THE NEW VALUE FRONTIER

KYOCERA

High efficiency end mill
for aluminum machining | MEAS

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

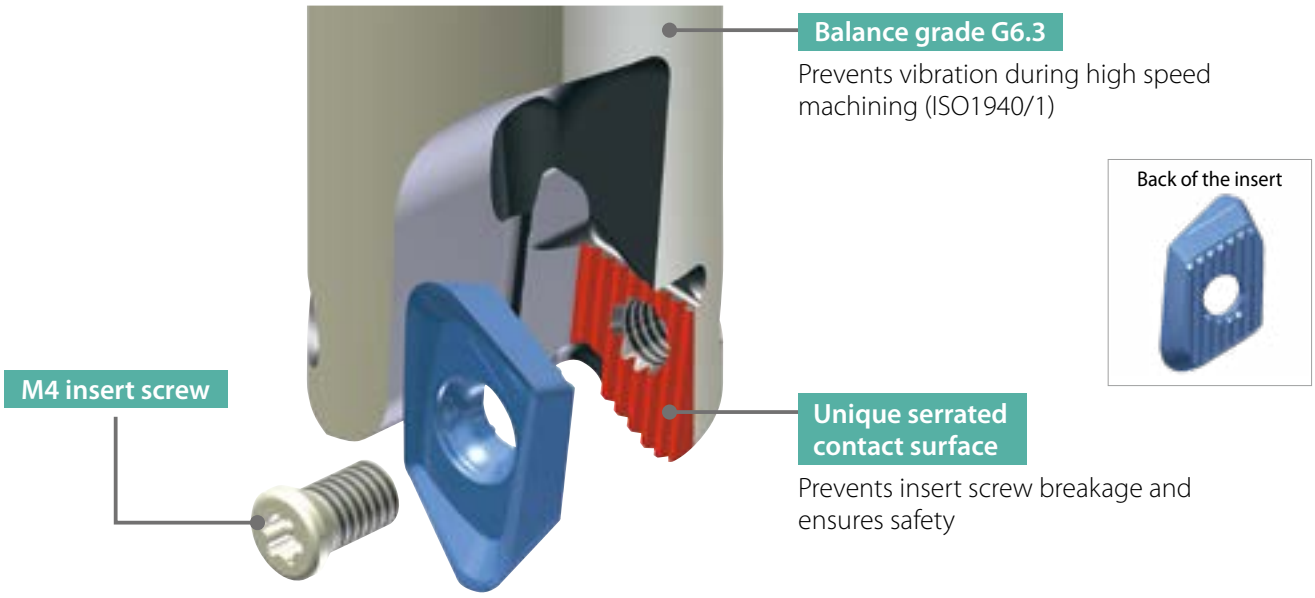
High efficiency end mill for aluminum machining

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.

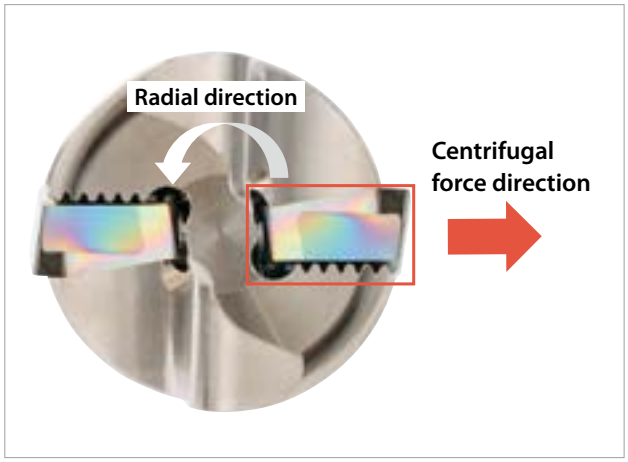
1 High reliability and high efficiency machining

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

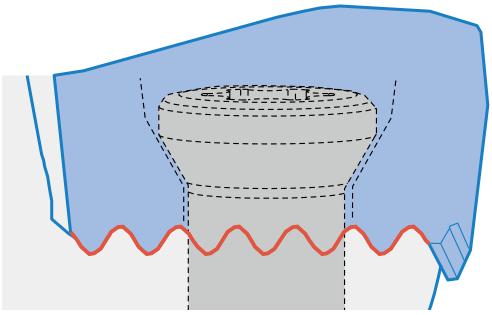


Serrated insert pocket

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

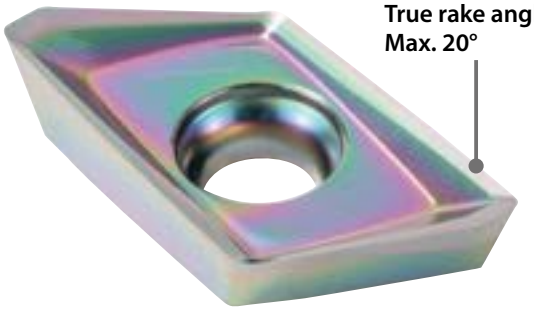


Serrated contact surface

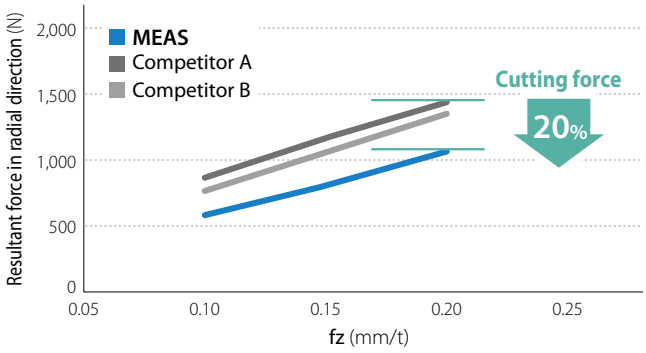


2 Low cutting force with sharp cutting edge

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



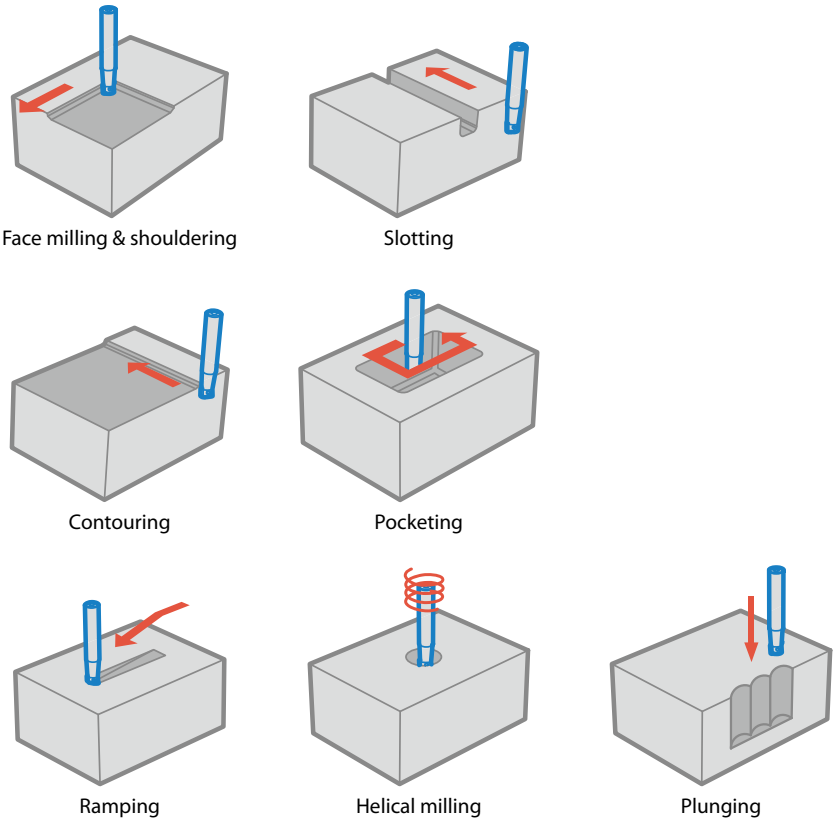
Cutting force comparison (In-house evaluation)



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

3 Wide variety of applications

Max. ramping angle 20° (ø25)



MEAS | End mill

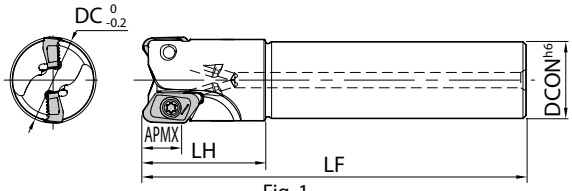


Fig. 1

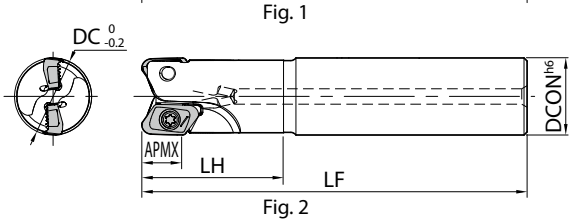


Fig. 2

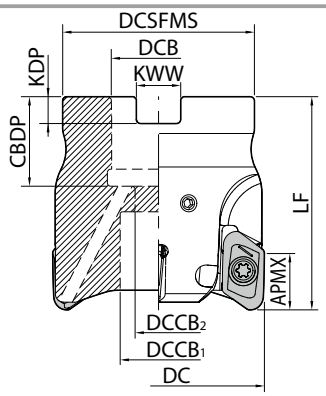
Toolholder dimensions

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



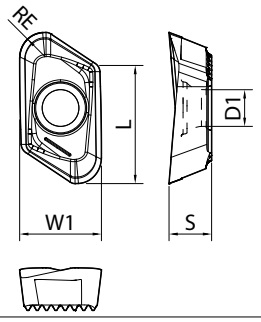
Toolholder dimensions

Description	Availability	No. of inserts	Dimensions (mm)										Rake angle		Coolant hole	Weight (kg)	Spare parts				Max. revolution (min^{-1})
			DC	DCSFMS	DCB	$DCCB_1$	$DCCB_2$	LF	CBDP	KDP	KWW	APMX	A.R. (MAX.)	R.R.			Clamp screw	Mounting bolt	Wrench	Anti-seize compound	
MEAS 050R-13-4T-M	●	4	50	45	22	18	11	50	21	6.3	10.4	12	+10°	-11°	Yes	0.4	SB-4090TRP	HH10X30H	DTPM-15 Recommended torque for insert clamp 3.5 N-m	P-37	36,000

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

Applicable inserts

Shape		Description		Dimension (mm)					DLC coating
				W1	S	D1	L	RE	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	●

● : Available

Recommended cutting conditions

Recommended cutting conditions

Workpiece	Property	Vc (m/min)	fz (mm/t)
Aluminum alloy	Si ratio 12.5% or below	200 ~ 1,000 ~ 3,000	0.05 ~ 0.15 ~ 0.25
	Si ratio 12.5% or above	200 ~ 300 ~ 400	0.05 ~ 0.1 ~ 0.2

- Recommended cutting conditions are reference values. Please adjust cutting speed and feed rate according to actual machining conditions taking into account machine and workpiece rigidity
- Do not exceed the maximum cutting speed limit (see page 6)
- Regularly changing the insert screw is recommended
  Use appropriate safety covers to protect from tool breakage and chip scattering
- When using at a higher revolution (10,000min^{-1} or over), refer to the table below to adjust the balance of the MEAS and arbor

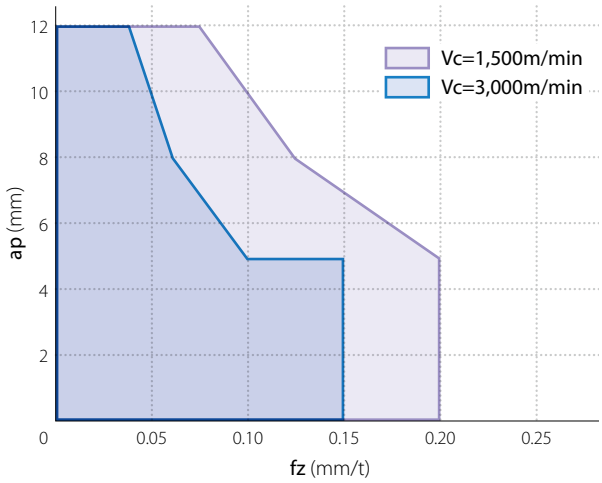
Spindle revolution (min^{-1})	ISO Balance grade ISO 1940-1/8821 (JIS B0905)
~ 20,000	G16
~ 30,000	G6.3
30,000 ~	G2.5

Max. revolution for each cutting diameter

Cutting diameter øD (mm)	Cutter max. revolution n (min^{-1})
ø25	59,000 Long shank: 49,000
ø28	54,000
ø32	49,000
ø35	46,000 Long shank: 39,000
ø40	42,000
ø50	36,000

MEAS cutting performance

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



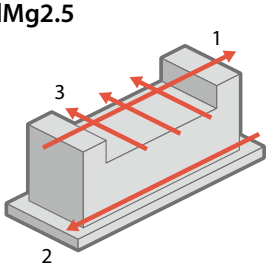
- Reduce the feed rate when machining at high speeds

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

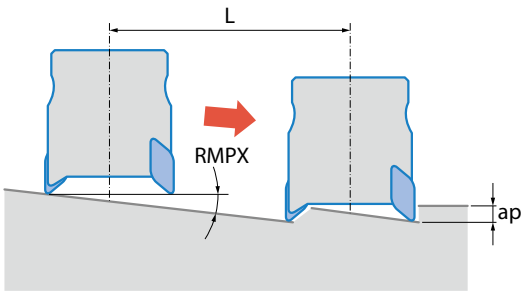
Cutting dia. DC (mm)	25	28	32	35	40	50
Max. ramping angle RMPX	20°	16°	12.5°	11°	8.5°	6°
tan RMPX	0.363	0.287	0.221	0.194	0.149	0.105

Ramping tips

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

Max. cutting length (L) at max. ramping angle

$$L = \frac{ap}{\tan RMPX}$$



Plunging tips

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

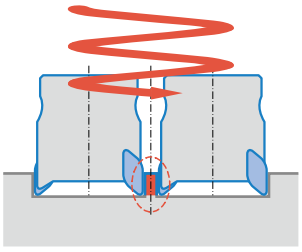
Insert description	Maximum width of cut (ae)
KCGT13 type	8 mm

Helical milling tips

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

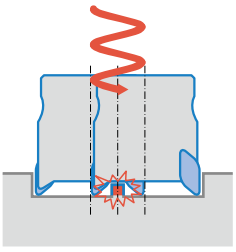
Exceeding max. cutting diameter

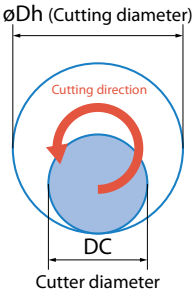
Center core remains after machining



Under min. cutting diameter

Center core hits holder body



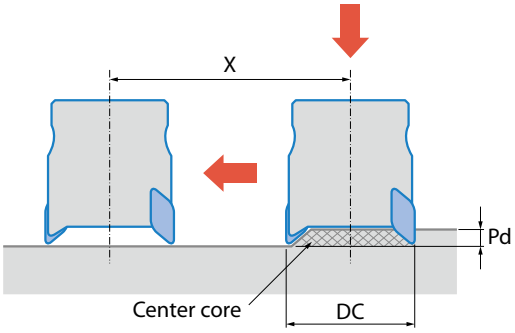


Description	Min. cutting diameter	Max. cutting diameter	Maximum ramping depth per cycle
MEAS···13···	2×DC-16	2×DC-3	3.5

Unit: mm

- 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

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

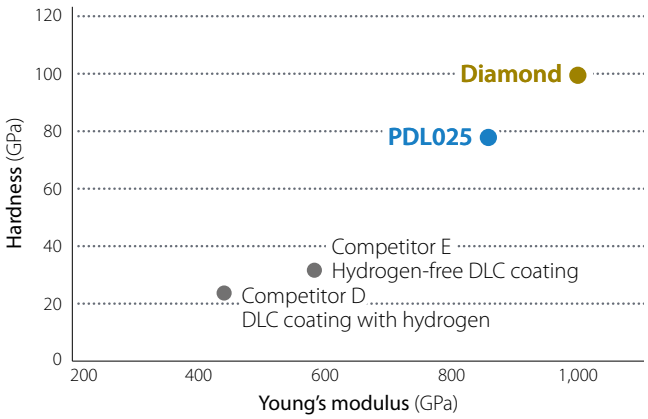
DLC Coating

PDL025

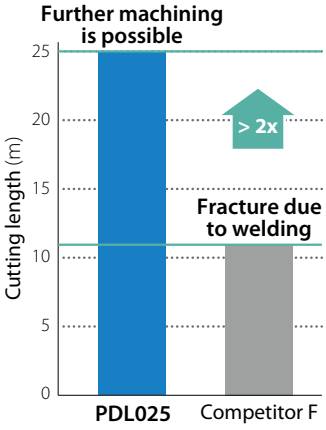
Kyocera's proprietary hydrogen-free DLC coating achieves long tool life with hardness close to that of diamond

1 Long and stable tool life

Coating properties (In-house evaluation)



Tool life (In-house evaluation)



PDL025
After machining 25 m

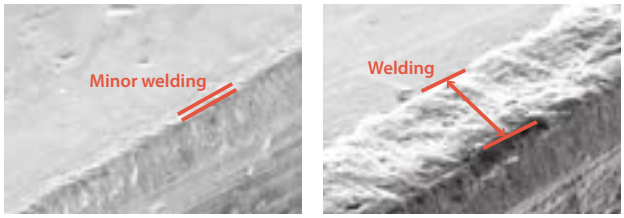
Competitor F
After machining 11 m

Cutting conditions: Vc = 500 m/min, fz = 0.2 mm/t, ap × ae = 3 × 5 mm, dry
Cutter dia.: ø25 mm Workpiece: AlZnMgCu1.5

2 Excellent surface finish

Excellent surface finish thanks to its resistance to aluminium welding.

Welding resistance comparison (In-house evaluation)



PDL025 **Competitor G**

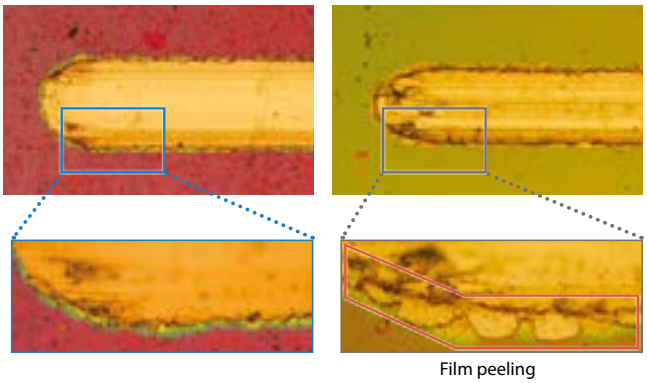
Cutting conditions: Vc = 800 m/min, fz = 0.1 mm/t, ap × ae = 3 × 5 mm, dry
Cutter dia. ø25 mm Workpiece: AlMg2.5 Cutting length: 57 m

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 (In-house evaluation)

PDL025 **Competitor H (DLC coating)**



Film peeling

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