KYOCERA

MFH-RAPTOR -MiNi

High Feed Milling Cutter

Expanded Lineup

New MFH-Mini end mills now available in diameters from 0.625” to 1.250”

Higher Productivity

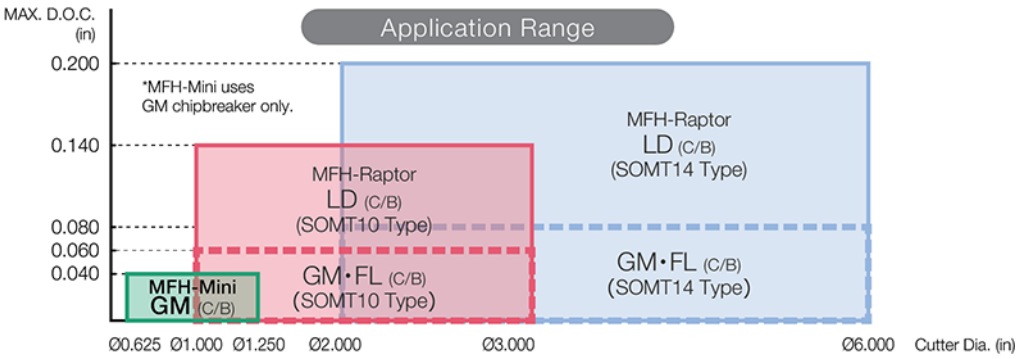
Double-sided 4-edge inserts will save money and increase productivity

MEGACOAT NANO

Coating technology increases tool life when machining difficult-to-cut materials

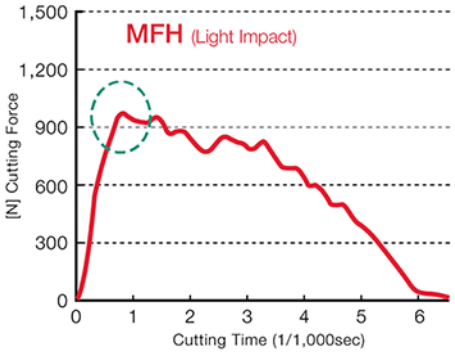
MFH-RAPTOR -MiNi

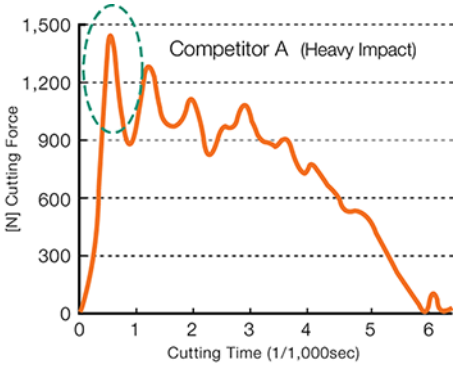
High feed milling for small diameters
and small machining centers



Reduced Chattering with Convex Cutting Edge Design

Cutting force and vibration when approaching the workpiece (D.O.C. = half of cutter diameter)



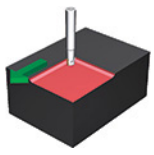


Convex Cutting Edge

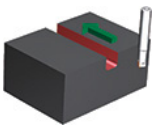
MFH-Raptor Mini

Cutting Conditions:
Dc: Ø0.630", Workpiece: 1049 Steel, DRY, Vc=490sfm, fz=0.039ipt, D.O.C.=0.020", ae=0.315"

Wide Application Range for Multiple Metalworking Processes

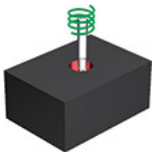


Face Milling & Shouldering



Slotting

Ramping



Helical Milling

Pocketing

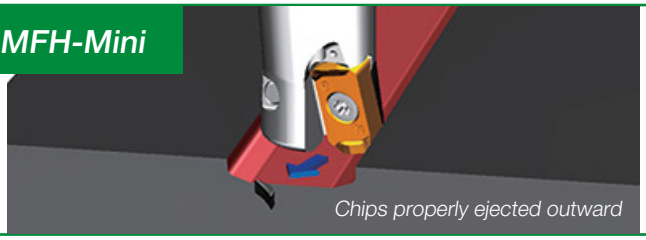
Contouring

※ **GM** chipbreaker is applicable for all above applications

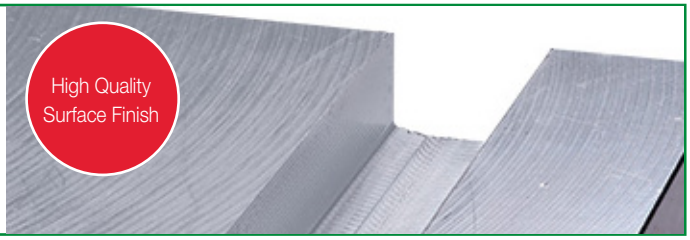
Economical double-sided 4-edge insert

Great Chip Evacuation

MFH-Mini

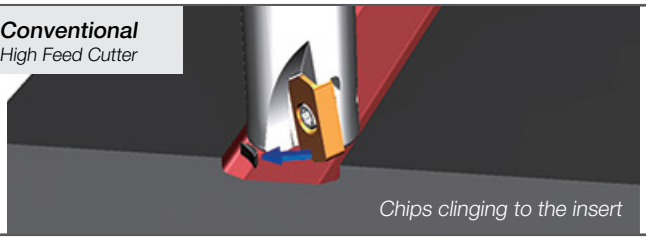


Chips properly ejected outward

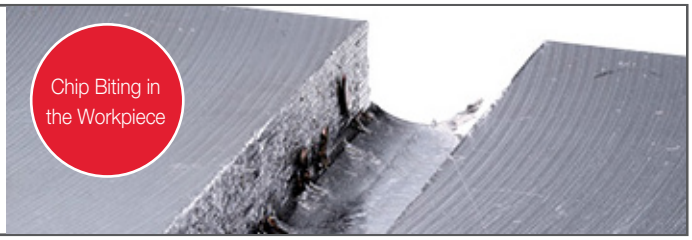


High Quality Surface Finish

Conventional
High Feed Cutter



Chips clinging to the insert



Chip Biting in the Workpiece

Multi-Edge Design for Efficient Machining

MFH-Mini

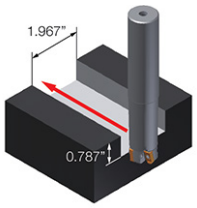
5 Inserts
MFH1000-W100-03-5T47

MFH-Raptor

2 Inserts
MFH1000-W100-10-2T

Case Study

MFH-Mini Precipitation Hardened Stainless Steels



1.8 Times the Machining Productivity

- Aircraft Part • Vc=390sfm • fz=0.024ipt
- D.O.C. × ae=0.028"×max0.984" • Dry
- MFH1000-W100-03-4T47 (4 inserts) • LOGU030310ER-GM (PR1535)

PR1535	Machining Efficiency 100pcs
Competitor A *(5 inserts)*	Machining Efficiency 55pcs

PR1535 maintained good edge condition and stable machining after 100 pcs. (User Evaluation)

New Grades for Difficult-to-Cut Material

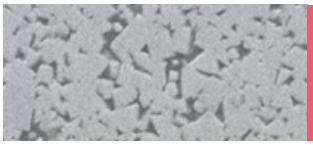
- Stable cutting prevents insert fracturing
- Good for high efficiency machining

CA6535

- For Ni-base heat resistant alloy and martensitic stainless steel
- High heat resistance and wear resistance with CVD coating
- Improved stability due to thin film coating technology

PR1535

- For titanium alloy and precipitation hardened stainless steel
- Stabilized milling operation and long tool life with Kyocera's MEGACOAT NANO coating technology
- Improved stability due to thin film coating technology



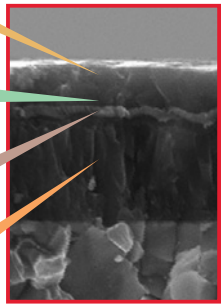
Newly Developed Tougher Substrate

TiN
Smooth & less adhesion

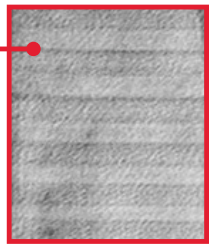
α-Al_2O_3
Oxidation and wear resistant

Special Interlayer
Prevent peeling of coating layer

TiCN
Frictional wear resistant



Layer structure of MEGACOAT NANO



(Standard Shank)

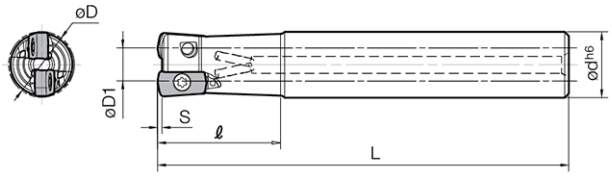


Fig.1

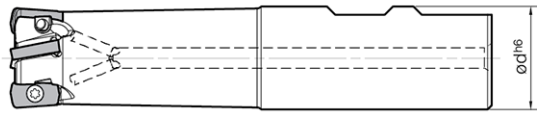


Fig.2

MFH-Mini End Mill (Inch)

Shank		Part Number	Stock	No. of Inserts	Dimensions (in) ØD	ØD1	Ød	L	ℓ	S	Ramping Angle α	Rake Angle A.R.	R.R.	Coolant Hole	Figure	Weight (Kg)	Max. Revolution (min⁻¹)
Weldon Standard	MFH	0625-W625-03-2T-3	▲	2	0.625	0.310	0.625	3.196	1.250	0.039	2.8°	-10°	-15°	✓	2	0.1	18,800
		0750-W750-03-3T-4	▲	3	0.750	0.435	0.750	4.070	2.000	0.039	1.7°	-10°	-15°	✓	2	0.2	15,700
		1000-W100-03-4T47	▲	4	1.000	0.685	1.000	4.820	2.500	0.039	1.2°	-10°	-15°	✓	2	0.4	13,400
		1000-W100-03-5T47	▲	5	1.000	0.685	1.000	4.820	2.500	0.039	1.2°	-10°	-15°	✓	2	0.4	13,400
		1250-W125-03-5T-5	▲	5	1.250	0.935	1.250	5.070	2.750	0.039	0.8°	-10°	-15°	✓	2	0.7	11,400
		1250-W125-03-6T-5	▲	6	1.250	0.935	1.250	5.070	2.750	0.039	0.8°	-10°	-15°	✓	2	0.7	11,400
Cylindrical Long	MFH	0625-S625-03-2T-6	▲	2	0.625	0.310	0.625	6.000	2.000	0.039	2.8°	-10°	-15°	✓	1	0.2	18,800
		0750-S750-03-3T65	▲	3	0.750	0.435	0.750	6.500	3.000	0.039	1.7°	-10°	-15°	✓	1	0.3	15,700
		1000-S100-03-4T-7	▲	4	1.000	0.685	1.000	7.000	4.000	0.039	1.2°	-10°	-15°	✓	1	0.6	13,400
		1250-S125-03-5T-8	▲	5	1.250	0.935	1.250	8.000	4.750	0.039	0.8°	-10°	-15°	✓	1	1.1	11,400

▲ : U.S. Stock Available June 2015

MFH-Mini End Mill Spare Parts (Inch)

Part Number	Spare Parts: Clamp Screw	DTPM Wrench	Anti-seize Compound	Applicable Inserts See P6
MFH 0625-W625-03-2T-3	SB-3065TRP	DTPM-8	MP-1	LOGU030310ER-GM
0750-W750-03-3T-4				
1000-W100-03-4T47				
1000-W100-03-5T47				
1250-W125-03-5T-5				
1250-W125-03-6T-5				
MFH 0625-S625-03-2T-6	SB-3065TRP	DTPM-8	MP-1	
0750-S750-03-3T65				
1000-S100-03-4T-7				
1250-S125-03-5T-8				

Recommended Torque for Insert Clamp 1.2N · m

Recommended Cutting Conditions ➡ **P7**

• **Caution with Max. Revolution**
When running an end mill or a cutter at the maximum revolution, the insert or cutter may be damaged by centrifugal force.

•
Coat Anti-seize Compound (MP-1) thinly on portion of taper and thread when insert is fixed

(Standard Shank)

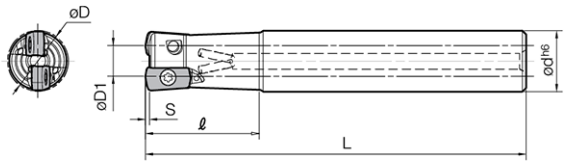


Fig.1

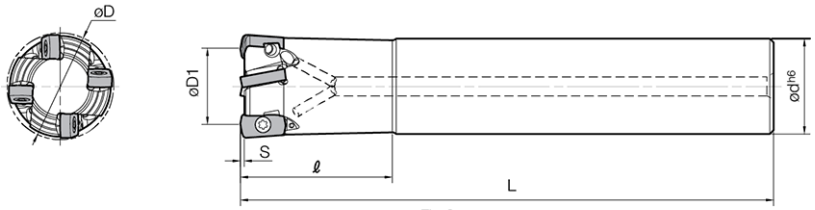


Fig.2

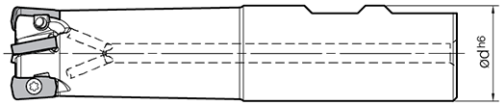


Fig.3

MFH-Mini End Mill (Metric)

Shank	Part Number	Stock	No. of Inserts	Dimensions (mm) ØD	ØD1	Ød	L	ℓ	S	Ramping Angle α	Rake Angle A.R.	R.R.	Coolant Hole	Figure	Weight (Kg)	Max. Revolution (min⁻¹)
Standard	MFH 16-S16-03-2T	△	2	16	8	16	100	30	1	2.8°	-10°	-15°	✓	1	0.1	18,800
	20-S20-03-3T	△	3	20	12	20	130	50	1	1.7°	-10°	-15°	✓	1	0.3	15,700
	20-S20-03-4T	△	4	20	12	20	130	50	1	1.7°	-10°	-15°	✓	1	0.3	15,700
	25-S25-03-4T	△	4	25	17	25	140	60	1	1.2°	-10°	-15°	✓	1	0.5	13,400
	25-S25-03-5T	△	5	25	17	25	140	60	1	1.2°	-10°	-15°	✓	1	0.5	13,400
	32-S32-03-5T	△	5	32	24	32	150	70	1	0.8°	-10°	-15°	✓	1	0.8	11,400
	32-S32-03-6T	△	6	32	24	32	150	70	1	0.8°	-10°	-15°	✓	1	0.8	11,400
Over Size	MFH 17-S16-03-2T	○	2	17	9	16	100	20	1	2.5°	-10°	-15°	✓	2	0.1	17,900
	18-S16-03-2T	○	2	18	10	16	100	20	1	2.1°	-10°	-15°	✓	2	0.1	17,000
	22-S20-03-3T	△	3	22	14	20	130	30	1	1.4°	-10°	-15°	✓	2	0.3	14,700
	22-S20-03-4T	△	4	22	14	20	130	30	1	1.4°	-10°	-15°	✓	2	0.3	14,700
	28-S25-03-4T	△	4	28	20	25	140	40	1	1.0°	-10°	-15°	✓	2	0.5	12,400
	28-S25-03-5T	△	5	28	20	25	140	40	1	1.0°	-10°	-15°	✓	2	0.5	12,400
Weldon Standard	MFH 16-W16-03-2T	△	2	16	8	16	79	30	1	2.8°	-10°	-15°	✓	3	0.1	18,800
	20-W20-03-3T	△	3	20	12	20	101	50	1	1.7°	-10°	-15°	✓	3	0.2	15,700
	20-W20-03-4T	△	4	20	12	20	101	50	1	1.7°	-10°	-15°	✓	3	0.2	15,700
	25-W25-03-4T	△	4	25	17	25	117	60	1	1.2°	-10°	-15°	✓	3	0.4	13,400
	25-W25-03-5T	△	5	25	17	25	117	60	1	1.2°	-10°	-15°	✓	3	0.4	13,400
	32-W32-03-5T	△	5	32	24	32	131	70	1	0.8°	-10°	-15°	✓	3	0.7	11,400
	32-W32-03-6T	△	6	32	24	32	131	70	1	0.8°	-10°	-15°	✓	3	0.7	11,400
Long Shank	MFH 16-S16-03-2T-150	△	2	16	8	16	150	50	1	2.8°	-10°	-15°	✓	4	0.2	18,800
	20-S20-03-3T-160	△	3	20	12	20	160	80	1	1.7°	-10°	-15°	✓	4	0.3	15,700
	25-S25-03-4T-180	△	4	25	17	25	180	100	1	1.2°	-10°	-15°	✓	4	0.6	13,400
	32-S32-03-5T-200	△	5	32	24	32	200	120	1	0.8°	-10°	-15°	✓	4	1.1	11,400

△ : Wold Express Available June 2015 ○ : World Express (Shipping - 10 Business Days)

MFH-Mini End Mill Spare Parts (metric)

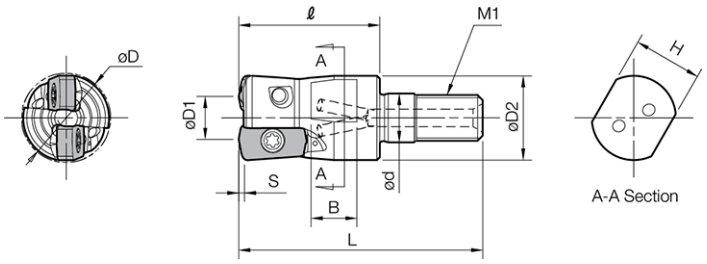
Part Number	Spare Parts: Clamp Screw	DTPM Wrench	Anti-seize Compound	Applicable Inserts See P6
MFH ...-03-...	SB-3065TRP	DTPM-8	MP-1	LOGU030310ER-GM
	Recommended Torque for Insert Clamp 1.2N · m			

Recommended Cutting Conditions P7

• Caution with Max. Revolution
When running an endmill or a cutter at the maximum revolution, the insert or cutter may be damaged by centrifugal force.

•
Coat Anti-seize Compound (MP-1) thinly on portion of taper and thread when insert is fixed

MFH-Mini Modular End Mill (Inch / Metric Sizes)



MFH-Mini Modular

Part Number	Stock	Unit	No. of Inserts	Dimensions ØD	ØD1	ØD2	Ød	L	ℓ	M1 (mm)	H	B	S	Ramping Angle α	Rake Angle A.R.	R.R.	Coolant Hole	Max. Revolution (min⁻¹)
MFH 0625-M8-03-2T	▲	inch	2	0.625	0.310	0.579	0.625	3.196	1.250	M8xP1.25	0.472	0.315	0.039	2.8°	-10°	-15°	✓	18,800
0750-M10-03-3T	▲		3	0.750	0.435	0.728	0.750	4.070	2.000	M10xP1.5	0.591	0.354	0.039	1.7°	-10°	-15°	✓	15,700
1000-M12-03-4T	▲		4	1.000	0.685	0.906	1.000	4.820	2.500	M12xP1.75	0.748	0.394	0.039	1.2°	-10°	-15°	✓	13,400
1000-M12-03-5T	▲		5	1.000	0.685	0.906	1.000	4.820	2.500	M12xP1.75	0.748	0.394	0.039	1.2°	-10°	-15°	✓	13,400
1250-M16-03-5T	▲		5	1.250	0.935	1.181	1.250	5.070	2.750	M16xP2	0.945	0.472	0.039	0.8°	-10°	-15°	✓	11,400
1250-M16-03-6T	▲		6	1.250	0.935	1.181	1.250	5.070	2.750	M16xP2	0.945	0.472	0.039	0.8°	-10°	-15°	✓	11,400
MFH 16-M08-03-2T	△	mm	2	16	8	14.7	8.5	43	25	M8xP1.25	12	8	1	2.8°	-10°	-15°	✓	18,880
17-M08-03-2T	△		2	17	9	14.7	8.5	43	25	M8xP1.25	12	8	1	2.5°	-10°	-15°	✓	17,900
18-M08-03-2T	△		2	18	10	14.7	8.5	43	25	M8xP1.25	12	8	1	2.1°	-10°	-15°	✓	17,000
20-M10-03-3T	△		3	20	12	18.7	10.5	49	30	M10xP1.5	15	9	1	1.7°	-10°	-15°	✓	15,700
20-M10-03-4T	△		4	20	12	18.7	10.5	49	30	M10xP1.5	15	9	1	1.7°	-10°	-15°	✓	15,700
22-M10-03-3T	△		3	22	14	18.7	10.5	49	30	M10xP1.5	15	9	1	1.4°	-10°	-15°	✓	14,700
22-M10-03-4T	△		4	22	14	18.7	10.5	49	30	M10xP1.5	15	9	1	1.4°	-10°	-15°	✓	14,700
25-M12-03-4T	△		4	25	17	23	12.5	57	35	M12xP1.75	19	10	1	1.2°	-10°	-15°	✓	13,400
25-M12-03-5T	△		5	25	17	23	12.5	57	35	M12xP1.75	19	10	1	1.2°	-10°	-15°	✓	13,400
28-M12-03-4T	△		4	28	20	23	12.5	57	35	M12xP1.75	19	10	1	1.0°	-10°	-15°	✓	12,400
28-M12-03-5T	△		5	28	20	23	12.5	57	35	M12xP1.75	19	10	1	1.0°	-10°	-15°	✓	12,400
32-M16-03-5T	△		5	32	24	30	17	63	40	M16xP2	24	12	1	0.8°	-10°	-15°	✓	11,400
32-M16-03-6T	△		6	32	24	30	17	63	40	M16xP2	24	12	1	0.8°	-10°	-15°	✓	11,400

▲ : U.S. Stock Available June 2015 △ : World Express Available June 2015

MFH-Mini Modular End Mill Spare Parts

Part Number	Spare Parts: Clamp Screw	DTPM Wrench	Anti-seize Compound	Applicable Inserts See Table Below
MFH ...-03-...	SB-3065TRP	DTPM-8	MP-1	LOGU030310ER-GM
	Recommended Torque for Insert Clamp 1.2N · m			

Recommended Cutting Conditions ➡ **P7**

• Caution with Max. Revolution
When running an end mill or a cutter at the maximum revolution, the insert or cutter may be damaged by centrifugal force.

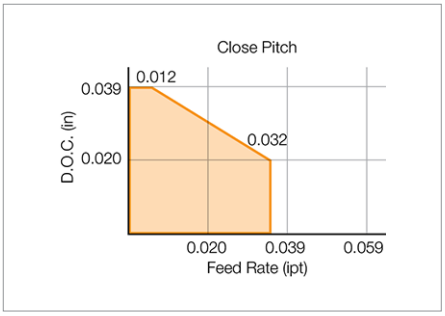
•
Coat Anti-seize Compound (MP-1) thinly on portion of taper and thread when insert is fixed

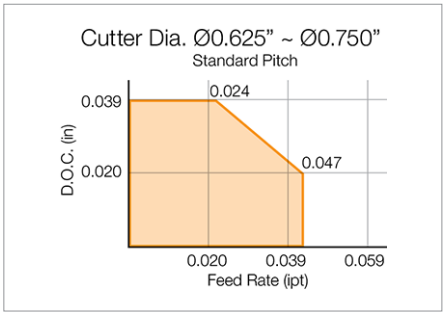
Applicable Insert

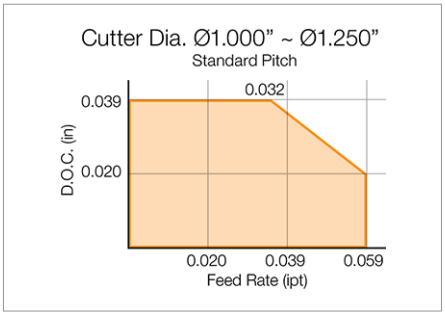
Insert	Part Number	Dimensions (in) A	T	Ød	W	rε	MEGACOAT NANO PR1535	PR1525	PR1510	CVD Coating CA6535
General Purpose	**LOGU 030310ER-GM**	0.244	0.156	0.136	0.469	0.039	●	●	●	●

▲ : U.S. Stock Available June 2015

Cutting Performance (GM Chipbreaker)







*When using close pitch, reduce cutting conditions compared to standard type

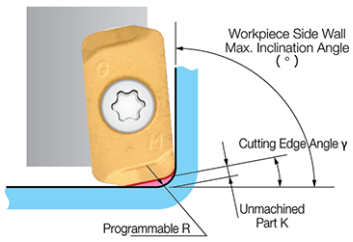
Recommended Cutting Conditions

Chipbreaker	Workpiece Material	Recommended Feed Rate / (ipt) *Recommended D.O.C. = 0.020" Reference Value							Recommended Insert Grade / (sfm)			
		MFH0625...2T (MFH16...2T)	MFH0750...3T (MFH20...3T)	N/A (MFH20...4T)	MFH1000...4T (MFH25...4T)	MFH1000...5T (MFH25...5T)	MFH1250...5T (MFH32...5T)	MFH1250...6T (MFH32...6T)	MEGACOAT NANO PR1535	MEGACOAT NANO PR1525	MEGACOAT NANO PR1510	CVD Coating CA6535
GM	Carbon Steel	0.008~**0.028**~0.047		0.008~**0.020**~0.031	0.008~**0.031**~0.059	0.008~**0.020**~0.031	0.008~**0.031**~0.059	0.008~**0.020**~0.031	☆ 390~**590**~820	★ 390~**590**~820	-	-
	Alloy Steel	0.008~**0.028**~0.047		0.008~**0.020**~0.031	0.008~**0.031**~0.059	0.008~**0.020**~0.031	0.008~**0.031**~0.059	0.008~**0.020**~0.031	☆ 330~**520**~720	★ 330~**520**~720	-	-
	Die Steel (~40HRC)	0.008~**0.020**~0.035		0.008~**0.016**~0.024	0.008~**0.024**~0.047	0.008~**0.016**~0.024	0.008~**0.024**~0.047	0.008~**0.016**~0.024	☆ 260~**460**~590	★ 260~**460**~590	-	-
	Die Steel (40~50HRC)	0.008~**0.012**~0.020		0.008~**0.010**~0.012	0.008~**0.012**~0.024	0.008~**0.010**~0.012	0.009~**0.012**~0.024	0.008~**0.010**~0.012	☆ 200~**330**~430	★ 200~**330**~430	-	-
	Austenitic Stainless Steel	0.008~**0.020**~0.035		0.008~**0.016**~0.024	0.008~**0.024**~0.047	0.008~**0.016**~0.024	0.008~**0.024**~0.047	0.008~**0.016**~0.024	★ 330~**520**~660	☆ 330~**520**~660	-	-
	Martensitic Stainless Steel	0.008~**0.020**~0.035		0.008~**0.016**~0.024	0.008~**0.024**~0.047	0.008~**0.016**~0.024	0.008~**0.024**~0.047	0.008~**0.016**~0.024	☆ 490~**660**~820	-	-	★ 590~**790**~980
	Precipitation Hardened Stainless Steel	0.008~**0.020**~0.035		0.008~**0.016**~0.024	0.008~**0.024**~0.047	0.008~**0.016**~0.024	0.008~**0.024**~0.047	0.008~**0.016**~0.024	★ 300~**390**~490	-	-	-
	Gray Cast Iron	0.008~**0.028**~0.047		0.008~**0.020**~0.031	0.008~**0.031**~0.059	0.008~**0.020**~0.031	0.008~**0.031**~0.059	0.008~**0.020**~0.031	-	-	★ 390~**590**~820	-
	Ductile Cast Iron	0.008~**0.020**~0.035		0.008~**0.016**~0.024	0.008~**0.024**~0.047	0.008~**0.016**~0.024	0.008~**0.024**~0.047	0.008~**0.016**~0.024	-	-	★ 330~**490**~660	-
	Ni-base Heat Resistant Alloy	0.008~**0.012**~0.024		0.008~**0.010**~0.016	0.008~**0.016**~0.031	0.008~**0.010**~0.016	0.008~**0.016**~0.031	0.008~**0.010**~0.016	☆ 70~**100**~160	-	-	★ 70~**100**~160
	Titanium Alloy (Ti-6Al-4V)	0.008~**0.012**~0.024		0.008~**0.010**~0.016	0.008~**0.016**~0.031	0.008~**0.010**~0.016	0.008~**0.016**~0.031	0.008~**0.010**~0.016	★ 130~**200**~260	-	☆ 100~**160**~230	-

: Standard Pitch : Fine Pitch ★ : 1st Choice ☆ : 2nd Choice

※ Machining with coolant is recommended for Ni-base Heat Resistant Alloy and Titanium Alloy
※ 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 CAT30 equivalent, feed rate should be reduced to 25% of recommended cutting conditions
※ Internal coolant is recommended for grooving applications

Approximate Programming Radius Adjustment



Holder	Chipbreaker	Cutting Edge Angle (γ)	Programmable R	Unmachined Part (K)	Max. Wall Angle
MFH…-03-…	GM	12°	0.063	0.015	90°

Ramping

Inch Size Standard & Modular End Mills

Description	Cutter Dia. Ø	0.625"	0.750"	1.000"	1.250"
MFH…-03-…	Max. Ramping Angle α	2.8°	1.7°	1.2°	0.8°
	tan α max	0.049	0.030	0.021	0.014

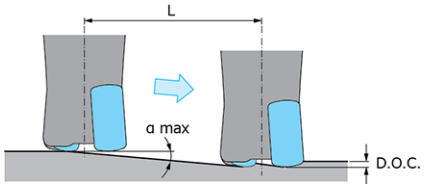
Metric Size Standard & Modular End Mills

Description	Cutter Dia. Ø	16mm	17mm	18mm	20mm	22mm	25mm	28mm	32mm
MFH…-03-…	Max. Ramping Angle α	2.8°	2.5°	2.1°	1.7°	1.4°	1.2°	1.0°	0.8°
	tan α max	0.049	0.042	0.037	0.030	0.024	0.021	0.017	0.014

- Recommended ramping angle is ≤ α max (see chart above for recommended ramp angle)
- Reduce recommended feed rate by 70%

Plunging Formulas
Helical Milling

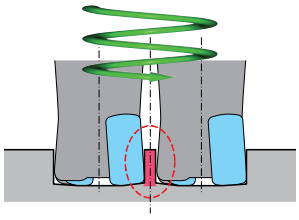
$$L = \frac{D.O.C.}{\tan \alpha \max}$$



Helical Milling

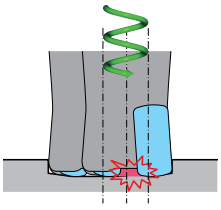
Min. & Max. Machining Diameter

Exceeding Max. Machining Dia.



Center Core

Under Min. Machining Dia.

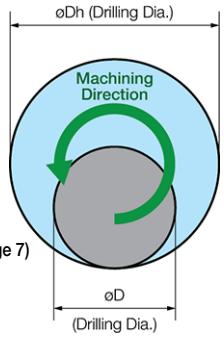


Center Core Hits Holder Body

(Inch)

Description	**Min.** Drilling Dia.	**Max.** Drilling Dia.
MFH…-03-…	2xøD-0.315	2xøD-0.079

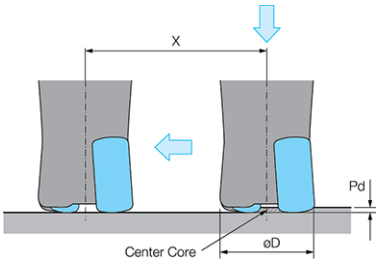
- Keep machine depth per rotation less than max D.O.C. (0.039")
- Use climb milling. (Refer to detail on right)
- Feed rate should be reduced to 50% of recommended cutting condition (**Page 7**)
- Use caution to eliminate incidences caused by producing long chips



Drilling

Description	**GM** Max. Drilling Depth **(Pd)**	**GM** **X**
MFH…-03-…	0.039	øD-0.354

(Inch)

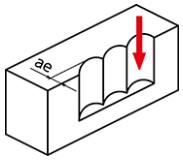


Plunging After Drilling

① It is recommended to reduce feed by 25% of recommendation on **Page 7** until Center Core is removed

② Axial feed rate recommendation per revolution is ≦0.008ipr while drilling

Plunging



Insert	Max. Width of Cut **(ae)**
LOGU03...	0.138"

- Reduce feed rate to fz≦0.008ipt when plunging

KYOCERA

KYOCERA Precision Tools, Inc.
102 Industrial Park Road
Hendersonville, NC 28792
Customer Service | 800.823.7284 - Option 1
Technical Support | 800.823.7284 - Option 2

W | Official Website | www.kyoceraprecisiontools.com
W | Distributor Website | http://mykpti.kyocera.com
E | cuttingtools@kyocera.com

©KYOCERA Precision Tools, Inc.