MITSUBISHI MATERIALS
TOOL NEWS
2018.4 Update
B216A

High Feed Finish Milling Cutter for Aluminum Alloys

FMAX

Insert Expansion

Feed Maximum (FMAX) milling cutter for ultra efficient and accurate finishing.

* By CG image

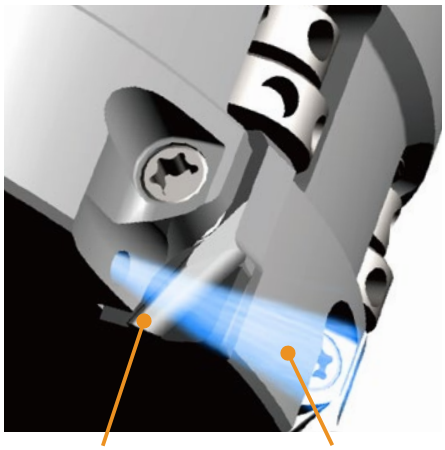
High Feed Finish Milling Cutter for Aluminum Alloys

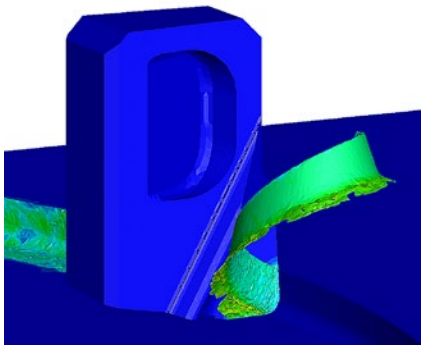
FMAX

Ultra High Efficiency Machining

The ultra fine pitch design is ideal for high efficiency machining (IPM ≥ 787).

Internal coolant and a special chip breaker wall (body protector) provides ideal chip discharge performance.



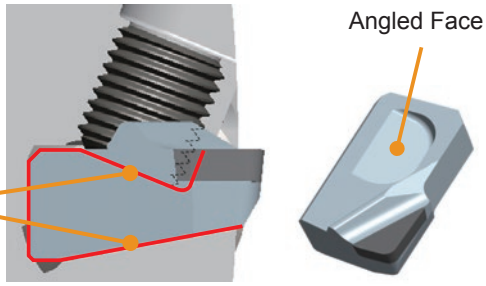


*Graphical Representation.

The body protector on the rake face forms chip shapes ideal for disposal and disperses them away from the body. Internal coolant also aids this process. The body is compatible with all center through coolant arbors.

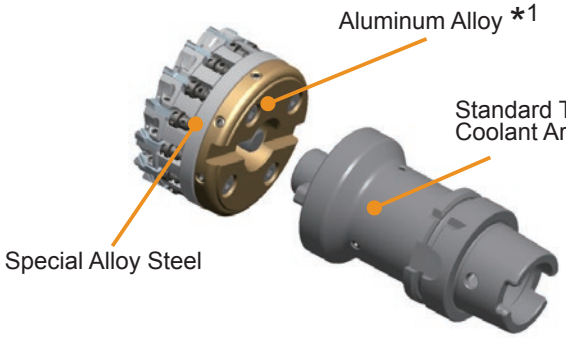
Designed for High Speeds

Anti Fly dovetail clamping mechanism.



Light Weight, High Rigidity Body

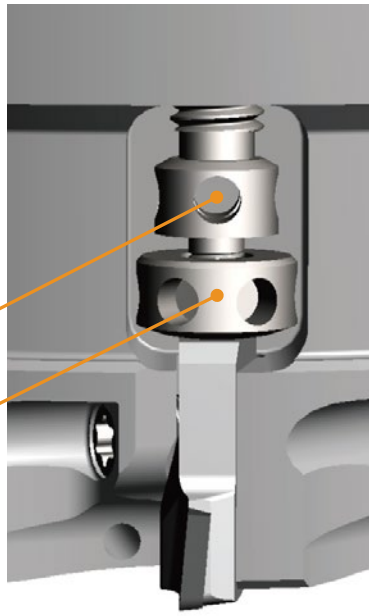
A special alloy steel and aluminum body combine to provide rigidity and light weight.



*1 Except DC=50, 63mm

High Precision, Easy Setting

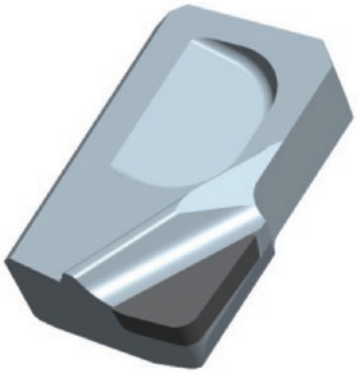
The combination of both a large and micro screw provides precise run-out adjustment and for adjusting new or re-grinding inserts (.0002" or better).



Inserts, General Purpose and Burr Prevention

DC = 50, 63mm

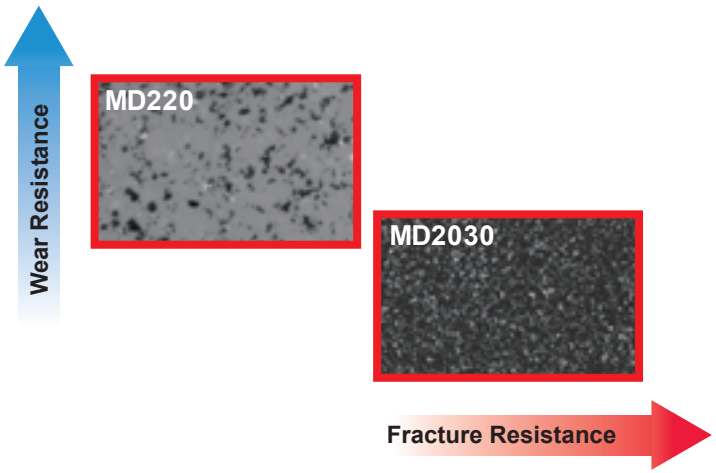
New PCD Grade for Machining Aluminum Alloys



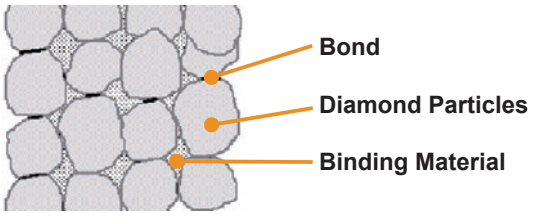
GAMP 5°

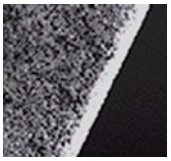
Features of the Grades

Diamond Sintered Segment Containing Ultra Microparticle Diamond



Bond of Diamond Particles





Diamond Particles : Give a highly stable cutting edge performance because of the strong bonding.

Features of MD2030

Intended for milling.
Improved fracture resistance when used in unstable applications.
The stability of the cutting edge can meet a wide variety of work material and cutting conditions.

Features of MD220

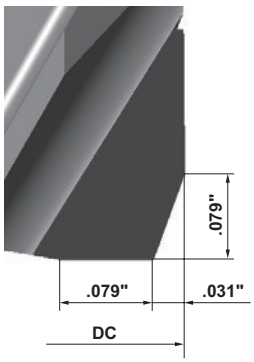
Sintered medium grain diamond particles. Wear resistance and fracture resistance are superbly balanced.
MD220 can prevent burr formation and achieve long tool life.

Features of the Inserts

NEW Burr Prevention Inserts

The burr prevention insert has a corner angle so it produces thin chips. This results in less burr generation compared with conventional inserts.
By applying the small corner R, it can prevent chipping and maintain stable tool life.
* For details refer to Page 7

Burr Prevention Type

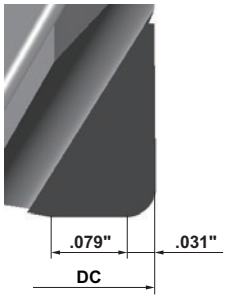


General Purpose Inserts

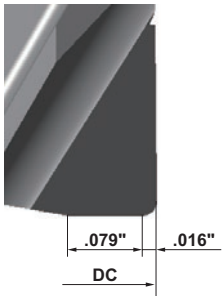
Inserts with corner R(RE) = .031" are excellent for general applications, and can be used in a wide variety of cutting areas. They are able to exhibit outstanding cutting edge stability, particularly under high-load conditions such as heavy interrupted cutting.

The sharpness of inserts with corner R(RE) = .016" is one of their most notable features. Its effectiveness can be demonstrated by the ability to suppress chatter and maintain finished surfaces.

RE=.031"



RE=.016"



FACE MILLING
<HIGH FEED FINISHING>

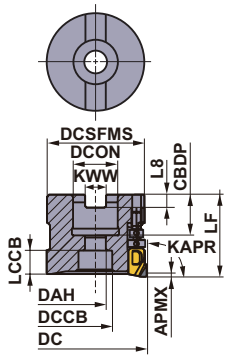
90° KAPR

F

FMAX-50/63

P M K **N** S H

Fig.1
ø50
ø63



Metric Standard

For metric arbors

Right hand tool holder only.

Arbor Type

DC=mm, DCON=mm GAMP: +5° GAMF: -6°– -3° (mm)

DC	Order Number	Stock	∗1 Coolant Thru	∗2 No.T	LF	DCON	WT (kg)	APMX	RPMX (min^{-1})	Fig.
50	**FMAX-050A08R**	★	Y	8	40	22	0.37	2	30000	1
50	**FMAX-050A10R**	★	Y	10	40	22	0.35	2	30000	1
63	**FMAX-063A10R**	★	Y	10	40	22	0.67	2	27000	1
63	**FMAX-063A12R**	★	Y	12	40	22	0.66	2	27000	1

∗1 Y=Yes
∗2 Number of Teeth
(Note 1) 2 mm or less is the recommended maximum depth of cut for ultra high efficiency machining.

Mounting Dimensions

(mm)

DCON	DC	Tool Holder Type	CBDP	DAH	DCCB	LCCB	DCSFMS	KWW	L8	KWL	Fig.
22	50	**FMAX-050**	20	11	17	12	47	10.4	6.3	—	1
22	63	**FMAX-063**	20	11	17	12	60	10.4	6.3	—	1

Spare Parts

(mm)

DC	Tool Holder Type	Insert Clamp∗ Screw	Micro Adjustment Nut	Large Adjustment Screw	Balance Adjustment Screw	Cutter Set Bolt	Wrench T10	Wrench ø2.5
								
50	**FMAX-050**	TSS04505S	KSN2	KSS2	HSS04004G	HSC10030H	TKY10T	RKY25S
63	**FMAX-063**	TSS04505S	KSN2	KSS2	HSS04004G	HSC10030H	TKY10T	RKY25S

∗ Clamp Torque (N • m) : TSS04505S=3.5
(Note 1) Refer to the instruction manual included in the cutter body for how to locate the insert and adjust the run-out.
(Note 2) Set bolt not included (mm).

★ : **Inventory maintained in Japan.**

FACE MILLING
<HIGH FEED FINISHING>

90° KAPR | F

FMAX

P | M | K | **N** | S | H

Fig.2
ø3.000"
ø4.000"

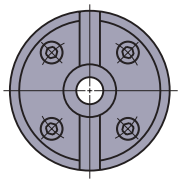
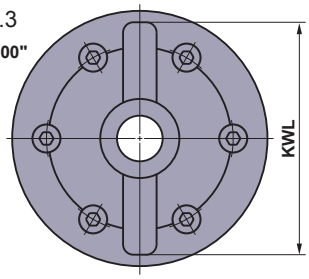
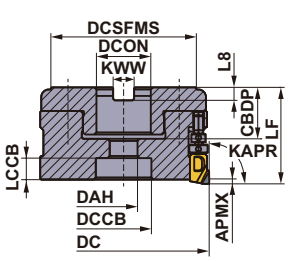
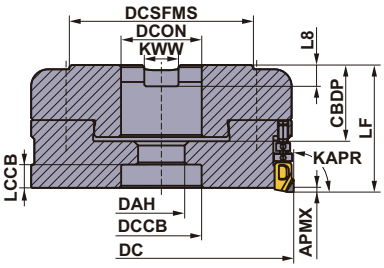


Fig.3
ø5.000"







Arbor Type

DC=Inch, DCON=Inch GAMP: +5° GAMF: 0° Right hand tool holder only. (inch)

DC	Order Number	Stock	∗1 Coolant Thru	∗2 No.T	LF	DCON	WT (lbs)	APMX	RPMX (min^{-1})	Fig.
3.000	**FMAXUR0310C**	●	Y	10	1.772	1.000	2.2	.079	24500	2
3.000	**FMAXUR0314C**	●	Y	14	1.772	1.000	2.1	.079	24500	2
4.000	**FMAXUR0412D**	●	Y	12	1.969	1.250	4.2	.079	22000	2
4.000	**FMAXUR0418D**	●	Y	18	1.969	1.250	4.1	.079	22000	2
5.000	**FMAXUR0516E**	●	Y	16	2.362	1.500	7.6	.079	19600	3
5.000	**FAMXUR0524E**	●	Y	24	2.362	1.500	7.5	.079	19600	3

∗1 Y=Yes
∗2 Number of Teeth
(Note 1) .079" or less is the recommended maximum depth of cut for ultra high efficiency machining.

Mounting Dimensions

(inch)

DCON	DC	Tool Holder Type	CBDP	DAH	DCCB	LCCB	DCSFMS	KWW	L8	KWL	Fig.
1.000	3.000	**FMAXUR03**	.945	.539	1.024	.433	2.677	.375	.219	—	2
1.250	4.000	**FMAXUR04**	1.260	.669	1.260	.394	3.465	.500	.281	—	2
1.500	5.000	**FMAXUR05**	1.417	.787	1.496	.472	3.465	.625	.375	4.409	3

Spare Parts

(inch)

DC	Tool Holder Type	Insert Clamp Screw ∗	Micro Adjustment Nut	Large Adjustment Screw	Balance Adjustment Screw	Cutter Set Bolt	Wrench T10	Wrench ø.098"
								
3.000	**FMAXUR03**	TSS04505S	KSN2	KSS2	HSS05005G	HSCXU50012H	TKY10T	RKY25S
4.000	**FMAXUR04**	TSS04505S	KSN2	KSS2	HSS06006G	HSCXU62514H	TKY10T	RKY25S
5.000	**FMAXUR05**	TSS04505S	KSN2	KSS2	HSS08008G	HSCXU75017H	TKY10T	RKY25S

∗ Clamp Torque (lbf-in) : TSS04505S=31
(Note 1) Refer to the instruction manual included in the cutter body for how to locate the insert and adjust the run-out.
(Note 2) The (inch) cutter body includes a set bolt for an arber.

● : Inventory maintained. ★ : Inventory maintained in Japan.

FACE MILLING
<HIGH FEED FINISHING>

90° KAPR | F

FMAX

P | M | K | **N** | S | H

Metric Standard

For inch arbors

Fig.2
ø80

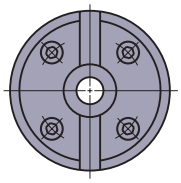
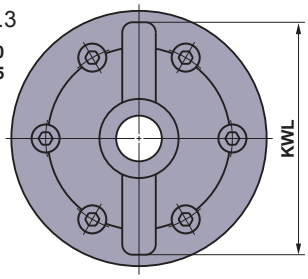
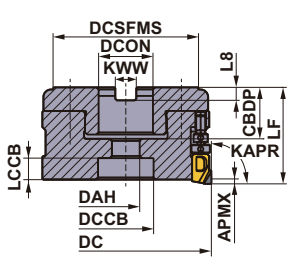
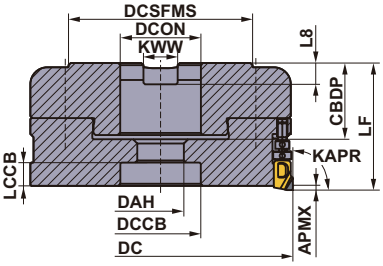


Fig.3
ø100
ø125







Arbor Type

DC=mm, DCON=Inch GAMP: +5° GAMF: 0° Right hand tool holder only. (mm)

DC	Order Number	Stock	∗1 Coolant Thru	∗2 No.T	LF	DCON	WT (kg)	APMX	RPMX (min^{-1})	Fig.
80	**FMAXR08010C**	★	Y	10	45	25.4 [1.00"]	1.11	2	24500	2
80	**FMAXR08014C**	★	Y	14	45	25.4 [1.00"]	1.09	2	24500	2
100	**FMAXR10012D**	★	Y	12	50	31.75 [1.25"]	1.85	2	22000	3
100	**FMAXR10018D**	★	Y	18	50	31.75 [1.25"]	1.81	2	22000	3
125	**FMAXR12516E**	★	Y	16	60	38.1 [1.50"]	3.33	2	19600	3
125	**FMAXR12524E**	★	Y	24	60	38.1 [1.50"]	3.27	2	19600	3

∗1 Y=Yes ∗2 Number of Teeth

(Note 1) 2 mm or less is the recommended maximum depth of cut for ultra high efficiency machining.

Mounting Dimensions

(mm)

DCON	DC	Tool Holder Type	CBDP	DAH	DCCB	LCCB	DCSFMS	KWW	L8	KWL	Fig.
25.4 [1.00"]	80	**FMAXR080**	24	13	26	11	68	9.5	6	—	2
31.75 [1.25"]	100	**FMAXR100**	32	17	32	10	79	12.7	8	90	3
38.1 [1.50"]	125	**FMAXR125**	36	22	38	12	88	15.9	10	112	3

Spare Parts

(mm)

DC	Tool Holder Type	Insert Clamp∗ Screw	Micro Adjustment Nut	Large Adjustment Screw	Balance Adjustment Screw	Cutter Set Bolt	Wrench T10	Wrench ø2.5
								
80	**FMAXR080**	TSS04505S	KSN2	KSS2	HSS05005G	HSCX12030H	TKY10T	RKY25S
100	**FMAXR100**	TSS04505S	KSN2	KSS2	HSS06006G	HSCX16035H	TKY10T	RKY25S
125	**FMAXR125**	TSS04505S	KSN2	KSS2	HSS08008G	HSCX20035H	TKY10T	RKY25S

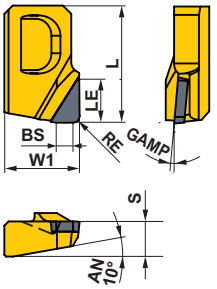
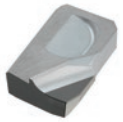
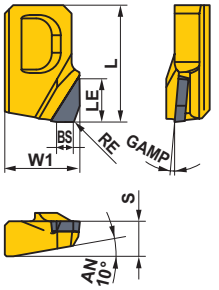
∗ Clamp Torque (N • m) : TSS04505S=3.5

(Note 1) Refer to the instruction manual included in the cutter body for how to locate the insert and adjust the run-out.

(Note 2) Set bolt not included (mm).

Inserts

(inch)

Shape	Order Number	MD220	MD2030	L	LE	W1	S	BS	RE	GAMP	Geometry
 General Purpose	GOER1404PXFR2 NEW	●	●	.551	.197	.354	.165	.079	.016	5°	
	GOER1408PXFR2 NEW	●	●	.551	.197	.354	.165	.079	.031	5°	
 Burr Prevention	NEW GOER1401ZXFR2	●		.551	.197	.354	.165	.079	.004	5°	

(Note 1) If general purpose inserts (RE = .016", .031") and burr prevention inserts are used together, they will not be able to sufficiently display their full performance. Inserts of the same shape should be used according to the application.
(Note 2) The cutting diameter will change depending on the shape. Refer to page 3 for details.
Be particularly careful when cutting near vertical walls, since there is a possibility of interference with the holder.

● : Inventory maintained. (PCD inserts are available with 1 piece in one case.)

Recommended Cutting Conditions

Wet Cutting

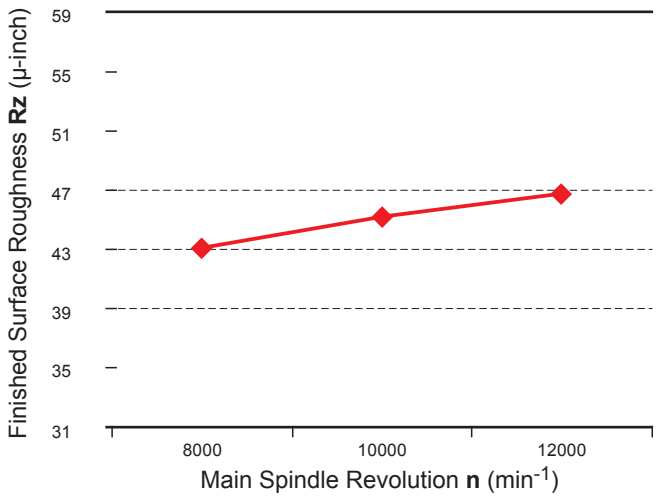
(inch)

Work Material		Properties	Grade	**vc** (SFM)	**ae**	**ap**	**fz** (IPT)
N	Aluminum Alloys	Si < 5%	**MD2030 MD220**	8200 (6560—9840)	≤ 0.2 DC	≤ .118 (.020—.118)	.003 (.002—.008)
					≤ 0.5 DC	≤ .098 (.020—.098)	
					≤ 0.8 DC	≤ .079 (.020—.079)	
		5% ≤ Si ≤ 10%	**MD2030 MD220**	8200 (6560—9840)	≤ 0.2 DC	≤ .118 (.020—.118)	.003 (.002—.008)
					≤ 0.5 DC	≤ .098 (.020—.098)	
					≤ 0.8 DC	≤ .079 (.020—.079)	
		10% < Si < 15%	**MD2030 MD220**	1970 (1310—2625)	≤ 0.2 DC	≤ .118 (.020—.118)	.003 (.002—.008)
					≤ 0.5 DC	≤ .098 (.020—.098)	
					≤ 0.8 DC	≤ .079 (.020—.079)	
		Si ≥ 15%	**MD2030 MD220**	1970 (1310—2625)	≤ 0.2 DC	≤ .118 (.020—.118)	.003 (.002—.008)
					≤ 0.5 DC	≤ .098 (.020—.098)	
					≤ 0.8 DC	≤ .079 (.020—.079)	

* Adjust the depth of cut **ap** depending on the width of cut **ae**.

Cutting Performance

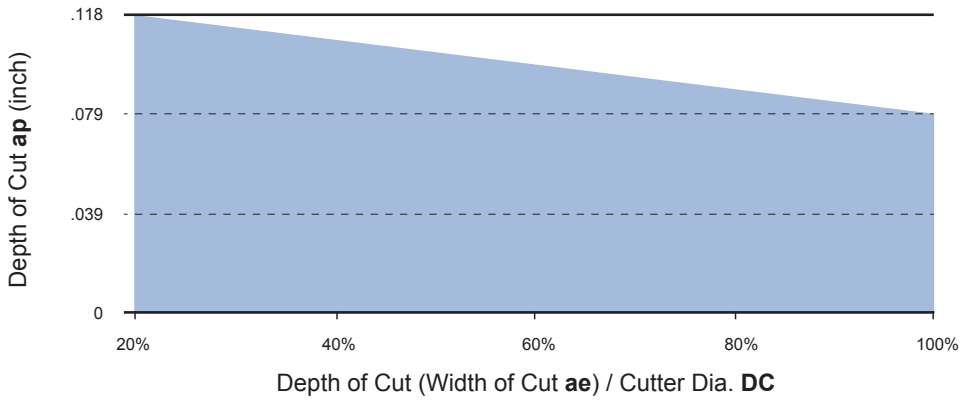
Finished Surface Roughness (Rz)



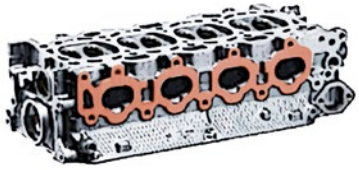
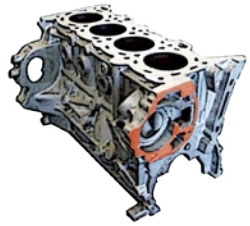
<Cutting Conditions>

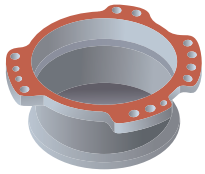
Work Material	: AISI 383.0 Cylinder Head
Tool	: FMAXR12524E
Insert	: GOER1408PXFR2
Grade	: MD2030
Revolution	: n = 8000–12000 min^{-1}
Feed per Tooth	: fz = .003 IPT
Depth of Cut	: ap = .079 inch
Width of Cut	: ae = 2.677 inch x 3
Cutting Mode	: Internal Coolant 580 psi

Effective Chip Disposal Range



Application Examples

		FMAXR10018D	FMAXR08014C
Cutter Body		FMAXR10018D	FMAXR08014C
Insert (Grade)		GOER1408PXFR2 (MD2030)	GOER1408PXFR2 (MD2030)
Workpiece		Aluminum Alloy 	Aluminum Alloy 
Cutting Conditions	Cutting Speed **vc** (SFM)	8245	6600
	Revolution **n** (min^{-1})	8000	8000
	Feed per Tooth **fz** (IPT)	.008	.005
	Table Feed **vf** (IPM)	1134	591
	Depth of Cut **ap** (inch)	.059	.098
	Width of Cut **ae** (inch)	1.969	.787
Cutting Mode		Wet Cutting	Wet Cutting
Machine		Horizontal MC	Horizontal MC
Results		Increased efficiency with a table feed increase 2.6 times, FMAX achieved good surface finishes and increased machining stability.	Increased efficiency with a table feed increase 2.2 times, FMAX achieved good surface finishes and increased machining stability.

		FMAX-050A08R
Cutter Body		FMAX-050A08R
Insert (Grade)		GOER1401ZXFR2 (MD220)
Workpiece		AISI 383.0 
Cutting Conditions	Cutting Speed **vc** (SFM)	3605
	Revolution **n** (min^{-1})	7000
	Feed per Tooth **fz** (IPT)	.002
	Table Feed **vf** (IPM)	138
	Depth of Cut **ap** (inch)	.012
	Width of Cut **ae** (inch)	.787–1.181
Cutting Mode		Wet Cutting
Machine		Vertical MC (BT30)
Results		Tool Life (feet) 16400 49200 82000 FMAX Conventional Can Continue Burr prevention inserts can ensure smooth finished surfaces and can maintain their effective burr prevention capabilities over long periods of use. As a result, they can achieve tool life which is over triple longer than conventional products.

High Feed Finish Milling Cutter for Aluminum Alloys

FMAX

For your safety
●Don't handle inserts and chips without gloves. ●Please machine within the recommended application range and exchange expired tools with new ones in advance of breakage. ●Please use safety covers and wear safety glasses. ●When using compounded cutting oils, please take fire precautions. ●When attaching inserts or spare parts, please use only the correct wrench or driver. ●When using rotating tools, please make a trial run to check run-out, vibration and abnormal sounds etc.

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(Tools specifications subject to change without notice.)

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