



MEAS

High-Efficiency Milling Cutters for Aluminum Machining



High-Speed, High-Efficiency Machining for Aluminum

Grooved Insert Pockets Provide Secure Clamping to Ensure Stable, High-Speed Machining

Sharp Cutting Edge with Low Cutting Force Design

Simultaneous 3-axis with a Max. Ramping Angle of 20° (Ø1.000" / Ø25mm)

Kyocera's Proprietary Hydrogen-free DLC Coated PDL025 Inserts

NEW AM Chipbreaker with Tough Edge



MEAS

High Efficiency Milling Cutters for Aluminum Machining

Excellent Scatter Prevention to Ensure Stable, High Speed Aluminum Machining
Simultaneous 3-axis with Large Ramping Angle for a Wide Range of Machining Applications

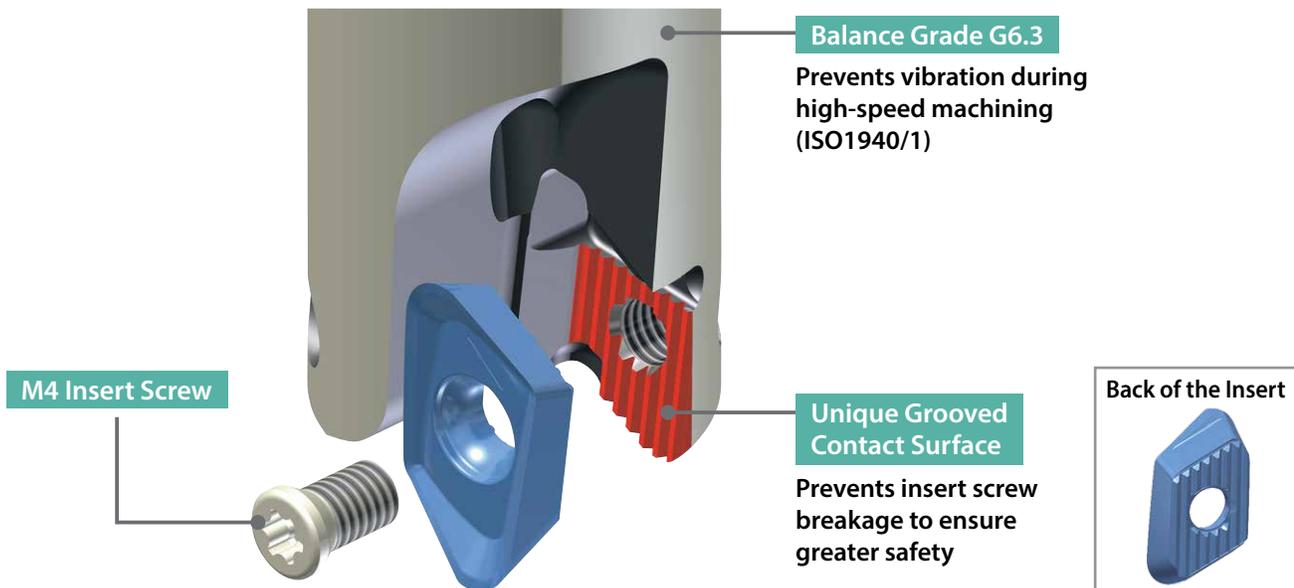


1 Reliable High Efficiency Machining

Grooved Connection Between the Insert and Holder

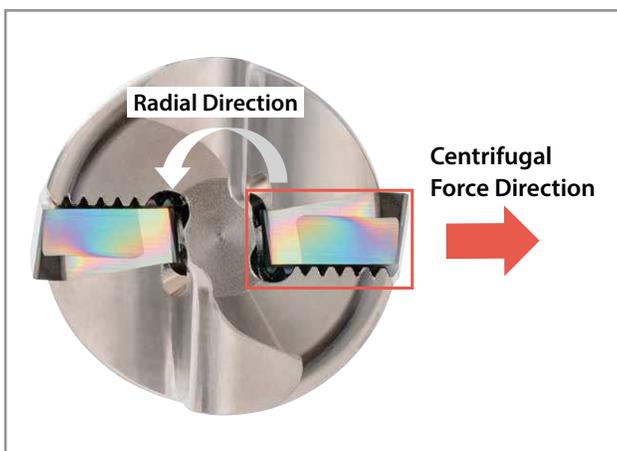
Provides High-Speed Aluminum Machining

($\phi 1.250'' / \phi 32\text{mm}$: Recommended Max. Cutting Speed $V_c = 9,840 \text{ sfm}$) *When using AL chipbreaker

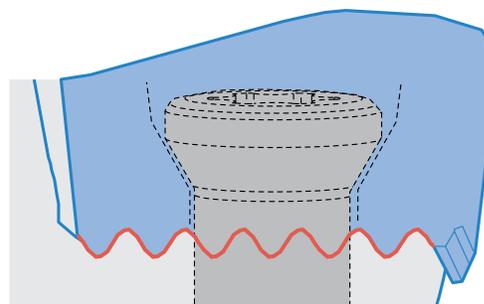


Grooved Insert Pocket

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



Grooved Contact Surface

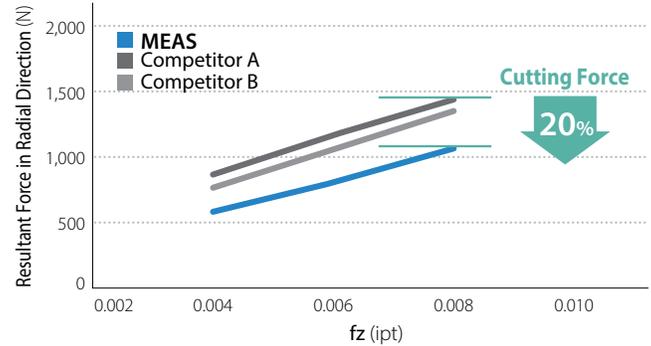


2 Low Cutting Force with Sharp Cutting Edge

True Rake Angle Max. 20°
Low Cutting Force and Excellent Chattering Resistance



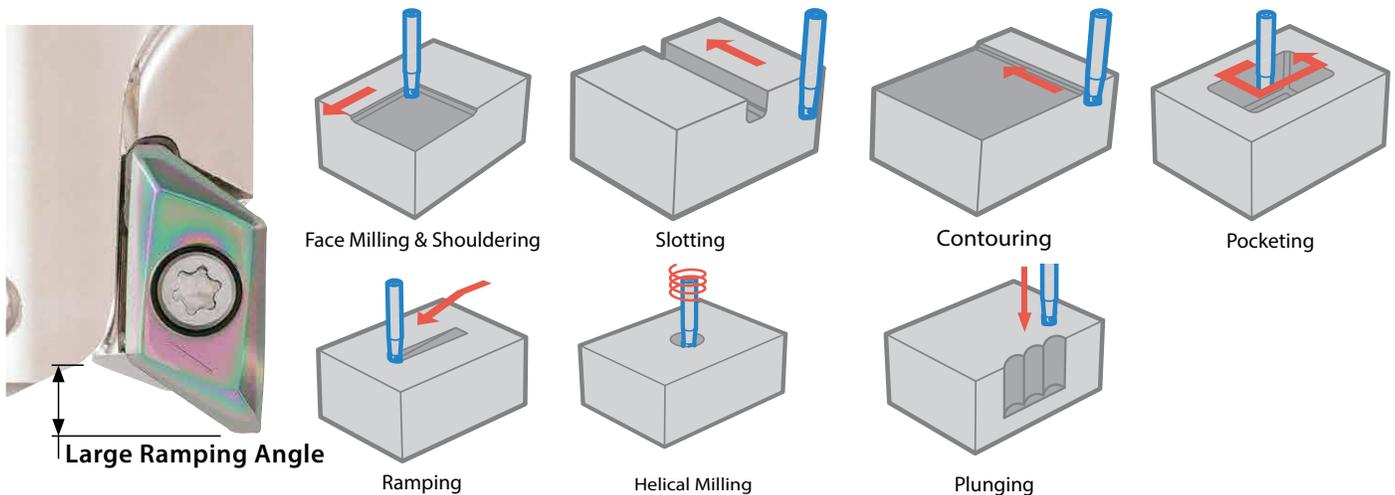
Cutting Force Comparison (Internal Evaluation)



Cutting Conditions: $V_c = 1,280$ sfm, D.O.C. \times ae = $0.315'' \times 0.197''$, Dry
Cutter Diameter: $\varnothing 1.000''$ (2 flutes) Workpiece: 7075

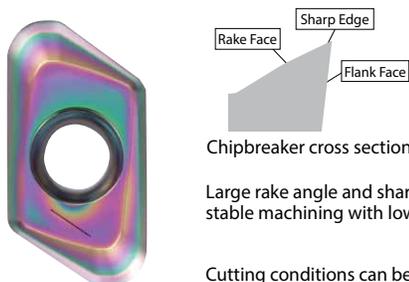
3 Machining for a Wide Variety of Applications

Max. Ramping Angle 20° ($\varnothing 1.000'' / \varnothing 25\text{mm}$)
The MEAS can be used for shouldering, slotting, ramping, and helical milling applications



Two Different Chipbreakers Available

AL Chipbreaker with Low Cutting Force Design

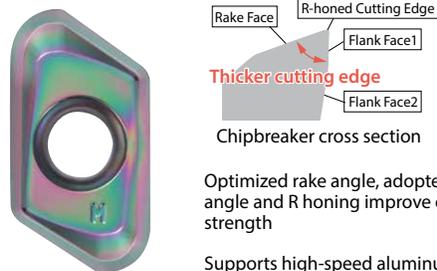


Chipbreaker cross section

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

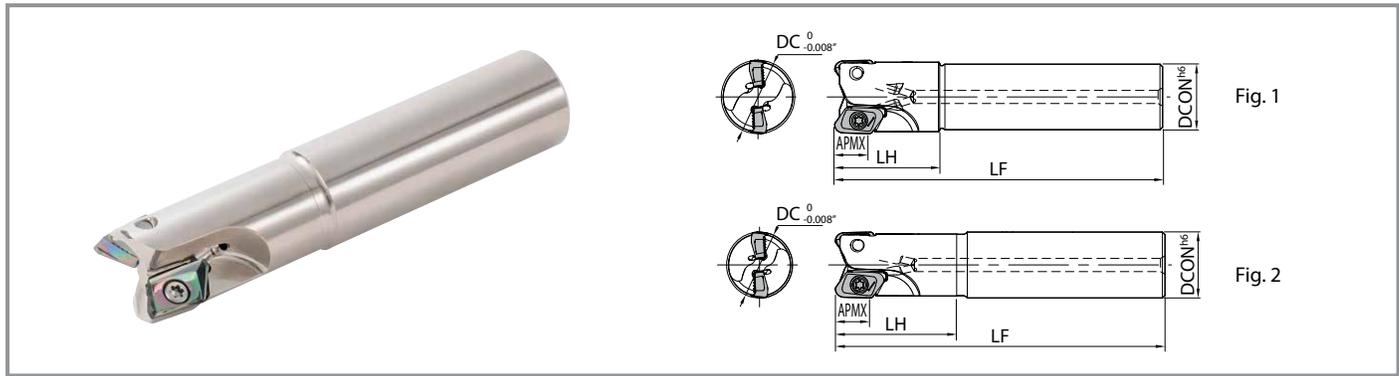
NEW AM Chipbreaker with Tough Edge



Chipbreaker cross section

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

Supports high-speed aluminum milling of $V_c = 9,840$ sfm or more
(When machining aluminum with a Si ratio 12.5% or less)

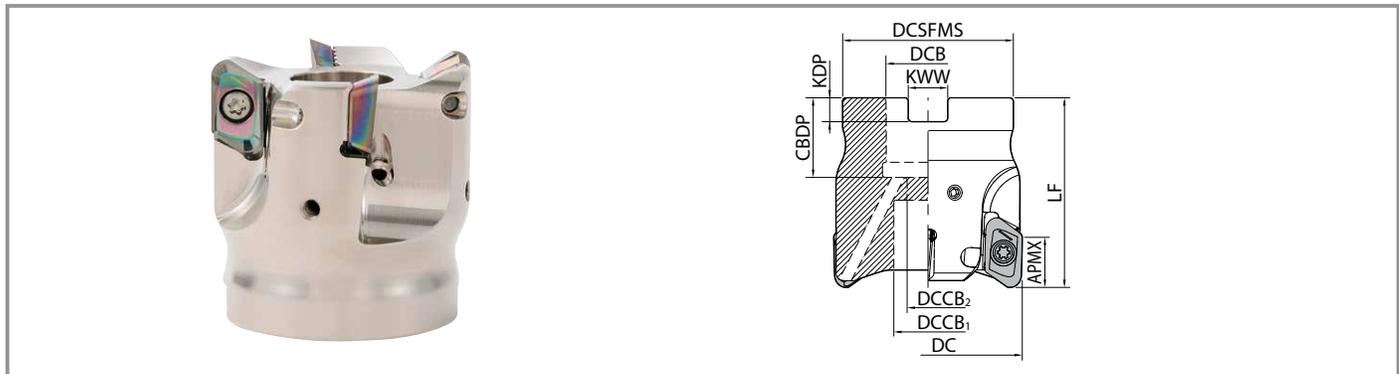


Toolholder Dimensions (Inch / Metric)

Part Number	Stock	Unit	No. of Inserts	Dimensions (mm)					Rake Angle		Coolant Hole	Drawing	Spare Parts			Weight (kg)	Max RPM	
				DC	DCON	LF	LH	APMX	A.R. (MAX.)	R.R.			Clamp Screw	Wrench	Anti-seize Compound			
Cylindrical Shank	Standard	inch	MEAS 1000-S1000-13-2T	2	1.000	1.000	5.000	2.000	0.472	+10°	14°	Yes	Fig.2	SB-4075TRP	DTPM-15 Recommended Torque for Insert Clamp 3.5 Nm	P-37	0.4	59,000
			1250-S1250-13-2T	2	1.250	1.250	6.000	2.750	0.472	+10°	13°		Fig.2	SB-4090TRP			0.8	49,000
			1500-S1250-13-3T	3	1.500	1.250	6.000	2.000	0.472	+10°	12°		Fig.1	SB-4090TRP			0.9	42,000
	Long	inch	MEAS 1000S1000132T675	2	1.000	1.000	6.750	3.550	0.472	+10°	14°	Yes	Fig.2	SB-4075TRP	DTPM-15 Recommended Torque for Insert Clamp 3.5 Nm	P-37	0.6	49,000
			1250S1250132T800	2	1.250	1.250	8.000	4.800	0.472	+10°	13°		Fig.2	SB-4090TRP			1.1	39,000
	Standard	mm	MEAS 25-S25-13-2T	2	25	25	125	49	12	+10°	-14°	Yes	Fig.2	SB-4075TRP	DTPM-15 Recommended Torque for Insert Clamp 3.5 Nm	P-37	0.4	59,000
			28-S25-13-2T	2	28	25	125	40	12	+10°	-13°		Fig.1	SB-4090TRP			0.4	54,000
			32-S32-13-2T	2	32	32	150	69	12	+10°	-13°		Fig.2	SB-4090TRP			0.8	49,000
			35-S32-13-2T	2	35	32	150	50	12	+10°	-13°		Fig.1	SB-4090TRP			0.9	46,000
			40-S32-13-3T	3	40	32	150	50	12	+10°	-12°		Fig.1	SB-4090TRP			0.9	42,000
Long	mm	MEAS 25-S25-13-2T-170	2	25	25	170	89	12	+10°	-14°	Yes	Fig.2	SB-4075TRP	DTPM-15 Recommended Torque for Insert Clamp 3.5 Nm	P-37	0.5	49,000	
		32-S32-13-2T-200	2	32	32	200	119	12	+10°	-13°		Fig.2	SB-4090TRP			1.1	39,000	

When using inserts with a corner-R (RE) of 1/8" (3.2mm), or larger, additional modifications (R0.138" (3.5mm) or larger) on the corner of cutter body is necessary (If corner-radius is 0.118" (3.0mm) or smaller, additional modifications are not needed) ●: Standard Item
Coat Anti-seize Compound (P-37) thinly on portion of taper and thread when insert is mounted.

MEAS | Face Mill



Toolholder Dimensions (Inch / Metric)

Part Number	Stock	Unit	No. of Inserts	Dimensions (mm)										Rake Angle		Coolant Hole	Spare Parts				Weight (kg)	Max. RPM
				DC	DCSFMS	DCB	DCCB ₂	DCCB ₁	LF	CDBP	KDP	KWW	APMX	A.R. (MAX.)	R.R.		Clamp Screw	Arbor Bolt	Wrench	Anti-seize Compound		
MEAS 2000R-13-4T	●	inch	4	2.000	1.750	0.750	0.669	0.433	1.969	0.750	0.187	0.313	0.472	+10°	-10°	Yes	SB-4090TRP	HH3/8-1.25	DTPM-15 Recommended Torque for Insert Clamp 3.5Nm	P-37	0.4	36,000
MEAS 050R-13-4T-M	●	mm	4	50	45	22	18	11	50	21	6.3	10.4	12	+10°	-11°	Yes	SB-4090TRP	HH10X30H	P-37	0.4	36,000	

When using inserts with a corner-R (RE) of 1/8" (3.2mm), or larger, additional modifications (R0.138" (3.5mm) or larger) on the corner of cutter body is necessary (If corner-radius is 0.118" (3.0mm) or smaller, additional modifications are not needed) ●: Standard Item
Coat Anti-seize Compound (P-37) thinly on portion of taper and thread when insert is mounted.

Applicable Inserts

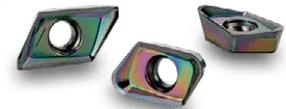
Shape	Part Number	Dimension (in)					DLC Coating
		W1	S	D1	L	RE	PDL025
	KCGT 130504FR-AL	0.390	0.201	0.173	0.555	1/64	●
	130508FR-AL				0.547	1/32	●
	130512FR-AL				0.543	3/64	●
	130516FR-AL				0.524	1/16	●
	130520FR-AL					5/64	●
	130524FR-AL					3/32	●
	130530FR-AL					0.118	●
	130532FR-AL				0.504	1/8	●
	130540FR-AL					0.157	●
	130550FR-AL					5.0	●
<p>NEW</p> <p>Tough Edge</p>	KCGT 130504ER-AM	0.390	0.201	0.173	0.539	1/64	●
	130508ER-AM				0.524	1/32	●
	130516ER-AM					1/16	●
	130525ER-AM				0.098	●	
	130530ER-AM				0.118	●	
	130540ER-AM				0.504	0.157	●

● : Standard Stock

DLC Coating

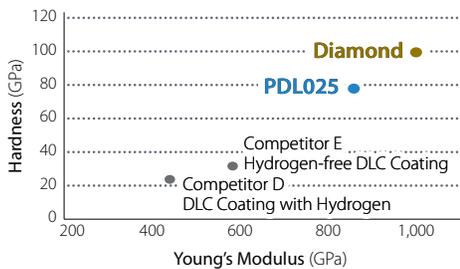
PDL025

Kyocera's Proprietary Hydrogen-free DLC Coating
Achieves Long Tool Life with Hardness Close to that of Diamond

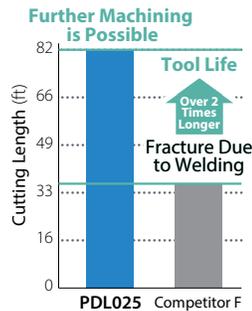


1 Long and Stable Tool Life

Coating Properties (Internal Evaluation)



Tool Life (Internal Evaluation)



PDL025
After Machining 82 ft



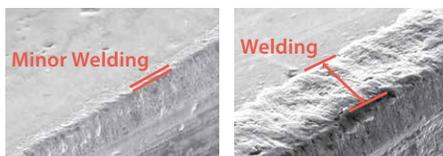
Competitor F
After Machining 36 ft

Cutting Conditions : Vc = 1,640 sfm, D.O.C. x ae = 0.118" x 0.197",
fz = 0.008 ipr, Dry
Cutter Dia. : 1.000" Workpiece : 7175

2 Excellent Surface Finish

Excellent Surface Finish with Aluminum Welding Resistance

Welding Resistance Comparison (Internal Evaluation)



PDL025 **Competitor G**

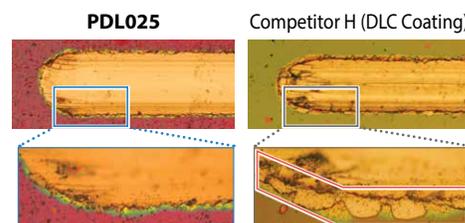
Cutting Conditions : Vc = 2,620 sfm, D.O.C. x ae = 0.118" x 0.197", fz = 0.004 ipt, Dry
Cutter Dia. ø1.000" Workpiece : 5052 Cutting Length : 187ft

3 Stable Machining

Stable Machining Due to DLC Coating Layer with Excellent Peeling Resistance

Improved Chip Evacuation Due to High Lubrication

Scratch Test : Coating Conditions Comparison with Load 80 N (Internal Evaluation)



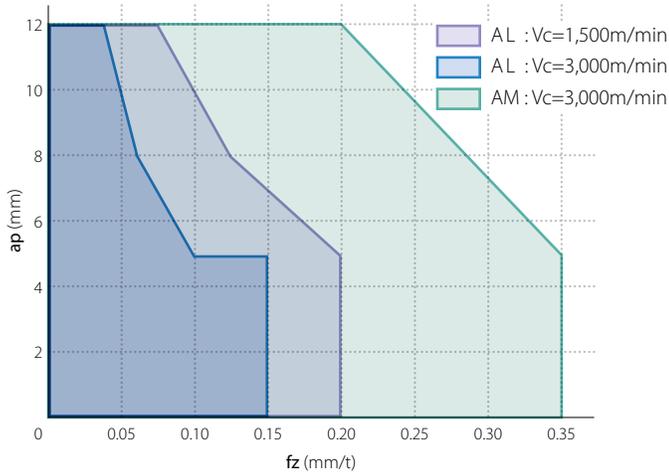
Recommended Cutting Conditions

Workpiece		Chipbreaker	Cutting Speed Vc (sfm)	Cutting Width ae (mm)	Cutting Diameter/Feed	
					D.O.C. = 0.020" (Reference value)	
					Cutting Diameter DC	Cutting Dia. ø1.000" / ø28mm or less
Aluminum Alloy	Si Ratio 12.5% or Below	AL	660 ~ 3,280 ~ 9,840	≤ 0.5DC	0.002 ~ 0.006 ~ 0.010	
				0.5DC <	0.002 ~ 0.006 ~ 0.010	
		AM	660 ~ 3,280 ~ 16,400	≤ 0.5DC	0.002 ~ 0.006 ~ 0.012	0.002 ~ 0.008 ~ 0.014
	0.5DC <			0.002 ~ 0.006 ~ 0.010	0.002 ~ 0.006 ~ 0.012	
	Si Ratio 12.5% or Above	AL	660 ~ 980 ~ 1,310	≤ 0.5DC	0.002 ~ 0.004 ~ 0.008	
				0.5DC <	0.002 ~ 0.004 ~ 0.008	
AM		660 ~ 980 ~ 2,620	≤ 0.5DC	0.002 ~ 0.006 ~ 0.012	0.002 ~ 0.008 ~ 0.014	
	0.5DC <		0.002 ~ 0.006 ~ 0.010	0.002 ~ 0.006 ~ 0.012		

1. Adjust the cutting speed and feed within the recommended machining range according to the actual cutting conditions. (machine rigidity, work rigidity, etc.)
2. Do not use it under conditions that exceed the recommended conditions.
3. When using at high speed rotation (10,000 RPM 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.
4. For high-speed machining, check the condition of the screws and replace them regularly. (When the cutting speed is 9,840 sfm replace the screws when replacing inserts.)

MEAS Cutting Performance

ø50mm (4 Flutes) Shouldering ae = 0.984" Workpiece: 7175



- Reduce the feed rate when machining at high speed.

Spindle Revolution (RPM)	ISO Balance Grade ISO 1940-1/8821 (JIS B0905)
~20,000	G16
~30,000	G6.3
30,000~	G2.5

Max. Revolution for Each Cutting Diameter

Cutting Diameter DC (mm)	Cutter Max. Revolution n (RPM)
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

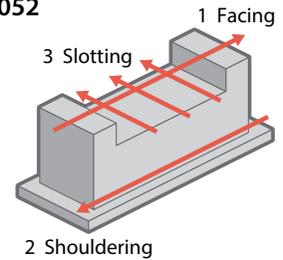
Maximum revolution without balance adjustment in combination with arbor

Cutting Diameter DC (mm)	Cutter Max. Revolution n (RPM)
25	12,500
28	11,500
32	9,600
35	8,800
40	7,700
50	6,300

Case Study

Industrial Machine Parts 5052

Vc = 4920 sfm (n = 9,550 rpm)
 1. D.O.C. x ae = 0.118" x 1.575"
 fz = 0.008 ipt (Vf = 300 ipm)
 2. D.O.C. x ae = 0.315" x 0.197"
 fz = 0.008 ipt (Vf = 300 ipm)
 3. D.O.C. x ae = 0.079" x ~ 1.97"
 fz = 0.006 ipt (Vf = 225 ipm)
 Wet
 MEAS050R-13-4T-M
 KCGT130504FR-AL PDL025



Cutting Time

MEAS ø50-4T

190 Sec

Cutting Time

50%

Competitor C ø50-3T

430 Sec

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

(User Evaluation)

Ramping Reference Data

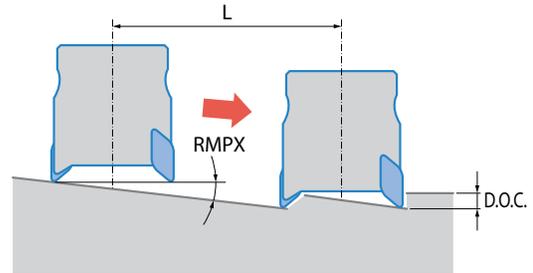
Cutting Dia. DC	1.000"	-	1.250"	-	1.500"	2.000M
	25mm	28mm	32mm	35mm	40mm	50mm
Max. Ramping Angle RMPX	20°	16°	12.5°	11°	8.5°	6°
tan RMPX	0.363	0.287	0.221	0.194	0.149	0.105

Ramping Tips

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

Formula for Max. Cutting Length (L) at Max. Ramping Angle

$$L = \frac{\text{D.O.C.}}{\tan \text{RMPX}}$$



Plunging Tips

* Reduce feed rate to $f_z \leq 0.004$ ipt when plunging

Insert	Maximum Width of Cut (ae)
KCGT13...	0.315"

Helical Milling Tips

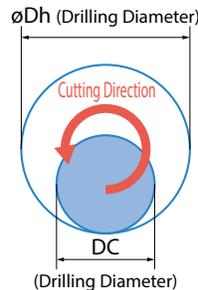
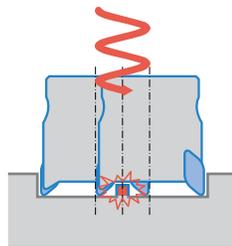
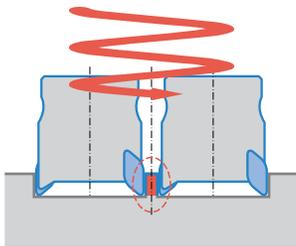
For Helical milling, use between Min. Drilling Dia. and Max. Drilling Dia.

Exceeding Max. Machining Dia.

Center Core Remains After Machining

Under Min. Machining Dia.

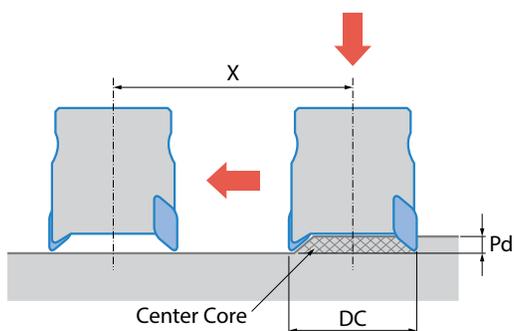
Center Core Hits Holder Body



Cutter	Min. Drilling Dia.	Max. Drilling Dia.	Maximum Ramping Depth per Cycle
MEAS...13...	2×DC-0.630"	2×DC-0.118"	0.138"

- Use climb milling. (Refer to detail on right above)
- Feed rates should be reduced to 50% of recommendation
- Use caution to eliminate incidences caused by producing long chips

Drilling Tips



Drilling Depth

Please refer to the figure on the left (Pd: Max. Drilling depth)

Traversing after Drilling

1. It is recommended to reduce feed by $f_z = 0.006$ ipt or less until the center core is removed
2. Axial feed rate recommendation per revolution is $f = 0.004$ ipr or less

Cutter	Max. Drilling Depth (Pd)	Min. Cutting Length (X) for Flat Bottom Surface
MEAS...13...	0.138"	DC-0.630"

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 picture on the right)
- (Recommended Torque 3.5Nm)



When using inserts with a corner-R(RE) of 1/8" (3.2mm) or larger

When using inserts with corner-R(RE) 0.126" (3.2mm) 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.

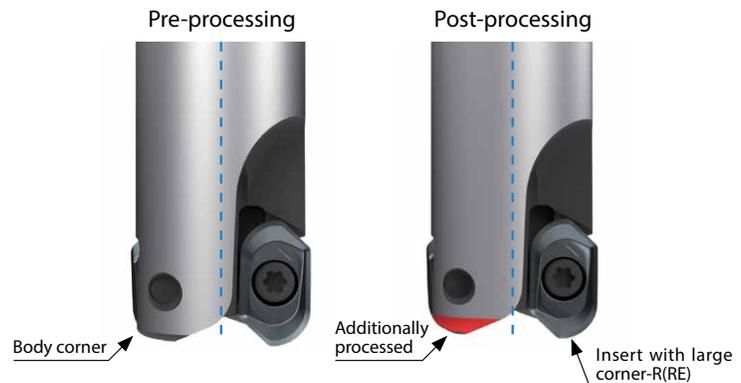
After the additional modifications, adjust the balance grade to G6.3 at a speed of 10,000 RPM.

Make sure that there is no burr on the insert pocket surface (grooved surface).

(If corner-R is 0.118" (3.0mm) or smaller, additional modifications are not needed.)

Insert Corner-R(RE)	Additional Processing Dimension to Body Corner
1/8" (3.2mm)	R0.079" (2.0mm)
0.157" (4mm)	R0.098" (2.5mm)
0.197" (5mm)	R0.118" (3.0mm)

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



Cautions

While in Use



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 gloves 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 (10,000 RPM or above), 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.

Spindle Revolution (RPM)	ISO Balance Grade ISO 1940-1/8821 (B0905)
~ 20,000	G16
~ 30,000	G6.3
30,000 ~	G2.5