4455	4460	4465	4470	4475	4480	4485	4490	4495	4500	4505	4510	4515	4520	4525	4530	4535	4540	4545	4550	4555	4560	4565	4570	4575	4580	4585	4590	4595	4600	4605	4610	4615	4620	4625	4630	4635	4640	4645	4650	4655	4660	4665	4670	4675	4680	4685	4690	4695	4700	4705	4710	4715	4720	4725	4730	4735	4740	4745	4750	4755	4760	4765	4770	4775	4780	4785	4790	4795	4800	4805	4810	4815

Maximum number of revolutions.

Set the number of revolutions per minute within the recommended cutting speed specified by the workpiece on Page 12.

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		Avail- ability	Number of inserts	Dimensions (mm)							Coolant hole	Maximum number of revolutions (min ⁻¹)	
				DC	DCSFMS	DCON	OAL	LF	CRKS	H			APMX
MA90 -	20M10-09T2C	●	2	20	18.8	10.5	48	30	M10×P1.5	15	8	Yes	19,000
	20M10-09T3C	●	3										25
	25M12-09T3C	●		4	32	30	17	62	40	M16×P2.0			
	25M12-09T4C	●	5										32
	32M16-09T4C	●		5	32	30	17	62	40	M16×P2.0			
	32M16-09T5C	●	5										32

●: 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 -	25M12-12T2C	●	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			16,300
	32M16-12T3C	●											

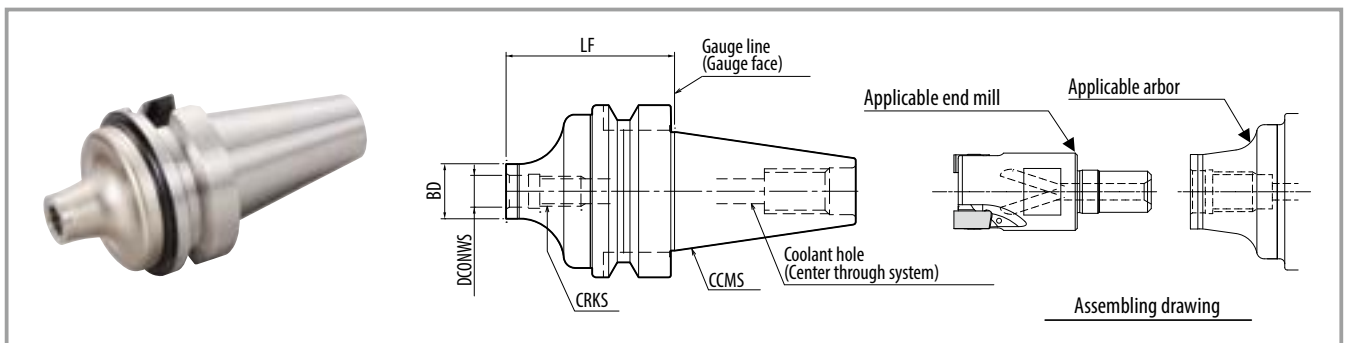
●: Available

Maximum number of revolutions

Set the number of revolutions per minute within the recommended cutting speed specified by the workpiece on Page 12.

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.

BT arbor for modular type (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			CCMS	
BT30K-	M10-45	●	45	18.7	10.5	M10×P1.5	Yes	BT30	MA90-...M10-...
	M12-45	●	45	23	12.5	M12×P1.75			MA90-...M12-...
BT40K-	M10-60	●	60	18.7	10.5	M10×P1.5	Yes	BT40	MA90-...M10-...
	M12-55	●	55	23	12.5	M12×P1.75			MA90-...M12-...
	M16-65	●	65	30	17	M16×P2.0			MA90-...M16-...

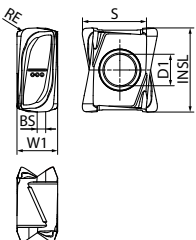
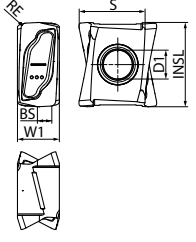
●: Available

BT Arbor for modular type (for exchangeable head/two face contact)

Actual end mill depth

	Arbor description		Applicable end mill (Head)		Actual end mill depth(mm)	
			Description	Cutting dia. (mm)	Dimensions (mm)	LUX
				DC	LF	
	BT30K-	M10-45	MA90-20M10-...	20	30	36.8
M12-45		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	

Applicable Inserts (G-class)

Usage classification		P	Carbon steel/Alloy steel		★	☆								
			Mold Steel	★	☆									
★: 1st recommendation ☆: 2nd recommendation	M Stainless steel	Austenitic		★										
		Martensitic		☆						★				
		Precipitation hardened		★										
		K	Gray cast iron			★								
			Ductile cast iron			★								
		S	Heat-resistant alloys		☆					★				
			Titanium alloy		★									
		H	Hardened material						★					
Shape		Description	Dimensions (mm)						MEGACOAT (PVD coating)				CVD Coating	
			W1	S	D1	INSL	BS	RE	PR1825	PR1835	PR1810	PR0155	CA6535	
		LOGU 090404ER-GM	4.3	6.77	3.33	8.89	1.29	0.4	●	●	●	—	●	
090408ER-GM		6.71		0.90			0.8	●	●	●	—	●		
090412ER-GM		6.65		0.49			1.2	●	●	●	—	●		
090416ER-GM		6.59		0.10			1.6	●	●	●	—	●		
		LOGU 090404ER-SM	4.3	6.77	3.33	8.89	1.29	0.4	●	●	—	—	●	
		090408ER-SM		6.71			0.89	0.8	●	●	—	—	●	
		090412ER-SM		6.65			0.49	1.2	●	●	—	—	●	
		090416ER-SM		6.59			0.10	1.6	●	●	—	—	●	
		LOGU 090408ER-GH	4.3	6.71	3.33	8.89	0.90	0.8	●	●	●	●	—	
			LOGU 120604ER-GM	6.6	10.10	4.55	13.28	2.50	0.4	●	●	●	—	●
			120608ER-GM		10.04		13.28	2.14	0.8	●	●	●	—	●
			120612ER-GM		9.97		13.28	1.79	1.2	●	●	●	—	●
	120616ER-GM		9.92		13.28		1.44	1.6	●	●	●	—	●	
	120620ER-GM		9.85		13.28		1.08	2.0	●	●	●	—	●	
	120624ER-GM		9.79		13.28		0.72	2.4	●	●	●	—	●	
	120630ER-GM		9.69		13.28		0.20	3.0	●	●	●	—	●	
	LOGU 120604ER-SM		10.10		13.28		2.50	0.4	●	●	—	—	●	
			120608ER-SM	10.04	13.28	2.14	0.8	●	●	—	—	●		
			120612ER-SM	9.97	13.28	1.79	1.2	●	●	—	—	●		
			120616ER-SM	9.92	13.28	1.44	1.6	●	●	—	—	●		
			120620ER-SM	9.85	13.28	1.08	2.0	●	●	—	—	●		
120624ER-SM		9.79	13.28	0.72	2.4	●	●	—	—	●				
120630ER-SM	9.69	13.28	0.20	3.0	●	●	—	—	●					
	LOGU 120608ER-GH	6.6	10.16	4.55	13.25	2.26	0.8	●	●	●	●	—		

●: Available

Recommended cutting conditions ★1st recommendation ☆2nd recommendation

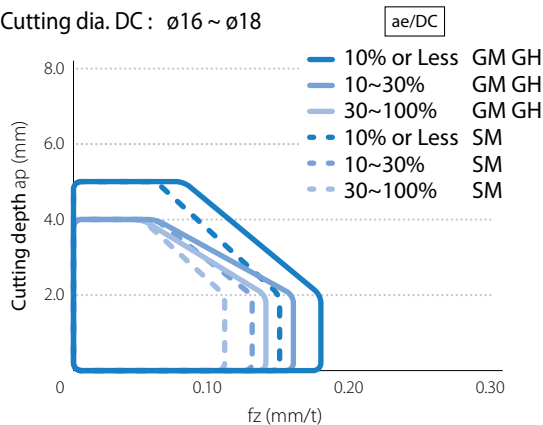
Type	Workpiece material	Toolholder description and feed rate (fz: mm/t)				Recommended insert grade (Vc: m/min)				
		09 size (LOGU09...)		12 size (LOGU12...)		MEGACOAT NANO EX			MEGACOAT HARD	CVD coating
		MA90-16~ MA90-18	MA90-20~MA90-50 MA90-040~MA90-063	MA90-25~ MA90-30	MA90-32~MA90-50 MA90-040~MA90-125	PR1825	PR1835	PR1810	PR015S	CA653S
General purpose GM	Carbon steel	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	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	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	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	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	–	–	★ 180 – 240 – 300
	Precipitation hardened stainless steel	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	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	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 -6Al -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	–	–	–
Low cutting force SM	Carbon steel	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	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	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	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	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	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
	Titanium alloy (Ti -6Al -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	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	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	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	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	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	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	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	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	–	–	–	–	–
	Titanium alloy (Ti -6Al -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	–	–	–

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.

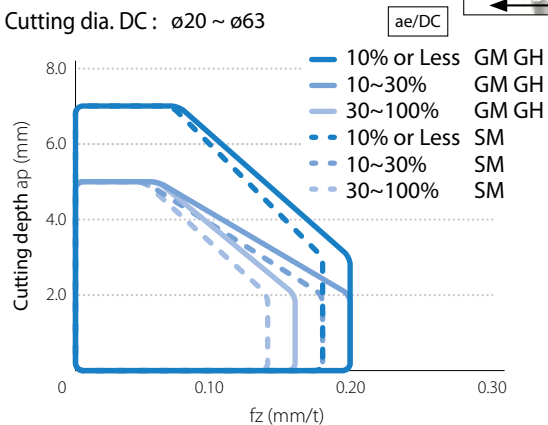
Cutting performance

09 size (LOGU09...) Steel machining (dry)

Cutting dia. DC: $\phi 16 \sim \phi 18$



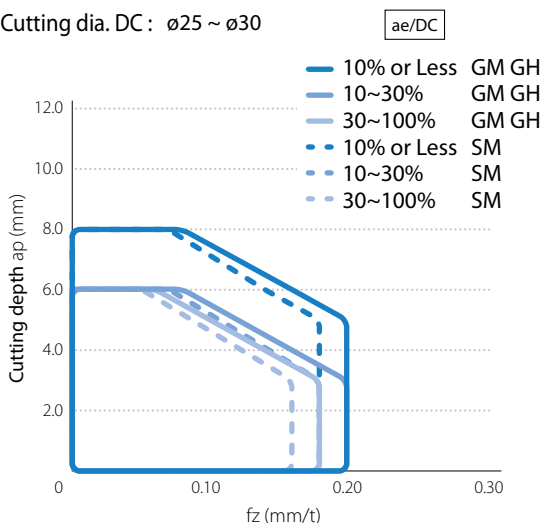
Cutting dia. DC: $\phi 20 \sim \phi 63$



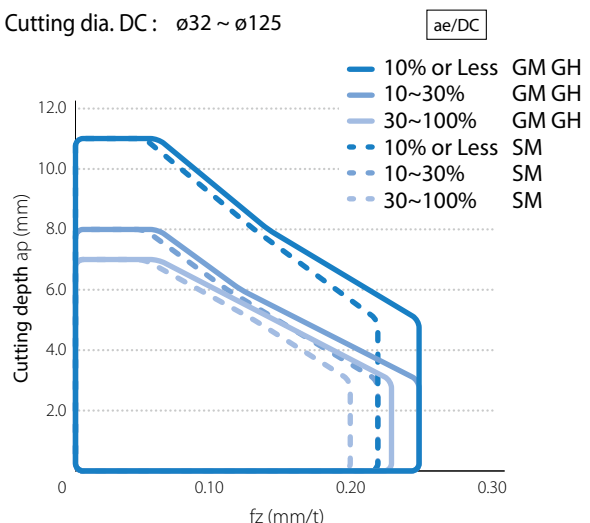
For other workpiece material, set ap and fz appropriately for each ae.

12 size (LOGU12...) Steel machining (dry)

Cutting dia. DC: $\phi 25 \sim \phi 30$



Cutting dia. DC: $\phi 32 \sim \phi 125$



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

Case Studies

Brake parts FCD500

Vc = 135 m/min
n = 535 min⁻¹
ap x ae = 3.4 x 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

Tool life
x1.6

Competitor G
(7 inserts)

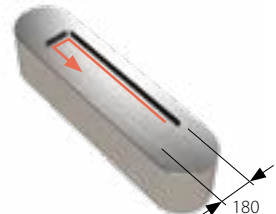
600 pcs

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

(User evaluation)

Mold parts Stainless steel

Vc = 125 m/min
n = 1,600 min⁻¹
ap x ae = 1.0 x 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

Machining efficiency
x1.5

Competitor H
(3 inserts)

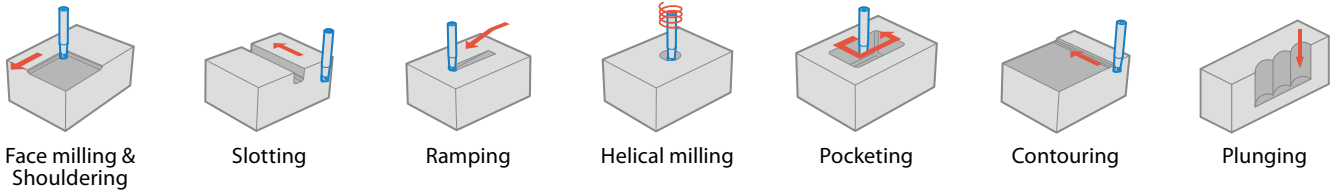
Q = 9.5 cc/min

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

(User evaluation)

Notes

Applications



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

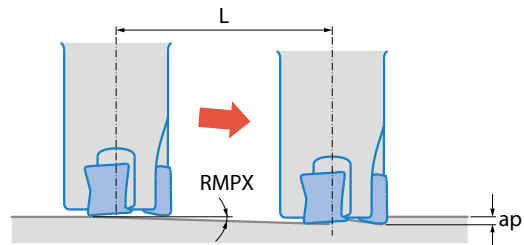
Decrease the angle of inclination when the chips extend longer.

Ramping tips

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

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

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

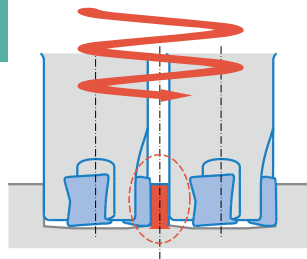


Helical milling tips

For helical milling, use between min. cutting dia. and max. cutting dia.

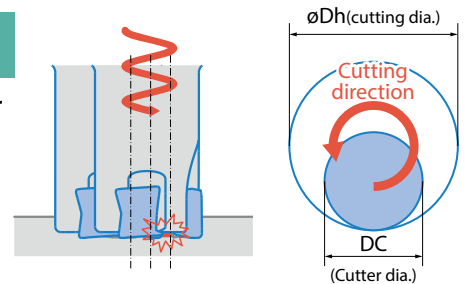
⊘ Exceeding max. cutting dia.

Center core remains after machining



⊘ Less than min. cutting dia.

Center core hits holder body

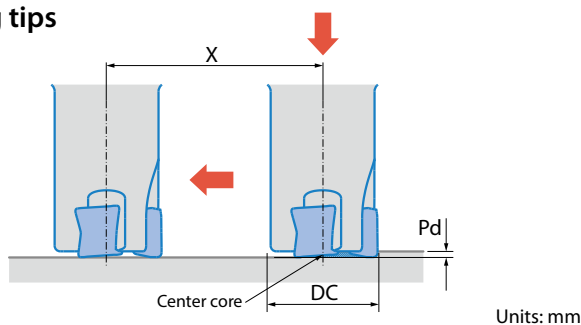


Units: mm

Description	Min. cutting dia. øDh1	Maxi. cutting dia. øDh2
MA... - 09 - ...	2×DC-4	2×DC-2
MA... - 12 - ...	2×DC-6	2×DC-2

For helical milling, use between min. cutting dia. and max. cutting dia..
The cutter direction should be counterclockwise (down cut) (see above).
Please machining in a safe environment as long chips may be produced.

Pecking tips



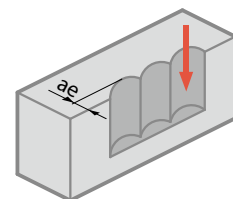
Units: mm

Description	Max. drilling depth Pd	Min. 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



Tangential Cutter

***Safe. Rigid.
Quality Machining***