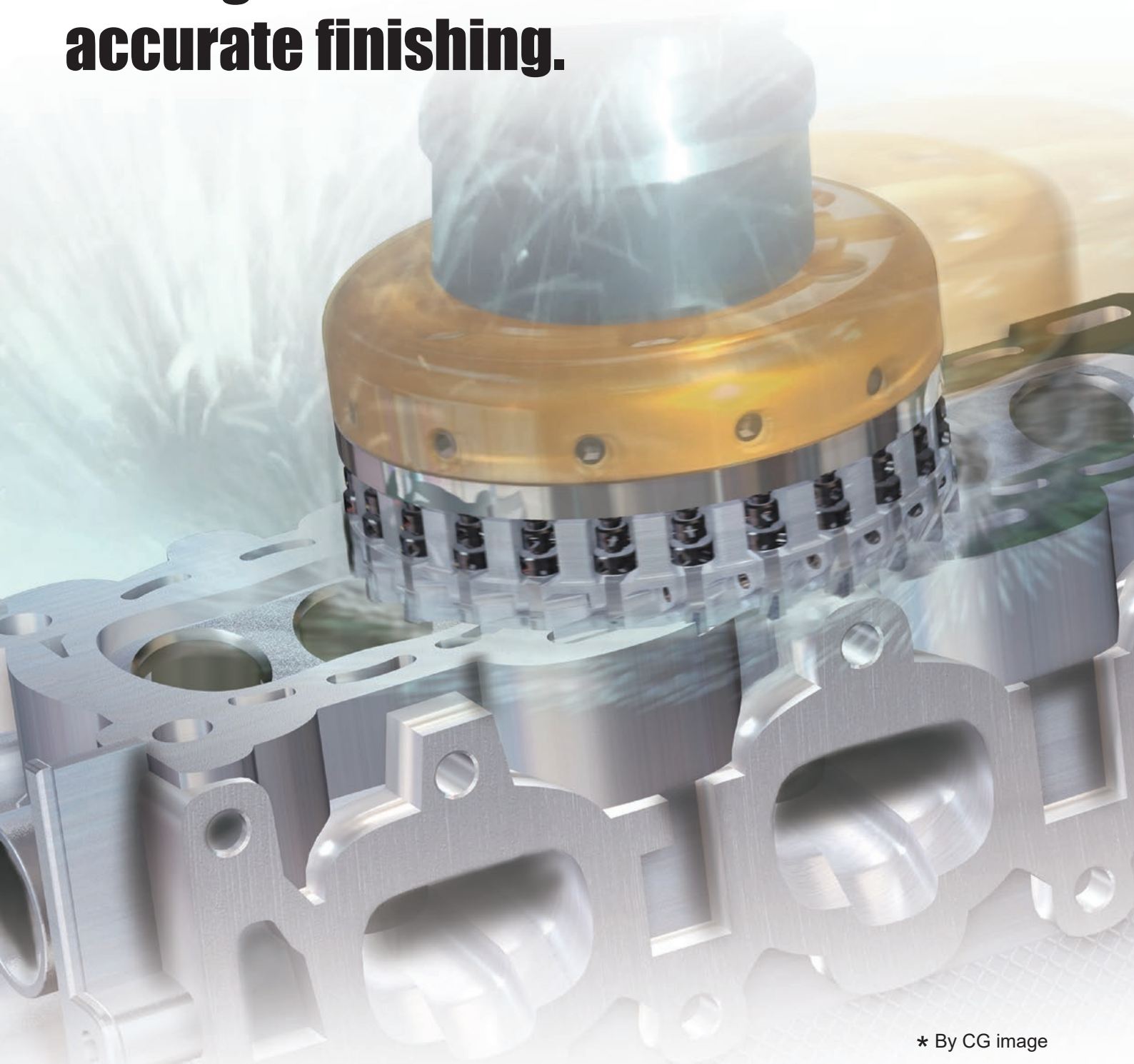


High Feed Finish Milling Cutter for Aluminium Alloys

# FMAX

Series  
Expansion

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



\* By CG image

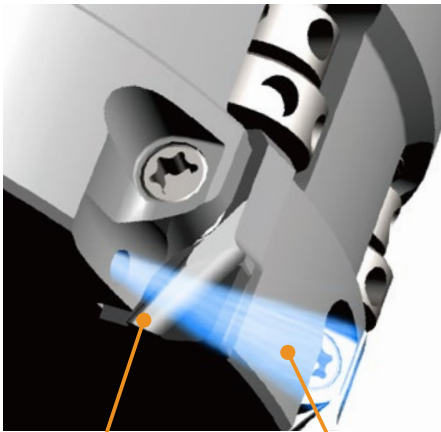
## High Feed Finish Milling Cutter for Aluminium Alloys

# FMAX

### Ultra High Efficiency Machining

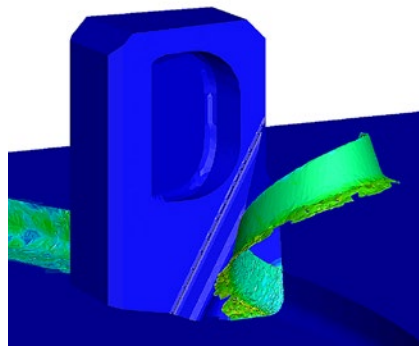
The ultra fine pitch design is ideal for high efficiency machining ( $v_f \geq 20000$  mm/min).

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



Body Protector

Internal Coolant



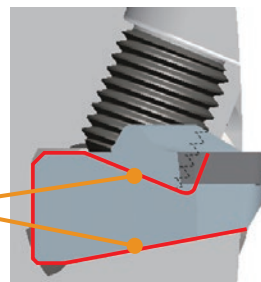
\*Graphical Representation.

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 centre through coolant arbors.

### Designed for High Speeds

Anti fly dovetail clamping mechanism.

Dovetail Clamp

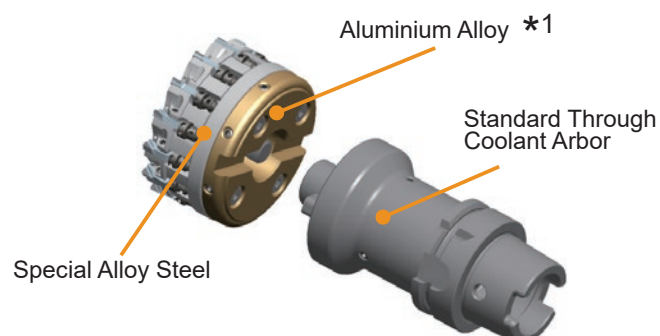


Angled Face



### Light Weight, High Rigidity Body

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



Aluminium Alloy \*1

Standard Through Coolant Arbor

Special Alloy Steel

\*1 Except DC=40, 50, 63mm

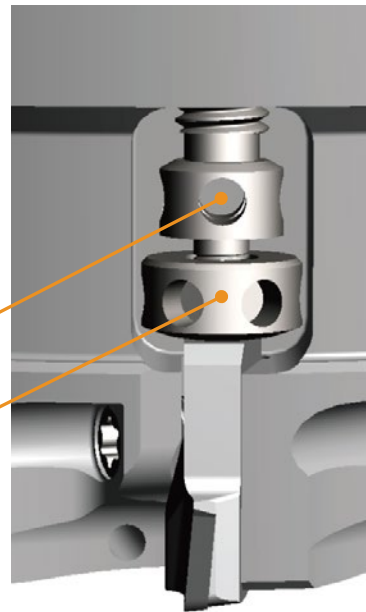
## High Precision, Easy Setting

The combination of both a large and micro screw provides precise run-out adjustment and for adjusting new or re-grinding inserts (5  $\mu\text{m}$  or better).



Large Adjustment Screw

Micro Adjustment Nut



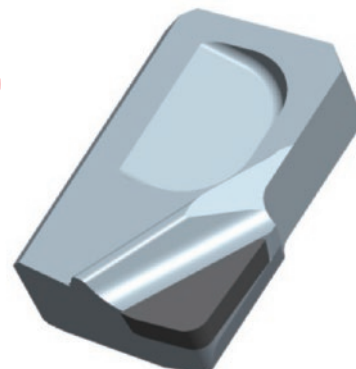
## Economy, Multi-use

A maximum re-grinding allowance of 0.6 mm is possible on both the peripheral and bottom edges.



DC = 40, 50, 63mm

PCD Grade





## High Feed Finish Milling Cutter for Aluminium Alloys

# FMAX <sup>NEW</sup> For Compact and Smaller Machining Centres

### Light Weight Design of 1.5kg or Less

DC	For Compact and Smaller Machining Centres		FMAX	
	Number of Teeth	WT (kg)	Number of Teeth	WT (kg)
100	10	1.06	12	1.85
	16	1.11	18	1.81
125	14	1.44	16	3.33
	20	1.48	24	3.27

(mm)

### Light Weight, High Rigidity Body

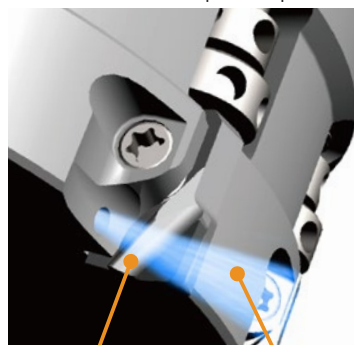
A special alloy steel and aluminium body combine to provide rigidity and light weight.



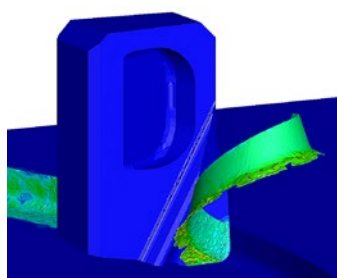
### High Efficiency Machining

Multi-blade design ideal for low power machines.

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



Body Protector Internal Coolant



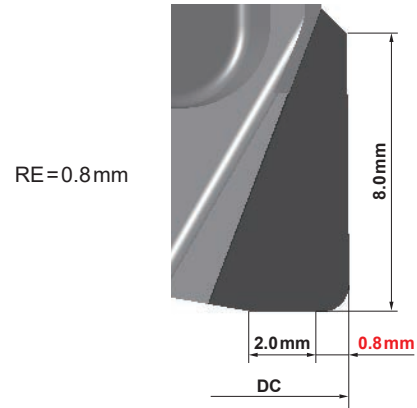
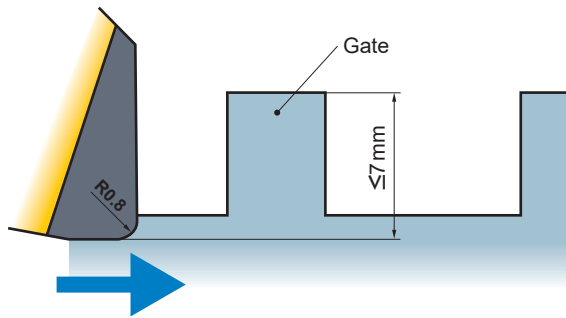
\*Graphical Representation.

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 centre through coolant arbors.

# Inserts for Specific Applications

## **NEW** Long Edge Inserts

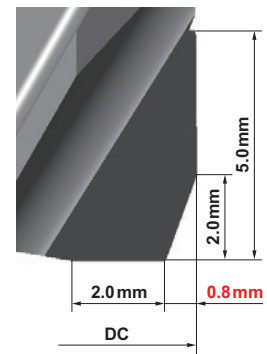
The long edge insert is capable of finish cutting of castings with a gate. Therefore, it is possible to reduce the number of cutting passes and to shorten the machining time as well.



## Burr Prevention Inserts

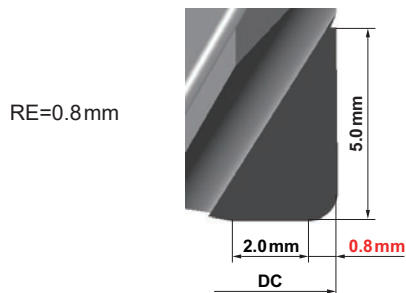
The tool cutting edge angle is effective at reducing the thickness of chips, with almost no burrs generated in comparison to conventional products. The finely-detailed R shape of the corner portion prevents chipping and enhances both stability and tool life.

Burr Prevention Type

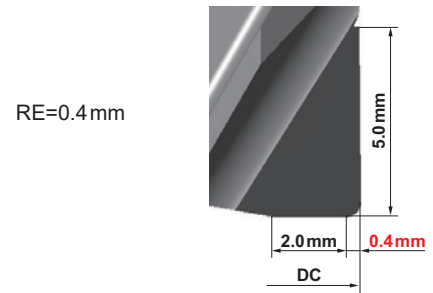


## General Purpose Inserts

Inserts with corner  $R(RE) = 0.8 \text{ mm}$  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.

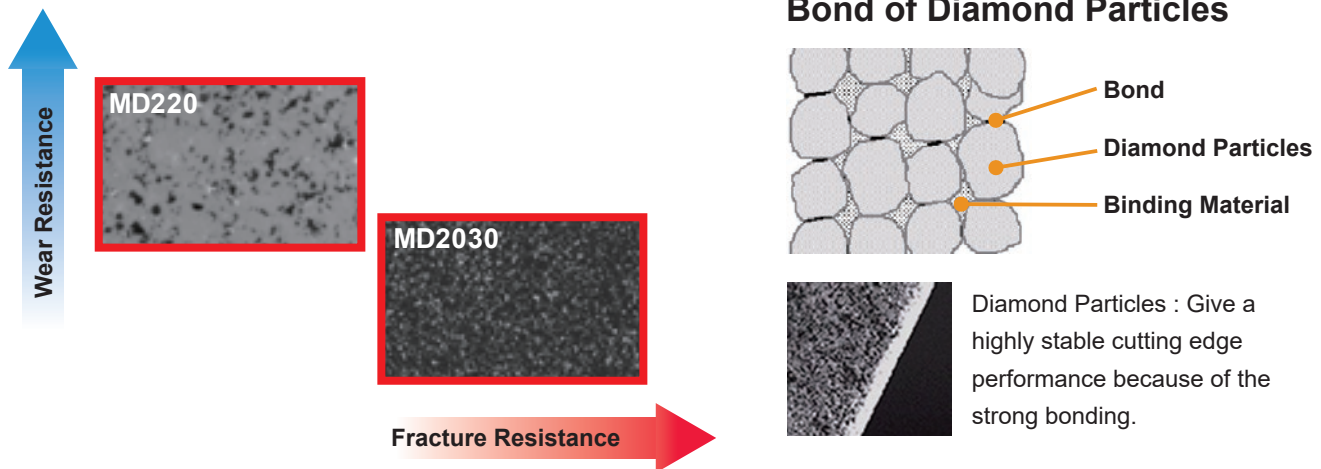


The sharpness of inserts with corner  $R(RE) = 0.4 \text{ mm}$  is one of their most notable features. Its effectiveness can be demonstrated by the ability to suppress chatter and maintain finished surfaces.



## Features of the Grades

### Diamond Sintered Segment Containing Ultra Microparticle Diamond



#### 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 workpiece material and cutting conditions.

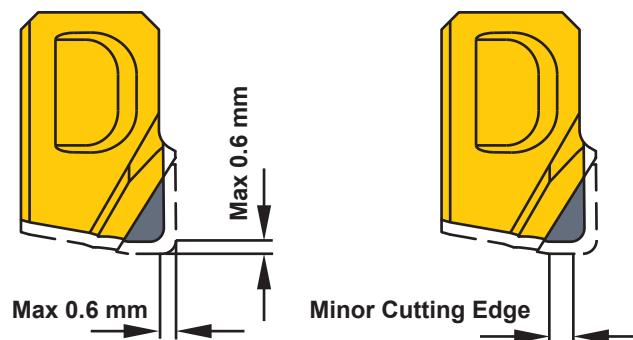
#### Features of MD220

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

#### Re-grinding of an Insert

The maximum material to be re-grinding is 0.6 mm.  
Use similar inserts after re-grinding to maintain balance.  
Problems may occur if the cutter isn't balanced correctly.  
After re-grinding the minor edge will reduce in size and may affect surface finishes.  
Check the diameter offset after fitting re-grinding inserts.

\* Please contact us regarding optimum re-grinding conditions.



# FACE MILLING

## <HIGH FEED FINISHING>

90°  
KAPR

F



# FMAX

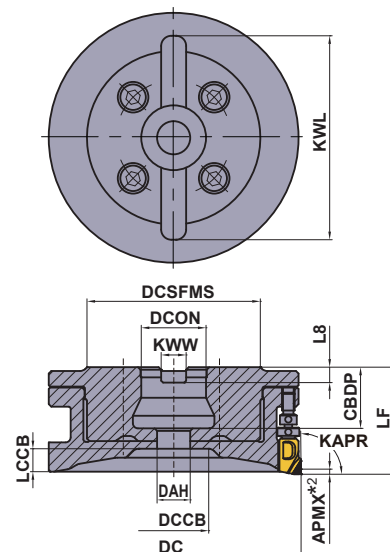
For Compact and Smaller  
Machining Centres

NEW

P M K **N** S H



Fig.1  
ø100  
ø125



Right hand tool holder only.

### Arbor Type

GAMP: +5° GAMF: 0°

DC=mm size, DCON=mm size

DC	Order Number	Stock	Coolant Hole	No.T	LF	DCON	WT (kg)	RPMX (min <sup>-1</sup> )	Fig.
100	FMAXR10010CLW	●	○	10	42	25.4	1.06	22000	4
100	FMAXR10016CLW	●	○	16	42	25.4	1.11	22000	4
125	FMAXR12514CLW	●	○	14	42	25.4	1.44	19600	4
125	FMAXR12520CLW	●	○	20	42	25.4	1.48	19600	4

\*1 Number of Teeth

\*2 For the maximum depth of cut (APMX), please refer to recommended cutting conditions (ap).

Note 1) The maximum depth of cut for should be 2mm or less for ultra high efficiency machining with table feed (vf ≥ 20000mm/min).

### Mounting Dimensions

DCON	DC	Order Number	CBDP	DAH	DCCB	LCCB	DCSFMS	KWW	L8	KWL	Fig.
25.4	100	FMAXR10010CLW	24	13	27	9	68	9.5	6	80	4
25.4	100	FMAXR10016CLW	24	13	27	9	68	9.5	6	80	4
25.4	125	FMAXR12514CLW	24	13	52	9	68	9.5	6	80	4
25.4	125	FMAXR12520CLW	24	13	52	9	68	9.5	6	80	4

### Spare Parts

Insert Clamp Screw *	Micro Adjustment Nut	Large Adjustment Screw	Balance Adjustment Screw	Cutter Set Bolt	Wrench T10	Wrench ø2.5
TSS04505S	KSN3	KSS2	HSS04004G	HSCX12030H	TKY10T	RKY25S

\* Clamp Torque (N • m) : TSS04505S=3.5

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

# High Feed Finish Milling Cutter for Aluminium Alloys

## FACE MILLING <HIGH FEED FINISHING>



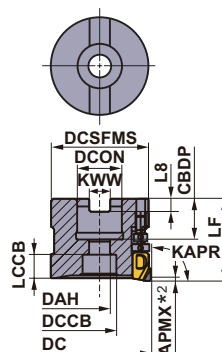
## FMAX-40/50/63

P M K **N** S H



Fig.1

ø40  
ø50  
ø63



Right hand tool holder only.

### Arbor Type

GAMP: +5° GAMF: -6°— -3°

DC=mm size, DCON=mm size

DC	Order Number	Stock	Coolant Hole	No.T	LF	DCON	WT (kg)	RPMX (min <sup>-1</sup> )	Fig.
40	FMAX-040A04R	●	○	4	40	16	0.24	30000	1
40	FMAX-040A06R	●	○	6	40	16	0.23	30000	1
50	FMAX-050A08R	●	○	8	40	22	0.37	30000	1
50	FMAX-050A10R	●	○	10	40	22	0.35	30000	1
63	FMAX-063A10R	●	○	10	40	22	0.67	27000	1
63	FMAX-063A12R	●	○	12	40	22	0.66	27000	1

\*1 Number of Teeth

\*2 For the maximum depth of cut (APMX), please refer to recommended cutting conditions (ap).

Note 1) The maximum depth of cut for should be 2mm or less for ultra high efficiency machining with table feed (vf ≥ 20000mm/min).

### Mounting Dimensions

DCON	DC	Order Number	CBDP	DAH	DCCB	LCCB	DCSFMS	KWW	L8	KWL	Fig.
16	40	FMAX-040A04R	18	9	14	10	37	8.4	5.6	—	1
16	40	FMAX-040A06R	18	9	14	10	37	8.4	5.6	—	1
22	50	FMAX-050A08R	20	11	17	12	47	10.4	6.3	—	1
22	50	FMAX-050A10R	20	11	17	12	47	10.4	6.3	—	1
22	63	FMAX-063A10R	20	11	17	12	60	10.4	6.3	—	1
22	63	FMAX-063A12R	20	11	17	12	60	10.4	6.3	—	1

### Spare Parts

DC	Tool Holder Type	Insert Clamp Screw	Micro Adjustment Nut	Large Adjustment Screw	Balance Adjustment Screw	Cutter Set Bolt	Wrench T10	Wrench ø2.5
40	FMAX-040	TSS04505S	KSN2	KSS2	HSS04004G	HSC08030H	TKY10T	RKY25S
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) Please refer to the instruction manual included in the cutter body for how to locate the insert and adjust the run-out.



# FACE MILLING

## <HIGH FEED FINISHING>



# FMAX

P M K **N** S H



Fig.2

ø80  
ø160

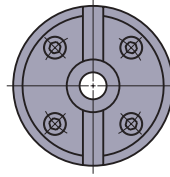
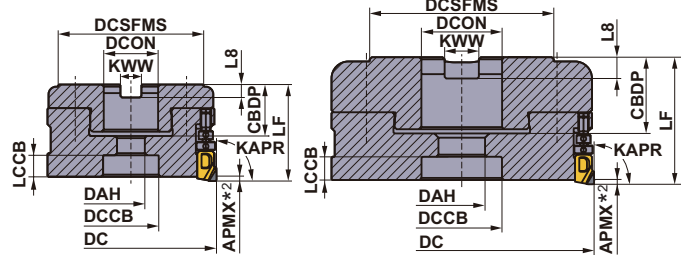
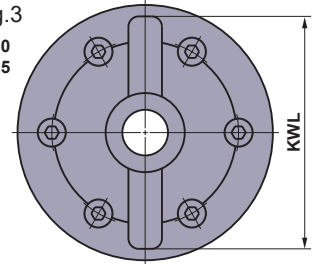


Fig.3

ø100  
ø125



Right hand tool holder only.

### Arbor Type

GAMP: +5° GAMF: -0°

DC=mm size, DCON=mm size

DC	Order Number	Stock	Coolant Hole	No.T	LF	DCON	WT (kg)	RPMX (min <sup>-1</sup> )	Fig.
80	FMAXR08010C	●	○	10	45	25.4	1.11	24500	2
80	FMAXR08014C	●	○	14	45	25.4	1.09	24500	2
100	FMAXR10012D	●	○	12	50	31.75	1.85	22000	3
100	FMAXR10018D	●	○	18	50	31.75	1.81	22000	3
125	FMAXR12516E	●	○	16	60	38.1	3.33	19600	3
125	FMAXR12524E	●	○	24	60	38.1	3.27	19600	3
160	FMAXR16016D	●	○	16	63	31.75	3.30	10000	2
160	FMAXR16024D	●	○	24	63	31.75	3.39	10000	2

\*1 Number of Teeth

\*2 For the maximum depth of cut (APMX), please refer to recommended cutting conditions (ap).

Note 1) The maximum depth of cut for should be 2mm or less for ultra high efficiency machining with table feed (vf ≥ 20000mm/min).

### Mounting Dimensions

DCON	DC	Order Number	CBDP	DAH	DCCB	LCCB	DCSFMS	KWW	L8	KWL	Fig.
25.4	80	FMAXR08010C	24	13	26	11	68	9.5	6	—	2
25.4	80	FMAXR08014C	24	13	26	11	68	9.5	6	—	2
31.75	100	FMAXR10012D	32	17	32	10	79	12.7	8	90	3
31.75	100	FMAXR10018D	32	17	32	10	79	12.7	8	90	3
38.1	125	FMAXR12516E	36	22	38	12	88	15.9	10	112	3
38.1	125	FMAXR12524E	36	22	38	12	88	15.9	10	112	3
31.75	160	FMAXR16016D	38	17	53	10	75	12.7	8	—	2
31.75	160	FMAXR16024D	38	17	53	10	75	12.7	8	—	2

### Spare Parts

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
160	FMAXR160	TSS04505S	KSN2	KSS2	HSS08008G	HSCX16045H	TKY10T	RKY25S

\* Clamp Torque (N · m) : TSS04505S=3.5

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

# High Feed Finish Milling Cutter for Aluminium Alloys



Fig.2  
ø80  
ø160

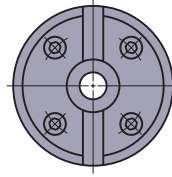
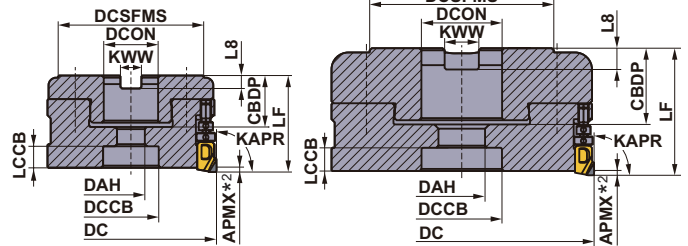
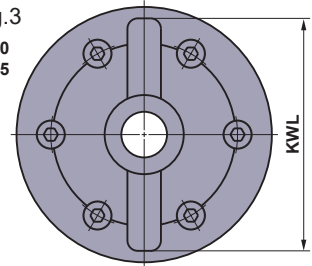


Fig.3  
ø100  
ø125



Right hand tool holder only.

## Arbor Type

GAMP: +5° GAMF: 0°

DC=mm size, DCON=mm size

DC	Order Number	Stock	Coolant Hole	*1 No.T	LF	DCON	WT (kg)	RPMX (min <sup>-1</sup> )	Fig.
80	<b>FMAX-080B14R</b>	●	○	14	45	27	1.08	24500	2
100	<b>FMAX-100B18R</b>	●	○	18	50	32	1.81	22000	3
125	<b>FMAX-125B24R</b>	●	○	24	60	40	3.26	19600	3

\*1 Number of Teeth

\*2 For the maximum depth of cut (**APMX**), please refer to recommended cutting conditions (**ap**).

Note 1) The maximum depth of cut for should be 2mm or less for ultra high efficiency machining with table feed (**vf** ≥ 20000mm/min).

## Mounting Dimensions

DCON	DC	Order Number	CBDP	DAH	DCCB	LCCB	DCSFMS	KWW	L8	KWL	Fig.
27	80	<b>FMAX-080B14R</b>	24	13	26	11	68	12.4	7	—	2
32	100	<b>FMAX-100B18R</b>	32	17	32	10	79	14.4	8	90	3
40	125	<b>FMAX-125B24R</b>	36	22	38	12	88	16.4	9	112	3

## Spare Parts


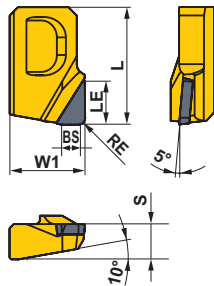
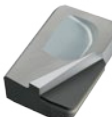
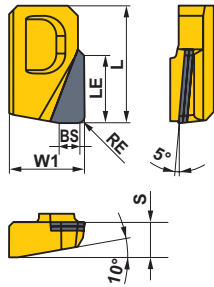

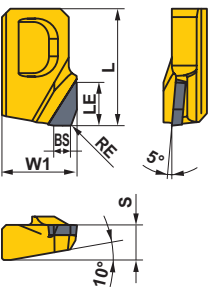
DC	Tool Holder Type	Insert Clamp Screw*	Micro Adjustment Nut	Large Adjustment Screw	Balance Adjustment Screw	Cutter Set Bolt	Wrench T10	Wrench ø2.5
80	<b>FMAX-080</b>	TSS04505S	KSN2	KSS2	HSS05005G	HSCX12030H	TKY10T	RKY25S
100	<b>FMAX-100</b>	TSS04505S	KSN2	KSS2	HSS06006G	HSCX16035H	TKY10T	RKY25S
125	<b>FMAX-125</b>	TSS04505S	KSN2	KSS2	HSS08008G	HSCX20035H	TKY10T	RKY25S

\* Clamp Torque (N · m) : TSS04505S=3.5

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

## ■ Inserts

(mm)

Shape	Order Number	MD220	MD2030	L	LE	W1	S	BS	RE	Geometry
 General Purpose	<b>GOER1404PXFR2</b>	●	●	14.0	5.0	9.0	4.2	2.0	0.4	
	<b>GOER1408PXFR2</b>	●	●	14.0	5.0	9.0	4.2	2.0	0.8	
 Long Edge	<b>NEW GOER1408PXFR2-8</b>	●		14.0	8.0	9.0	4.2	2.0	0.8	
 Burr Prevention	<b>GOER1401ZXFR2</b>	●		14.0	5.0	9.0	4.2	2.0	0.1	

Note 1) If general purpose inserts (RE = 0.4mm, 0.8mm), burr prevention inserts and long edge 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 4 for details.

Be particularly careful when cutting near vertical walls, since there is a possibility of interference with the holder.

Note 3) The long edge inserts corresponds to the gate remainder and can not be used for constant depth cutting.

# High Feed Finish Milling Cutter for Aluminium Alloys

## Recommended Cutting Conditions

### Wet Cutting

(mm)						
Workpiece material	Properties	Grade	vc (m/min)	Depth of Cut		fz (mm/t.)
				ae	ap	
N	Content Si < 5%	MD2030 MD220	2500 (2000—3000)	≤ 0.2 DC	≤ 3.0 (0.5—3.0)	0.08 (0.05—0.2)
				≤ 0.5 DC	≤ 2.5 (0.5—2.5)	
				≤ 0.8 DC	≤ 2.0 (0.5—2.0)	
	Content 5% ≤ Si ≤ 10%	MD2030 MD220	2500 (2000—3000)	≤ 0.2 DC	≤ 3.0 (0.5—3.0)	0.08 (0.05—0.2)
				≤ 0.5 DC	≤ 2.5 (0.5—2.5)	
				≤ 0.8 DC	≤ 2.0 (0.5—2.0)	
	Content 10% < Si < 15%	MD220 MD2030	600 (400—800)	≤ 0.2 DC	≤ 3.0 (0.5—3.0)	0.08 (0.05—0.2)
				≤ 0.5 DC	≤ 2.5 (0.5—2.5)	
				≤ 0.8 DC	≤ 2.0 (0.5—2.0)	
	Content Si ≥ 15%	MD220 MD2030	600 (400—800)	≤ 0.2 DC	≤ 3.0 (0.5—3.0)	0.08 (0.05—0.2)
				≤ 0.5 DC	≤ 2.5 (0.5—2.5)	
				≤ 0.8 DC	≤ 2.0 (0.5—2.0)	

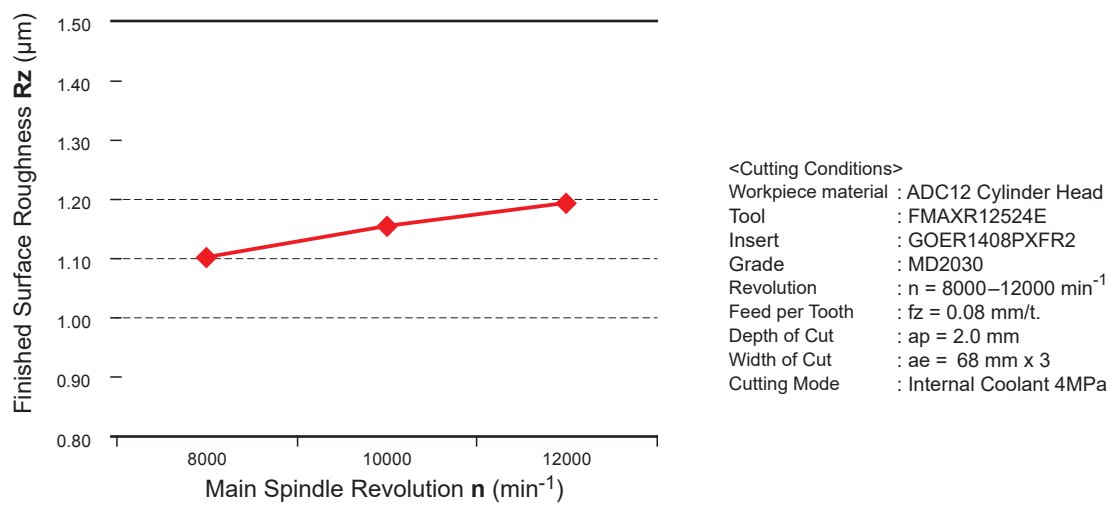
(Note 1) Please adjust the depth of cut **ap** depending on the width of cut **ae**.

(Note 2) When using the long edge insert, please select the conditions depending on depths of cut (**ap**) excluding the length of the gate.

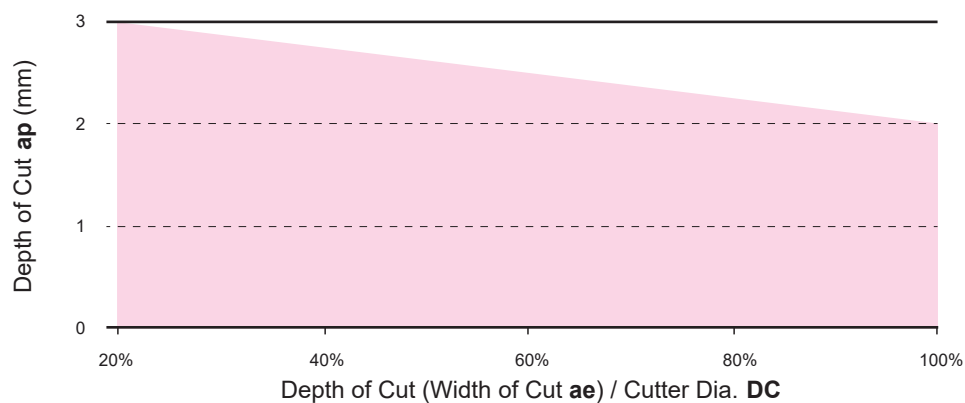
(Note 3) Wet cutting is recommended.

## Cutting Performance

### Finished Surface Roughness (Rz)

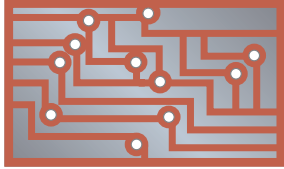


### Effective Chip Disposal Range



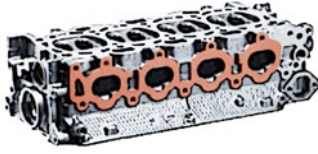



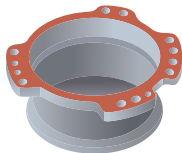
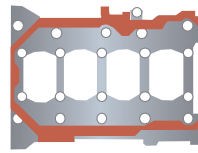




## Application Examples

Cutter Body		FMAXR12520CLW	
Insert (Grade)		GOER1401ZXFR2 (MD220)	
Workpiece		Aluminium Alloy 	
Cutting Conditions	Cutting Speed <b>vc</b> (m/min)	3927(Conventional 3141)	
	Revolution <b>n</b> (min <sup>-1</sup> )	10000(Conventional 8000)	
	Feed per Tooth <b>fz</b> (mm/t.)	0.09	
	Table Feed <b>vf</b> (mm/min)	18000(Conventional 15840)	
	Depth of Cut <b>ap</b> (mm)	0.5	
	Width of Cut <b>ae</b> (mm)	—	
Cutting Mode		Wet Cutting	
Machine		Vertical MC (BT30)	
Results		Compared to the conventional cutting conditions, the surface roughness is maintained and the machining efficiency is improved by 15%.	

The above application examples are customer's application examples, so it can be different from the recommended conditions.

## Application Examples

Cutter Body		FMAXR10018D	FMAXR08014C
Insert (Grade)		GOER1408PXFR2 (MD2030)	GOER1408PXFR2 (MD2030)
Workpiece		Aluminium Alloy 	Aluminium Alloy 
Cutting Conditions	Cutting Speed <b>vc</b> (m/min)	2513	2011
	Revolution <b>n</b> (min <sup>-1</sup> )	8000	8000
	Feed per Tooth <b>fz</b> (mm/t.)	0.2	0.13
	Table Feed <b>vf</b> (mm/min)	28800	15000
	Depth of Cut <b>ap</b> (mm)	1.5	2.5
	Width of Cut <b>ae</b> (mm)	50	20
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.

Cutter Body		FMAX-050A08R	FMAXR08014C
Insert (Grade)		GOER1401ZXFR2 (MD220)	GOER1408PXFR2-8 (MD220)
Workpiece		ADC12 	ADC12 
Cutting Conditions	Cutting Speed <b>vc</b> (m/min)	1099	2500
	Revolution <b>n</b> (min <sup>-1</sup> )	7000	9950
	Feed per Tooth <b>fz</b> (mm/t.)	0.06	0.1
	Table Feed <b>vf</b> (mm/min)	3500	14000
	Depth of Cut <b>ap</b> (mm)	0.3	1.0, Gate 7.0
	Width of Cut <b>ae</b> (mm)	20 – 30	25 – 50
Cutting Mode		Wet Cutting	Wet Cutting (Water-soluble)
Machine		Vertical MC (BT30)	Horizontal MC
Results		<p>Tool Life (m)</p> <p>5000 15000 25000</p> <p><b>FMAX</b>  <b>Can Continue</b></p> <p>Conventional </p> <p>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.</p>	<p>Table Feed <b>vf</b> (mm/min)</p> <p>5000 10000 15000</p> <p><b>FMAX</b> </p> <p>Conventional </p> <p>FMAX achieved 1.4 times higher efficiency than conventional product due to its fine pitch design.</p>

The above application examples are customer's application examples, so it can be different from the recommended conditions.



High Feed Finish Milling Cutter for Aluminium Alloys

**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.)