MEAS

High reliability at high speed machining of aluminum

Serrated insert pocket to resist centrifugal force to ensure stable, high speed machining

3-axis machining with a max. ramping angle of 20° (ø25)

PDL025 achieves long tool life with hardness close to that of diamond

NEW **Modular type available and extended face mill lineup**

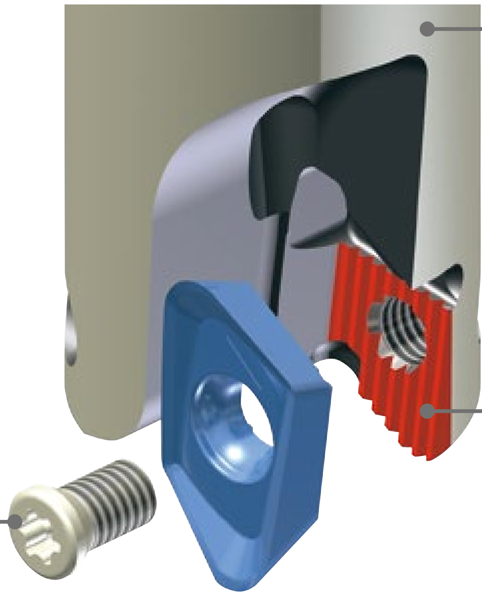
High efficiency end mill for aluminum machining

MEAS

Excellent scatter prevention to ensure stable, high speed aluminum machining. 3-axis machining with large ramping angle for a wide range of machining applications.

1 High reliability and high efficiency machining

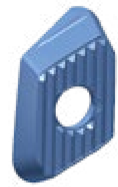
Serrated connection between the insert and holder provides high speed aluminum machining (ø32: recommended max. cutting speed Vc = 3,000 m/min)



Balance grade G6.3

Prevents vibration during high speed machining (ISO1940/1)

Back of the insert



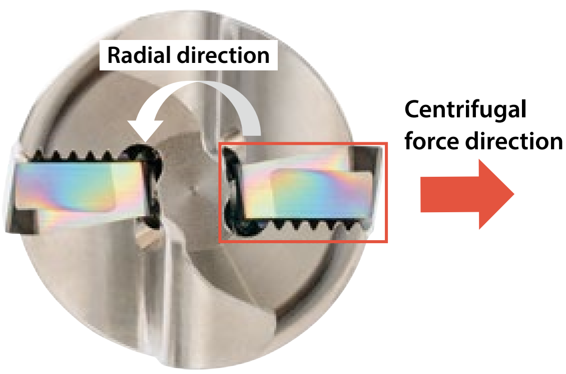
M4 insert screw

Unique serrated contact surface

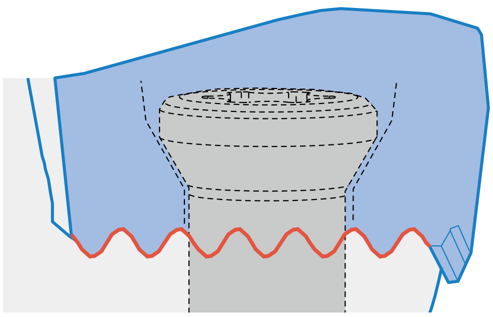
Prevents insert screw breakage and ensures safety

Serrated insert pocket

Centrifugal force is applied across the grooved surface to reduce pressure on the insert screw. Prevents insert screw breakage and safely secures the insert during high-speed revolutions

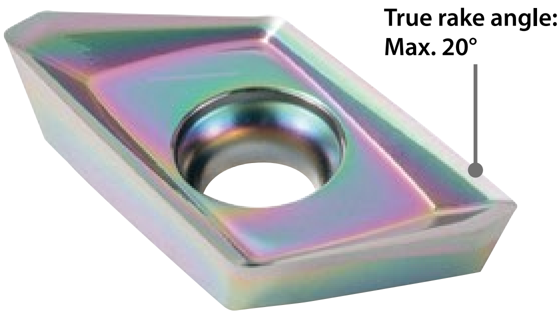


Serrated contact surface

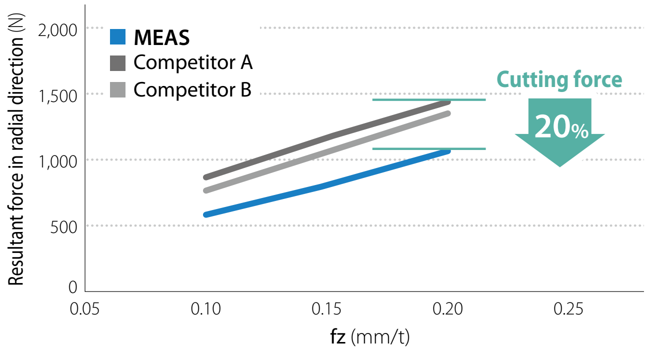


2 Low cutting force with sharp cutting edge

True rake angle max. 20°
Low cutting force and excellent chattering resistance



Cutting force comparison (In-house evaluation)

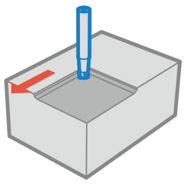


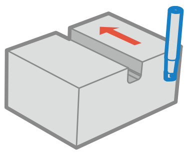
Cutting conditions: Vc = 390 m/min, ap × ae = 8 × 5 mm, dry
Cutter dia. ø25 mm (2 inserts) Workpiece: AlZnMgCu1.5

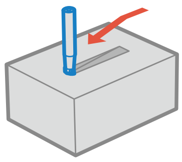
3 Machining for a wide variety of applications

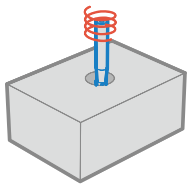
Max. ramping angle 20° (ø25)

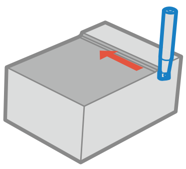
The MEAS can be used for shouldering, slotting, ramping, and helical milling applications

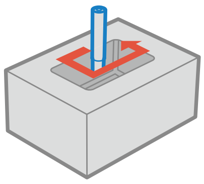

Face milling & Shouldering

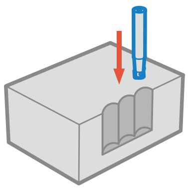

Slotting


Ramping


Helical milling

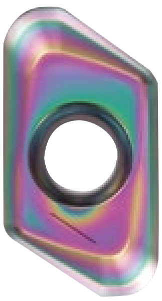

Contouring

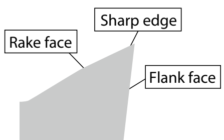

Pocketing


Plunging

Two different chipbreaker available

AL chipbreaker with low cutting force design



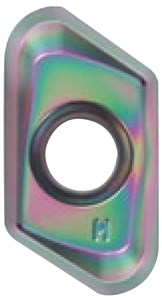


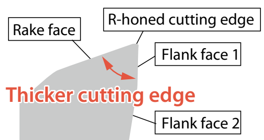
Chipbreaker cross section

Large rake angle and sharp edge design provide stable machining with low cutting force

Cutting conditions can be increased even for equipment with weak rigidity to increase efficiency

AM chipbreaker with tough edge





Chipbreaker cross section

Optimized rake angle, adopted 2-step rake angle and R honing improve cutting edge strength

Supports high-speed aluminum milling of Vc = 3,000 m/min or more
(When machining aluminum with a Si ratio 12.5% or less)

MEAS | End mill

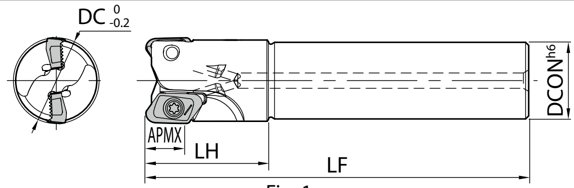


Fig. 1

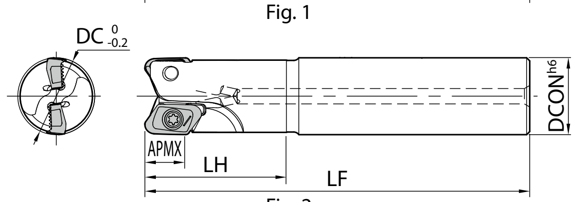


Fig. 2

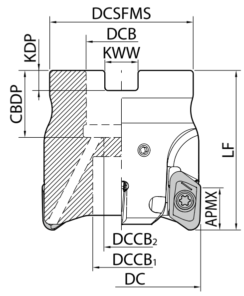
Toolholder dimensions

Description			Availability	No. of inserts	Dimensions (mm)					Rake angle		Coolant hole	Weight (kg)	Drawing	Spare parts			Max. revolution (min^{-1})
					DC	DCON	LF	LH	APMX	A.R. (MAX.)	R.R.				Clamp screw	Wrench	Anti-seize compound	
Straight shank	Standard	MEAS 28-S25-13-2T	●	2	28	25	125	40	12	+10°	-13°	Yes	0.4	Fig. 1	SB-4090TRP	DTPM-15 Recommended torque for insert clamp 3.5 N·m	P-37	54,000
		35-S32-13-2T	●		35	32	150	50			-13°		0.9					46,000
		40-S32-13-3T	●	3	40						-12°		0.9					42,000
	Same size	MEAS 25-S25-13-2T	●	2	25	25	125	49	12	+10°	-14°	Yes	0.4	Fig. 2	SB-4075TRP			59,000
		32-S32-13-2T	●		32	32	150	69			-13°		0.8		SB-4090TRP			49,000
	Long	MEAS 25-S25-13-2T-170	●	2	25	25	170	89	12	+10°	-14°	Yes	0.5	Fig. 2	SB-4075TRP			49,000
		32-S32-13-2T-200	●		32	32	200	119			-13°		1.1		SB-4090TRP			39,000

When using inserts with a corner-R (RE) of 3.2 or larger, additional modifications (R3.5 mm or larger) on the corner of cutter body is necessary.
If corner-radius is 3.0 mm or smaller, additional modifications are not needed.
Coat Anti-seize compound (P-37) thinly on portion of taper and thread when insert is fixed.

● : Available

MEAS | Face mill

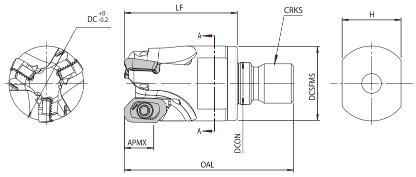


Toolholder dimensions

Description		Availability	No. of inserts	Dimensions (mm)										Rake angle		Coolant hole	Weight (kg)	Spare parts				Max. revolution (min^{-1})
				DC	DCSFMS	DCB	DCCB1	DCCB2	LF	CBDP	KDP	KWW	APMX	A.R. (MAX.)	R.R.			Clamp screw	Mounting bolt	Wrench	Anti-seize compound	
MEAS	040R-13-3T-M-KUA	●	3	40	38	16	14	9	40	18	5.6	8.4	12	+10°	-11°	Yes	0.3	SB-4090TRP	HH10X30H	DTPM-15 Recommended torque for insert clamp 3.5 N·m	P-37	44,000
	050R-13-4T-M	●	4	50	45	22	18	11	50	21	6.3	10.4					0.4					36,000
	063R-13-5T-M-KUA	●	5	63	47												0.6					28,000
	080R-13-5T-M-KUA	●		80	60	27	20	13	63	22	7	12.4					1.0					22,000

When using inserts with a corner-R (RE) of 3.2 or larger, additional modifications (R3.5 mm or larger) on the corner of cutter body is necessary.
If corner-radius is 3.0 mm or smaller, additional modifications are not needed.
Coat Anti-seize compound (P-37) thinly on portion of taper and thread when insert is fixed.

● : Available



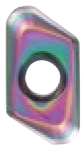
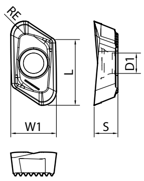
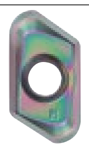
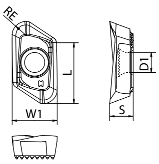
Toolholder dimensions

Description		Availability	No. of inserts	Dimensions (mm) DC	DCSFMS	DCON	OAL	LF	CRKS	H	APMX	Rake angle A.R. (MAX.)	R.R.	Coolant hole	Spare parts Clamp screw	Wrench	Anti-seize compound	Max. revolution (min^{-1})
MEAS	25-M12-13-2T-KUA	●	2	25	23	12.5	63	40	M12xP1.75	19	12	+10°	-11°	Yes	SB-4075TRP	DTPM-15	P-37	49,000
	32-M16-13-3T-KUA	●	3	32	30	17	69	46	M16xP2.0	24					SB-4090TRP			39,000

When using inserts with a corner-R (RE) of 3.2 or larger, additional modifications (R3.5 mm or larger) on the corner of cutter body is necessary.
If corner-radius is 3.0 mm or smaller, additional modifications are not needed. Recommended torque for insert clamp 3.5 N·m.
Coat Anti-seize compound (P-37) thinly on portion of taper and thread when insert is fixed.

● : Available

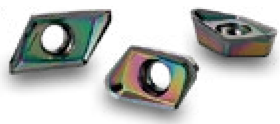
Applicable inserts

Shape		Description		Dimension (mm) W1	S	D1	L	RE	DLC coating PDL025
		KCGT	130504FR-AL	9.9	5.1	4.4	14.1	0.4	●
			130508FR-AL				13.9	0.8	●
			130512FR-AL				13.8	1.2	●
			130516FR-AL				13.3	1.6	●
			130520FR-AL					2.0	●
			130524FR-AL					2.4	●
			130530FR-AL					3.0	●
			130532FR-AL				12.8	3.2	●
			130540FR-AL					4.0	●
			130550FR-AL					5.0	●
 Tough edge		KCGT	130504ER-AM	9.9	5.1	4.4	13.7	0.4	●
			130508ER-AM					0.8	●
			130516ER-AM				13.3	1.6	●
			130525ER-AM					2.5	●
			130530ER-AM					3.0	●
			130540ER-AM				12.8	4.0	●

● : Available

PDL025

Kyocera's proprietary hydrogen-free DLC coating
Achieves long tool life with hardness close to that of diamond

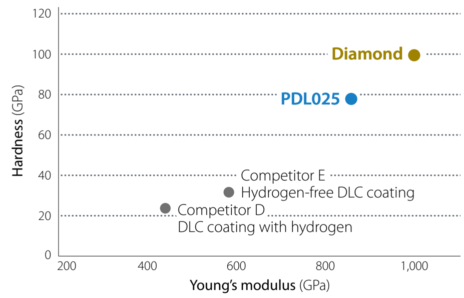


1 Long and stable tool life

2 Excellent surface finish

3 Stable machining

Coating properties (Internal evaluation)



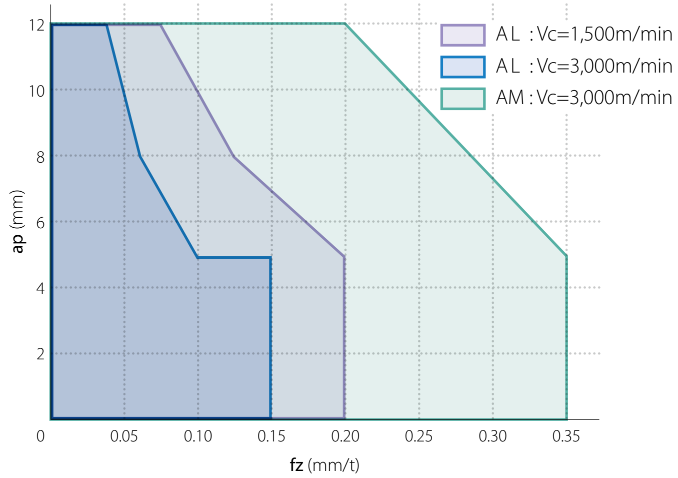
Recommended cutting conditions

Workpiece		Chipbreaker	Cutting speed Vc (m/min)	Cutting width ae (mm)	Cutting diameter/Feed ap = 0.5 mm (Reference value)	
				Cutting diameter DC	Cutting dia.ø28 or less	Cutting dia.ø32 or more
Aluminum alloy	Si ratio 12.5% or below	AL	200 ~ **1,000** ~ 3,000	≤0.5DC	0.05 ~ **0.15** ~ 0.25	
				0.5DC<	0.05 ~ **0.15** ~ 0.25	
		AM	*200 ~ **1,000** ~ 5,000	≤0.5DC	0.05 ~ **0.15** ~ 0.3	0.05 ~ **0.2** ~ 0.35
				0.5DC<	0.05 ~ **0.15** ~ 0.25	0.05 ~ **0.15** ~ 0.3
	Si ratio 12.5% or above	AL	200 ~ **300** ~ 400	≤0.5DC	0.05 ~ **0.1** ~ 0.2	
				0.5DC<	0.05 ~ **0.1** ~ 0.2	
		AM	*200 ~ **300** ~ 800	≤0.5DC	0.05 ~ **0.15** ~ 0.3	0.05 ~ **0.2** ~ 0.35
				0.5DC<	0.05 ~ **0.15** ~ 0.25	0.05 ~ **0.15** ~ 0.3

1. *Please note that the cutting speed is different between AL chipbreaker and AM chipbreaker.
2. Adjust the cutting speed and feed within the recommended machining range according to the actual cutting conditions. (machine rigidity, work rigidity, etc.)
3. Do not use it under conditions that exceed the recommended conditions.
4. When using at high speed rotation (10,000 min^{-1} or more), take effective safety measures by adjusting the balance of the combination of the tool body and arbor at the speed you are using, referring to the balance grade table below.
5. For high-speed machining, check the condition of the screws and replace them regularly. (When the cutting speed is 3,000 m/min, replace the screws when replacing inserts.)

MEAS cutting performance

ø50 (4 inserts) shouldering ae = 25 mm Workpiece: AlZnMgCu1.5



Spindle revolution (min^{-1})	ISO Balance grade ISO 1940-1/8821 (JIS B0905)
~ 20,000	G16
~ 30,000	G6.3
30,000 ~	G2.5

• Reduce the feed rate when machining at high speed.

Max. revolution for each cutting diameter

Cutting diameter DC (mm)	Cutter max. revolution n (min^{-1})
25	59,000 (Long shank : 49,000)
28	54,000
32	49,000
35	46,000 (Long shank : 39,000)
40	42,000
50	36,000

Maximum revolution without balance adjustment in combination with arbor

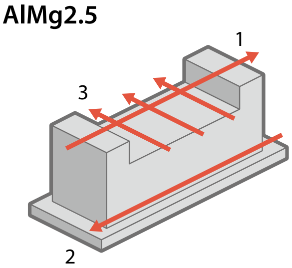
Cutting diameter DC (mm)	Cutter max. revolution n (min^{-1})
25	12,500
28	11,500
32	9,600
35	8,800
40	7,700
50	6,300

Case study

Industrial machine parts AlMg2.5

Vc = 1,500 m/min (n = 9,550 min^{-1})
1. ap x ae = 3 x 40 mm
   fz = 0.2 mm/t (Vf = 7,640 mm/min)
2. ap x ae = 8 x 5 mm
   fz = 0.2 mm/t (Vf = 7,640 mm/min)
3. ap x ae = 2 x ~ 50 mm
   fz = 0.15 mm/t (Vf = 5,730 mm/min)
   Wet

MEAS050R-13-4T-M
KCGT130504FR-AL PDL025



Cutting time

MEAS ø50-4T — **190 Sec**

50%

Competitor C ø50-3T — **430 Sec**

MEAS showed 50% faster cycle time or more compared to competitor C

(User evaluation)

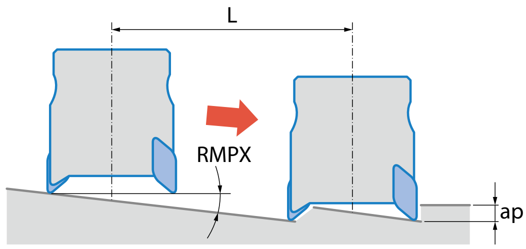
Ramping reference data

Cutting dia. DC (mm)	25	28	32	35	40	50	63	80
Max. ramping angle RMPX	20°	16°	12.5°	11°	8.5°	6°	3.9°	2.8°
tan RMPX	0.363	0.287	0.221	0.194	0.149	0.105	0.068	0.049

Ramping tips

Recommended ramping angle is ≤ RMPX
(see chart above for recommended ramp angle)
Reduce recommended feed rate by 50%

Max. cutting length (L) at max. ramping angle $L = \dfrac{ap}{\tan RMPX}$



Plunging tips

Reduce feed rate to fz ≤ 0.1mm/t when plunging

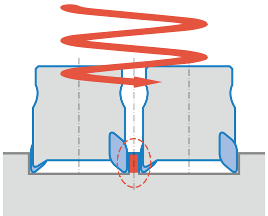
Insert description	Maximum width of cut (ae)
KCGT13 type	8 mm

Helical milling tips

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

Exceeding max. cutting diameter

Center core remains after machining

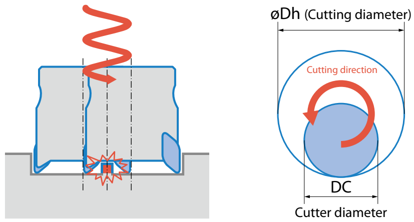


Description	Min. cutting diameter	Max. cutting diameter	Maximum ramping depth per cycle
MEAS···13···	2×DC-16	2×DC-3	3.5

Unit: mm

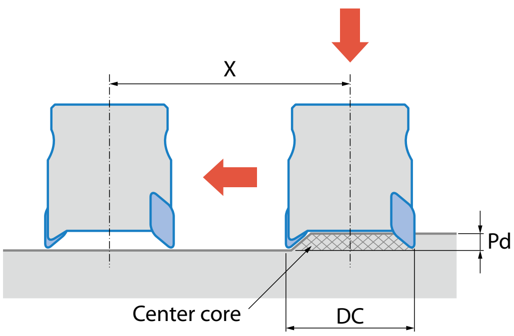
Under min. cutting diameter

Center core hits holder body



- Use down cut (Refer to detail on right)
- Feed rates should be reduced to 50% of recommended cutting
- Use caution to eliminate incidences caused by producing long chips

Peck milling tips



Peck milling depth
Please refer to the figure above (Pd: Max. pecking depth)
Traversing after drilling
1. It is recommended to reduce feed by fz = 0.15 (mm/t) or less until the center core is removed
2. Axial feed rate recommendation per revolution is f = 0.1mm/rev or less

Description	Max. drilling depth Pd	Min. cutting length X for flat bottom surface
MEAS····13····	3.5	DC-16

Unit: mm

How to mount inserts

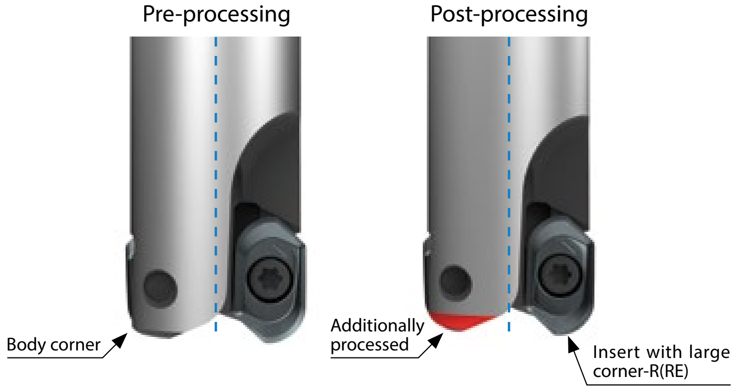
1. Completely eliminate chips and dust from the insert mounting side
2. Insert screw
   - Coat anti-seize compound (P-37) thinly on portion of taper and thread
   - Attach screw to the magnetized wrench tip and tighten while gently pressing the outside edge of the insert toward the insert pocket surface (grooved surface). See the picture on the right. Recommended torque 3.5 N·m

When using inserts with a corner-R(RE) of 3.2 or larger

When using inserts with corner-R(RE) 3.2 or larger, additional modifications of the cutter body will be necessary.
Additional modifications for the body will be necessary.
Ref. to the chart below for the recommended modifications.
After the additional modifications, adjust the balance grade to G6.3 at a speed of 10,000 min^{-1}.
Make sure that there is no burr on the insert pocket surface (grooved surface).
(If corner-R is 3.0 mm or smaller, additional modifications are not needed.)

Insert corner-R(RE) (mm)	Additional processing dimension to body corner (mm)
3.2	R2.0
4.0	R2.5
5.0	R3.0

* Round- shaped additional processing is recommended.
Do not make any additional chamfering.



Cautions

While in use

Caution

Please use within recommended cutting conditions

Do not run the cutter at revolutions exceeding the printed maximum revolution limit of the cutter body

Inserts may be damaged due to the centrifugal force and cutting load.

Please do not use under the following conditions:

When cutter is not fully loaded with inserts if the body is damaged.

Please wear protective equipment such as protective glove when changing inserts

Injury can occur when touching the cutting edge.

Dynamic balance

Balance adjustment on the cutter is completed before shipping

Balance adjustment has been made with special high precision inserts to be ISO balance grade (ISO1940/1) G6.3

When using at a higher revolution (10,000min^{-1} or over), refer to the table below to adjust the balance of MEAS and arbor

Do not operate the balance adjustment screw on the outer periphery of the cutter. This could lead to improper dynamic balance