

FMAX

FEED MAXIMUM

MILLING CUTTER FOR ULTRA EFFICIENT,
HIGH ACCURACY FINISHING



FMAX

HIGH FEED MILLING CUTTER FOR FINISHING

ULTRA HIGH EFFICIENCY MACHINING

The ultra fine pitch design is ideal for high efficiency machining ($F \geq 20 \text{ m/min}$). Internal coolant and a special chipbreaker wall (body protector) provide ideal chip discharge performance.

LIGHT WEIGHT, HIGH RIGIDITY BODY

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

- Aluminium alloy
- Special alloy steel

HIGH PRECISION, EASY SETTING

A combination of fine and ultra-fine pitch threads provides precise run-out adjustment ($\leq 5 \mu$).

- Fine pitch adjustment screw
- Micro adjustment nut

ECONOMICAL, MULTI-USE

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

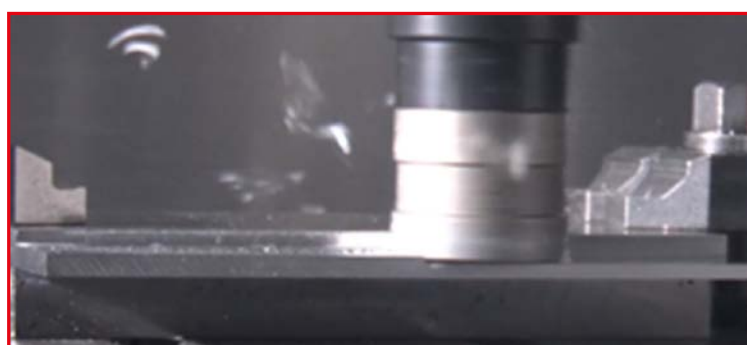
- PCD grades for machining aluminium alloys
- A.R.+5° New CBN grade for grey cast iron machining
- Internal coolant
- Body protector

CLASSIFICATION

Series	Use	Specification	DCON MS	Minimum			Maximum		
				DC	ZEFP	WT	DC	ZEFP	WT
FMAX	High feed finish milling cutter	Light weight, High rigidity body	mm	—	—	—	160	16	3.30
		Alloy steel and aluminium body	mm	80	14	1.08	125	24	3.39
			mm						
FMAX-LW	High feed finish milling cutter	Light weight, High rigidity body	mm	100	10	1.06	125	14	1.44
	Compact and smaller machining centres	Alloy steel and aluminium body	mm		16	1.11		20	1.48
FMAX-40/50/63	High feed finish milling cutter	Alloy steel body	mm	40	4	0.24	63	10	0.67
	Small Diameter		mm		6	0.23		12	0.66
FMAX-MB	For Low Rigidity Conditions	Coarse pitch type	mm	50	4	0.38	125	6	3.81

FMAX-MB

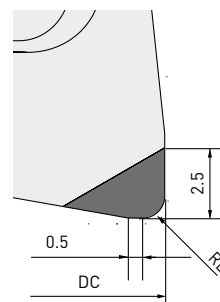
By reducing the number of teeth, finishing can be easily performed even if the machine or work material is not rigid. Tool installation costs can also be reduced while maintaining the existing insert mounting and cutting edge adjustment functions.



INSERTS FOR SPECIAL APPLICATIONS

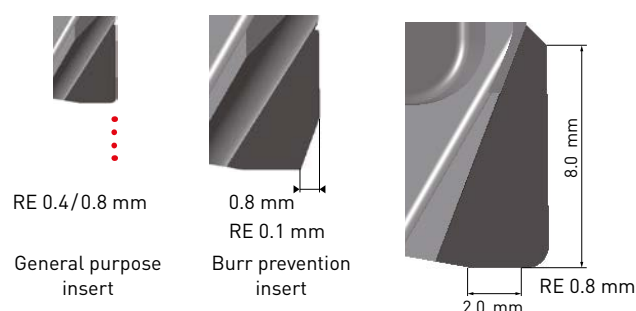
GENERAL PURPOSE INSERTS

CBN inserts for gray cast iron reduce the length of the wiper edge and provide excellent surface finishes with low cutting forces. These inserts are disposable and therefore economical because they don't require re-grinding.



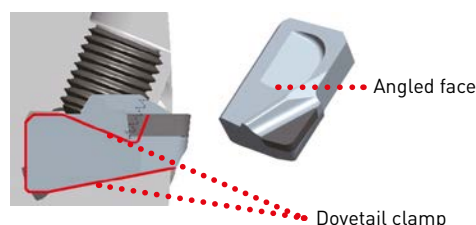
LONG EDGE INSERTS

The long edge insert is capable of finish cutting castings with a gate. This makes it possible to reduce the number of cutter passes, thereby shortening cycle times.



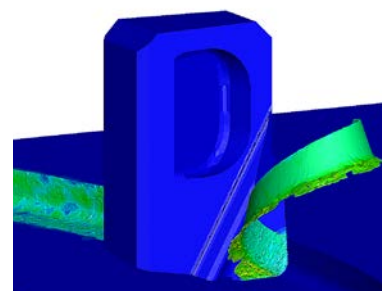
DESIGNED FOR HIGH SPEEDS

Anti-fly dovetail clamping mechanism.



IDEAL CHIP DISPOSAL

The body protector on the rake face forms chip shapes that are ideal for efficient dispersal. Internal coolant also aids this process. The body is compatible with all through centre coolant arbors.



Graphical representation



BENEFITS

- Light weight, High rigidity body
- Designed for high speeds
- PCD grade for machining aluminium alloys
- New CBN grade for grey cast iron machining
- High precision

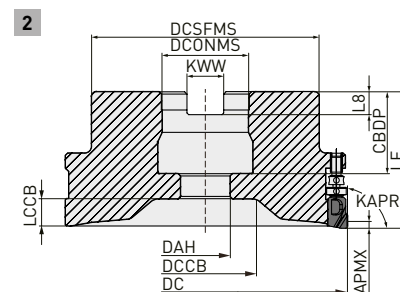
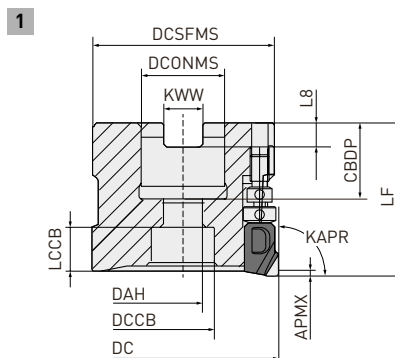
FMAX-MB



FOR LOW RIGIDITY CONDITIONS



Coarse pitch type



Right hand tool holder only

ARBOR TYPE

Order number	Stock	DC	DCONMS	LF	RPMX	WT	ZEFP*		Type
FMAX-050A04R	●	50	22	40	30000	0.38	4	○	1
FMAX-063A04R	●	63	22	40	30000	0.70	4	○	1
FMAX-080B04RMB	●	80	27	45	24500	1.12	4	○	2
FMAX-100B04RMB	●	100	32	50	22000	2.00	4	○	2
FMAX-125B06RMB	●	125	40	60	19600	3.81	6	○	2

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



MOUNTING DIMENSIONS

Order number	CBDP	DAH	DCCB	DCFSMS	KWW	LCCB	L8	Type
FMAX-050A04R	20	11	17	47	10.4	12	6.3	1
FMAX-063A04R	20	11	17	60	10.4	12	6.3	1
FMAX-080B04RMB	24	13	30	55	12.4	11	7	2
FMAX-100B04RMB	32	17	39	75	14.4	10	8	2
FMAX-125B06RMB	36	22	45	100	16.4	12	9	2

FMAX

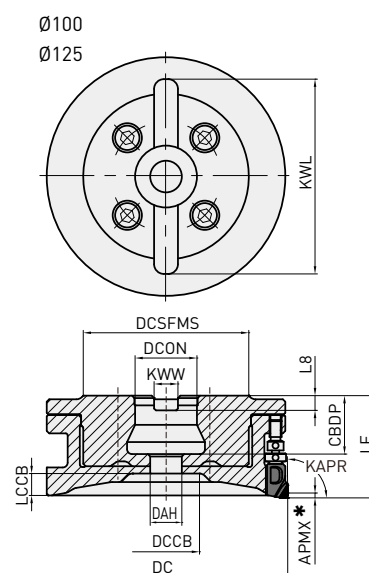


REDUCED WEIGHT MILLING CUTTER FOR USE ON SMALLER MACHINING CENTRES

N



GAMP : +5°
GAMF : 0°



Right hand tool holder only

ARBOR TYPE

Order number	Stock	DC	DCON	LF	RPMX	WT	ZEFP
FMAXR10010CLW	●	100	25.4	42	22000	1.06	10
FMAXR10016CLW	●	100	25.4	42	22000	1.11	16
FMAXR12514CLW	●	125	25.4	42	19600	1.44	14
FMAXR12520CLW	●	125	25.4	42	19600	1.48	20

* For the maximum depth of cut, please refer to recommended cutting conditions (ap).
1. 2 mm or less is the recommended maximum depth of cut for ultra high efficiency machining.



MOUNTING DIMENSIONS

Order number	CBDP	DAH	DCCB	DCSFMS	KWW	LCCB	L8	C	KWL
FMAXR10010CLW	24	13	27	68	9.5	9	6	–	80
FMAXR10016CLW	24	13	27	68	9.5	9	6	–	80
FMAXR12514CLW	24	13	52	68	9.5	9	6	–	80
FMAXR12520CLW	24	13	52	68	9.5	9	6	–	80

FMAX



HIGH FEED MILLING CUTTER FOR FINISHING

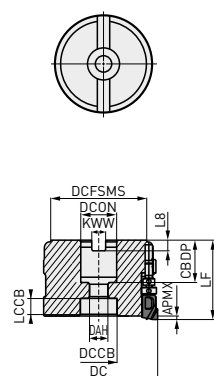
N



KAPR : 90°
 CH : 0°
 GAMP : +5°
 GAMF Ø40 - Ø63 : -6° - -3°
 GAMF Ø80 - Ø125 : 0°

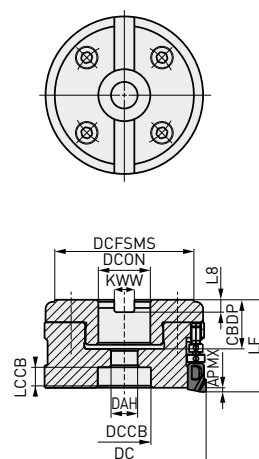
1

Ø40
 Ø50
 Ø63



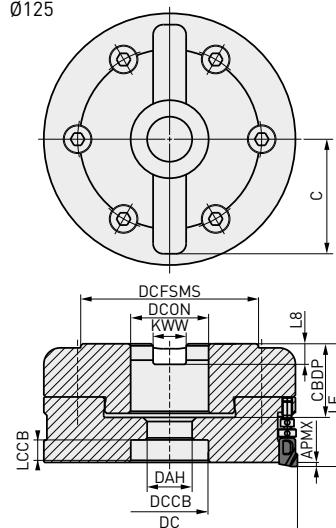
2

Ø80



3

Ø100
 Ø125



ARBOR TYPE

Order number	Stock	DC	DCON	LF	RPMX	WT	ZEFP	Type
FMAX-040A04R	★	40	16	40	30000	0.24	4	1
FMAX-040A06R	★	40	16	40	30000	0.23	6	1
FMAX-050A08R	★	50	22	40	30000	0.37	8	1
FMAX-050A10R	●	50	22	40	30000	0.35	10	1
FMAX-063A10R	★	63	22	40	27000	0.67	10	1
FMAX-063A12R	●	63	22	40	27000	0.66	12	1
FMAX-080B14R	●	80	27	45	24500	1.08	14	2
FMAX-100B18R	●	100	32	50	22000	1.81	18	3
FMAX-125B24R	●	125	40	60	19600	3.26	24	3

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



MOUNTING DIMENSIONS

Order number	CBDP	DAH	DCCB	DCFSMS	KWW	LCCB	L8	C	Type
FMAX-040A04R	18	9	14	37	8.4	10	5.6	-	1
FMAX-040A06R	18	9	14	37	8.4	10	5.6	-	1
FMAX-050A08R	20	11	17	47	10.4	12	6.3	-	1
FMAX-050A10R	20	11	17	47	10.4	12	6.3	-	1
FMAX-063A10R	20	11	17	60	10.4	12	6.3	-	1
FMAX-063A12R	20	11	17	60	10.4	12	6.3	-	1
FMAX-080B14R	24	13	26	68	12.4	11	7	-	2
FMAX-100B18R	32	17	32	79	14.4	10	8	45	3
FMAX-125B24R	36	22	38	88	16.4	12	9	56	3

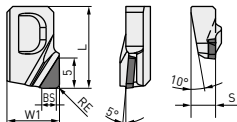
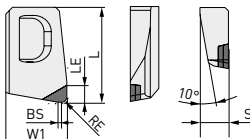
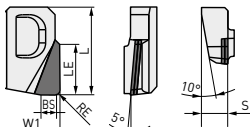
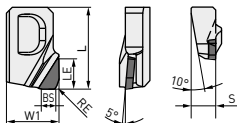
● : Inventory maintained. ★ : Inventory maintained in Japan.

SPARE PARTS

Tool holder number						
	Insert clamp screw	Micro adjustment nut	Fine pitch adjustment screw	Cutter clamp bolt	Wrench	Adjustment pin
FMAX-040 ○○○○	TSS04505S	KSN2 KSN3	KSS2	HSC08030H	TKY10T	RKY25S
FMAX-050 ○○○○				HSC10030H		
FMAX-063 ○○○○				HSC10030H		
FMAX-080 ○○○○				HSCX12030H		
FMAX-100 ○○○○				HSCX16035H		
FMAX-125 ○○○○				HSCX20035H		

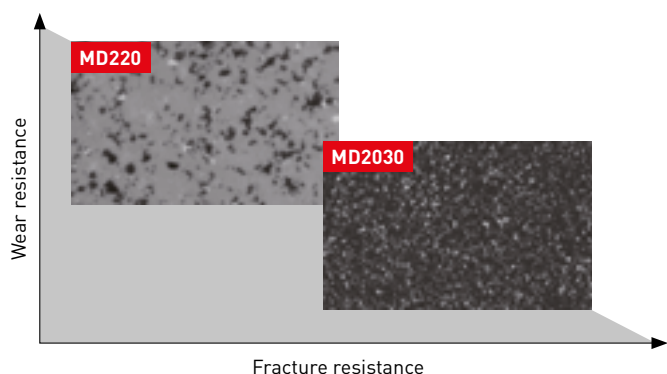
1. Clamp torque TSS04505S = 3.5 Nm
2. Please refer to the manual included for instructions how to seat the insert and adjust the run out.

INSERTS

Order number	MD2030	MD220	MB4120	L	LE	W1	S	BS	RE	Figure
GOER1404PXFR2	●	●		14.0	5.0	9.0	4.2	2.0	0.4	 
GOER1408PXFR2	●	●		14.0	5.0	9.0	4.2	2.0	0.8	
General purpose										
NP-GOEN1404PXSR05			★	14.0	2.5	9.0	4.2	0.5	0.4	 
NP-GOEN1408PXSR05			★	14.0	2.5	9.0	4.2	0.5	0.8	
General purpose										
GOER1408PXFR2-8		★		14.0	8.0	9.0	4.2	2.0	0.8	 
Long cutting edge										
GOER1401ZXFR2	●			14.0	5.0	9.0	4.2	2.0	0.1	 
Burr prevention										

1. If general-purpose inserts (RE = 0.4 mm, 0.8 mm) and burr prevention inserts are used together, they will not be able to achieve full performance.
2. Inserts of the same geometry should be used for all teeth.

FEATURES OF PCD GRADES

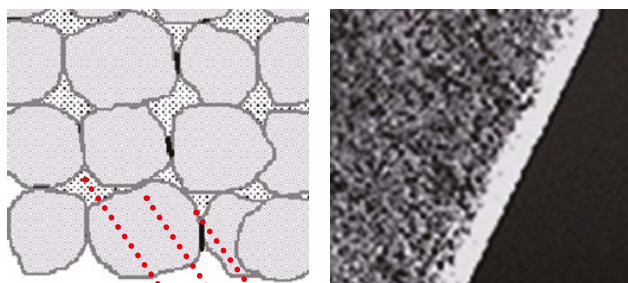


MD220

- Focused on wear resistance
- Prevention of burrs for longer tool life

MD2030

- Diamond sintered grade containing ultra microparticle diamond
- Optimised for milling
- Improved fracture resistance during interrupted cutting
- Offers a highly stable cutting edge that prevents burrs and gives an excellent surface finish



BONDING OF DIAMOND PARTICLES

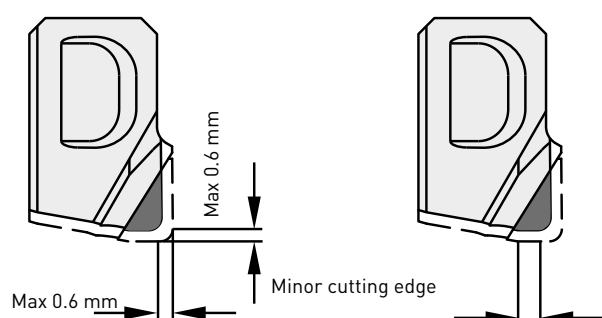
The strong bonding of the diamond particles provides a highly stable cutting edge.



Bond

Diamond particles

Binding material



RE-MANUFACTURING

- The maximum material to be removed is 0.6 mm.
- Use similar inserts at similar stages of refurbishing to maintain the balance of the cutter.
- After refurbishment, the minor edge will reduce in size and may affect surface finishes.

Please contact us about the optimum conditions for re-grinding.

CBN GRADE HIGH FRACTURE RESISTANCE

FEATURES OF MB4120

Fine CBN particles increase edge toughness and the high fracture resistance provides stability. The ideal grade for preventing fracturing, edge chipping and thermal cracks. Also capable of use when there is coolant remaining on the component from the preceding machining operation.

FMAX

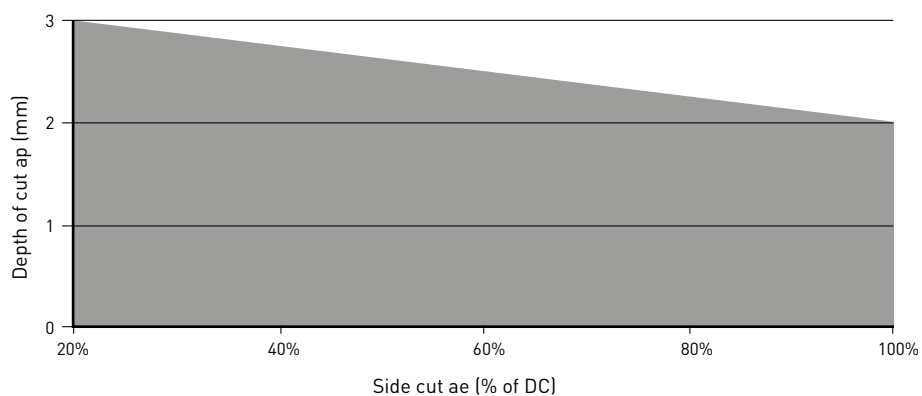
RECOMMENDED CUTTING CONDITIONS

Material	Properties	Grade	Vc	ae	ap	fz	Cutting mode
K	Gray cast iron	MB4120	1000 (700 – 1300)	≤0.8 DC	≤0.5	0.07 (0.05 – 0.15)	
				≤0.2 DC	≤3.0 (0.5 – 3.0)		
				≤0.5 DC	≤2.5 (0.5 – 2.5)		
	Si < 5 %	MD2030 MD220	2500 (2000 – 3000)	≤0.8 DC	≤2.0 (0.5 – 2.0)	0.08 (0.05 – 0.2)	
				≤0.2 DC	≤3.0 (0.5 – 3.0)		
				≤0.5 DC	≤2.5 (0.5 – 2.5)		
	5 % ≤ Si ≤ 10 %	MD2030 MD220	2500 (2000 – 3000)	≤0.8 DC	≤2.0 (0.5 – 2.0)	0.08 (0.05 – 0.2)	
				≤0.2 DC	≤3.0 (0.5 – 3.0)		
				≤0.5 DC	≤2.5 (0.5 – 2.5)		
N	Aluminium alloy	MD220 MD2030	600 (400 – 800)	≤0.8 DC	≤2.0 (0.5 – 2.0)	0.08 (0.05 – 0.2)	
				≤0.2 DC	≤3.0 (0.5 – 3.0)		
				≤0.5 DC	≤2.5 (0.5 – 2.5)		
				≤0.8 DC	≤2.0 (0.5 – 2.0)		
				≤0.2 DC	≤3.0 (0.5 – 3.0)		
				≤0.5 DC	≤2.5 (0.5 – 2.5)		
	Si ≥ 15 %	MD220 MD2030	600 (400 – 800)	≤0.8 DC	≤2.0 (0.5 – 2.0)	0.08 (0.05 – 0.2)	
				≤0.2 DC	≤3.0 (0.5 – 3.0)		

1. Please adjust the depth of cut ap depending on the width of cut ae.

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

EFFECTIVE CHIP DISPOSAL RANGE

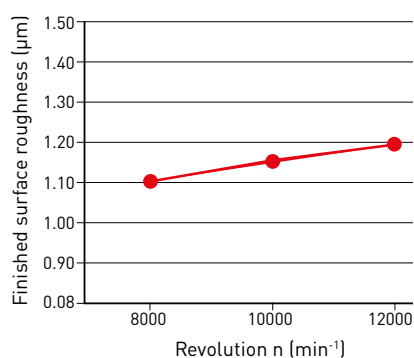


FINISHED SURFACE ROUGHNESS (RZ) CHART IN RELATION TO REVOLUTION

Cutter body	FMAX-125B24R
Insert (Grade)	GOER1408PXFR2 (MD2030)
Workpiece	ADC12 cylinder head
n (min ⁻¹)	8.000 – 12.000
Vc (m/min)	3.140 – 4.710
fz (mm/tooth)	0.08
Vf (mm/min)	15.360 – 23.040
ap (mm)	2.0
ae (mm)	68 x 3 passes
Cutting mode	Internal through coolant 4 MPa
Machine	Horizontal machining centre

Results

The FMAX cutter offered a smooth finishing operation with predictable wear and no burrs. Even at high revolutions the FMAX cutter achieves a top quality surface finish.



APPLICATION EXAMPLES

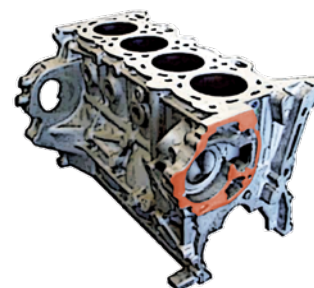
HIGH SPEED FINISHING OF CYLINDER HEAD - EXHAUST SIDE

Cutter body	FMAX-100B18R
Insert (Grade)	GOER1408PXFR2(MD2030)
Workpiece	Aluminium alloy
n (min ⁻¹)	8.000
V_c (m/min)	2.513
f_z (mm/tooth)	0.2
V_f (mm/min)	28.800
a_p (mm)	1.5
a_e (mm)	50
Cutting mode	Wet
Machine	Horizontal machining centre
Results	More than double table feed provided increased efficiency. FMAX gave improved stability and achieved good surface finishes. Flat surface and minimal burrs.



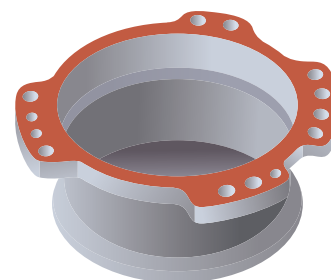
FINISHING OF ENGINE BLOCK - SIDE FLANGE

Cutter body	FMAX-080B14R
Insert (Grade)	GOER1408PXFR2 (MD2030)
Workpiece	Aluminium alloy
n (min ⁻¹)	8.000
V_c (m/min)	2.011
f_z (mm/tooth)	0.13
V_f (mm/min)	14.560
a_p (mm)	2.5
a_e (mm)	20
Cutting mode	Wet
Machine	Horizontal machining centre
Results	Consistent, high accuracy machining combined with reliability and long tool life



BURR FREE FINISHING OF FLANGE SURFACE

Cutter body	FMAX-050A08R
Insert (Grade)	GOER1401ZXFR2 (MD220)
Workpiece	ADC12
n (min ⁻¹)	7.000
V_c (m/min)	1.099
f_z (mm/tooth)	0.06
a_p (mm)	0.3
a_e (mm)	20 – 30
Cutting mode	Wet
Machine	Vertical Type (BT30)
Results	Burr prevention inserts can ensure smooth finished surfaces and maintain their effective burr prevention capabilities over long periods. Thereby enabling tool life three times longer than conventional products.



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