Vischer & Bolli
OSG GROUP COMPANY

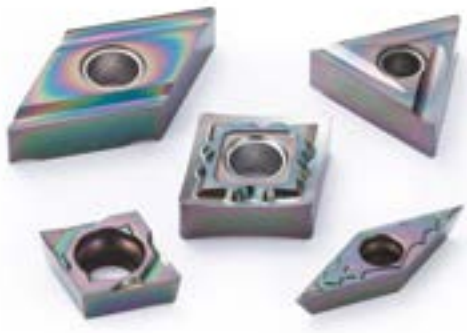
DLC coating

PDL010/PDL025

High quality and long tool life for machining aluminum

Achieves long tool life with hardness close to that of diamond
Excellent surface finish with aluminum welding resistance
Large lineup for turning, cut-off, and milling operations

NEW **New high wear resistant coating PDL010**

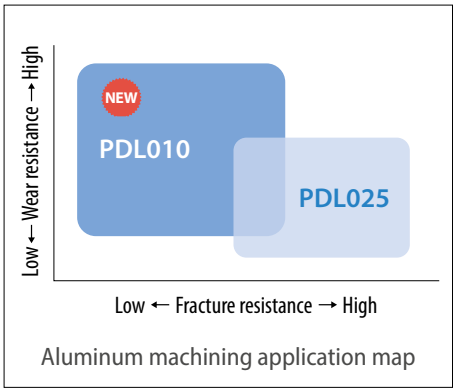


KYOCERA

DLC coating

PDL010/PDL025

Achieves long tool life with hardness close to that of diamond. Large lineup for turning, cut-off, and milling operations.

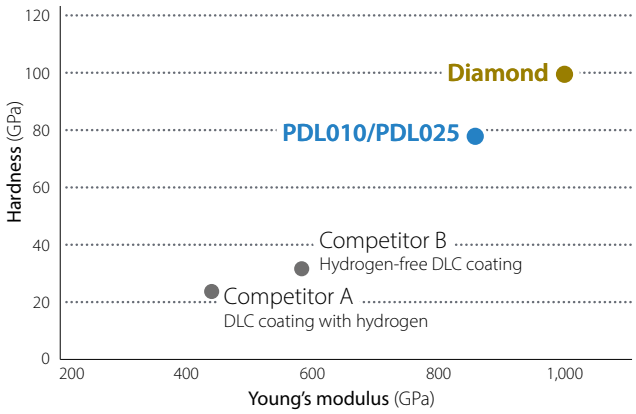


Aluminum machining application map

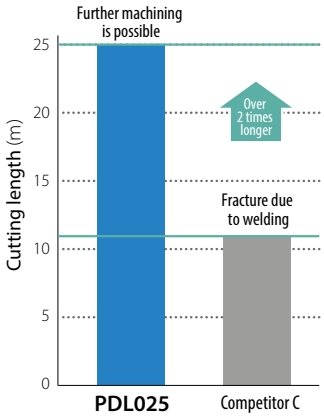
1 Long and stable tool life

High hardness with Kyocera's proprietary hydrogen-free DLC coating

Coating properties (In-house evaluation)



Tool life (In-house evaluation)




PDL025 After machining 25 m


Competitor C After machining 11 m

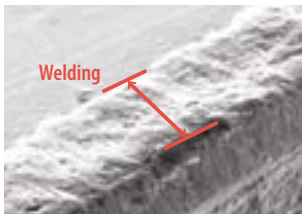
Cutting conditions: Vc = 500 m/min, fz = 0.2 mm/t, ap × ae = 3 × 5 mm, dry
Cutter dia. ø25 mm, workpiece: AlZnMgCu1.5

2 Excellent surface finish

Excellent surface finish with aluminum welding resistance

Welding resistance comparison (In-house evaluation)

PDL025



Competitor D

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

Machined surface comparison (In-house evaluation)


PDL025

Competitor E

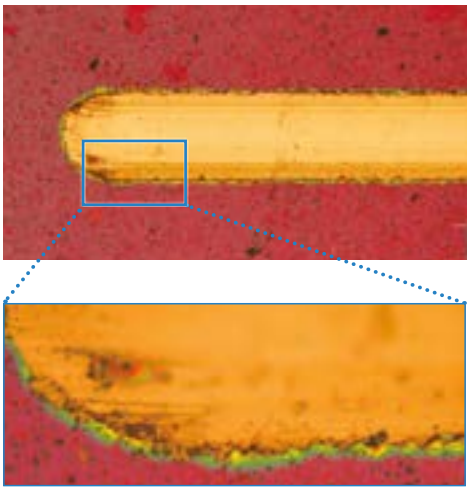
Cutting Conditions: Vc = 800 m/min, fz = 0.1 mm/t, ap × ae = 3 × 5 mm, dry
Cutter dia. ø25 mm, workpiece: A6061, cutting length: PDL025 (48 m), Competitor E (14 m)

3 Stable machining

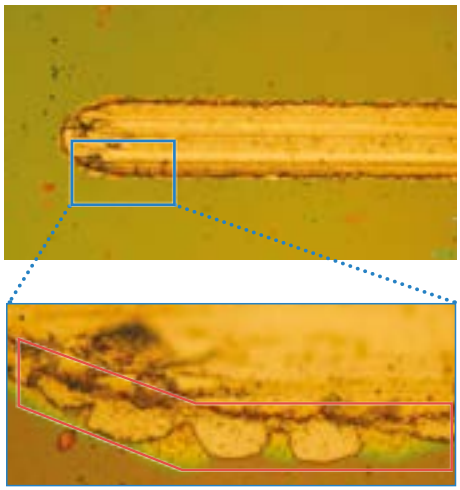
Stable machining due to DLC coating layer with excellent peeling resistance
Improved chip evacuation due to high lubrication

Scratch test: Coating conditions comparison with load 80 N (In-house evaluation)

PDL025



Competitor F (DLC Coating)



Film peeling

Chip Shape

PDL025

Even chips with small curl diameter

Carbide (non-coated)

Cutting Conditions:
Vc = 800 m/min, fz = 0.1 mm/t,
ap × ae = 3 × 5 mm, dry, cutter dia. ø25 mm
Insert BDGT11T304FR-JA, workpiece: AlMg2.5

4 Large tooling lineup

Wide range of applications including turning, cut-off, and milling operations

Turning

PDL010/PDL025

Cut-off

PDL025

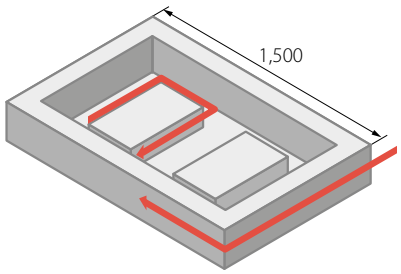
Milling

PDL025

Case study

Block AlMg2.5

Vc = 450 m/min
fz = 0.15 mm/t
(Vf = 1,900 mm/min)
ap × ae = 2 × ~ 80 mm
Wet
MEC080R-11-7T (7-Flute)
BDGT11T308FR-JA PDL025



Number of workpieces

PDL025 **7 pcs/edge** 1.4 times

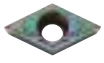
Competitor G (6-Flute) **5 pcs/edge**

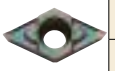
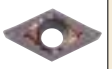
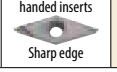
PDL025 has less welding compared to Competitor G and tool life is improved by 1.4 times. A good wall and surface finish is achieved.

(User evaluation)

Inserts

Turning inserts (Positive)

Shape		Description	Dimensions (mm) I.C.	Thick-ness	Hole diameter	Corner R (rε)	Relief angle	DLC coating PDL 010	PDL 025
Minute depth of cut	 Sharp edge Mirror surface finish	CCGT 030101MP-CF 030102MP-CF	3.5	1.4	1.9	<0.1 <0.2	7°	● ●	● ●
		CCGT 040101MP-CF 040102MP-CF	4.3	1.8	2.3	<0.1 <0.2	7°	● ●	● ●
Finishing	 Sharp edge Mirror surface finish	CCGT 060201MFP-SK 060202MFP-SK 060204MFP-SK	6.35	2.38	2.8	<0.1 <0.2 <0.4	7°	● ● ●	● ● ●
		CCGT 09T301MFP-SK 09T302MFP-SK 09T304MFP-SK	9.525	3.97	4.4	<0.1 <0.2 <0.4	7°	● ● ●	● ● ●
Finishing	 Sharp edge Mirror surface finish	CCGT 060201MP-CK 060202MP-CK	6.35	2.38	2.8	<0.1 <0.2	7°	● ●	● ●
		CCGT 09T301MP-CK 09T302MP-CK	9.525	3.97	4.4	<0.1 <0.2	7°	● ●	● ●
Finishing-Medium	 Sharp edge	CCGT 09T304AH 09T308AH	9.525	3.97	4.4	0.4 0.8	7°	● ●	● ●
Finishing-Medium	Image shows right handed inserts  Sharp Edge	CCGT 09T302$^{R}_{L}$-A3 09T304$^{R}_{L}$-A3 09T308$^{R}_{L}$-A3	9.525	3.97	4.4	0.2 0.4 0.8	7°	● ● ●	● ● ●
		CCGT 120402$^{R}_{L}$-A3 120404$^{R}_{L}$-A3 120408$^{R}_{L}$-A3	12.7	4.76	5.5	0.2 0.4 0.8	7°		● ● ●
Finishing	Image shows left handed inserts  Sharp edge	CCET 0301005ML-F 030101ML-F 030102ML-F 030104ML-F	3.5	1.4	1.9	<0.05 <0.1 <0.2 <0.4	7°	L L L L	L L L L
		CCET 040101ML-F 040102ML-F 040104ML-F	4.3	1.8	2.3	<0.1 <0.2 <0.4	7°	L L L	L L L
Low feed	Image shows right handed inserts  Sharp edge	CCET 0602005MF$^{R}_{L}$-U 060201MF$^{R}_{L}$-U 060202MF$^{R}_{L}$-U	6.35	2.38	2.8	<0.05 <0.1 <0.2	7°	● ●	● ● ●
		CCET 09T3005MF$^{R}_{L}$-U 09T301MF$^{R}_{L}$-U 09T302MF$^{R}_{L}$-U 09T304MF$^{R}_{L}$-U	9.525	3.97	4.4	<0.05 <0.1 <0.2 <0.4	7°	● ●	● ● ●
Minute depth of cut	 Sharp edge Mirror surface finish	DCGT 070201MP-CF 070202MP-CF	6.35	2.38	2.8	<0.1 <0.2	7°	● ●	● ●
		DCGT 11T301MP-CF 11T302MP-CF	9.525	3.97	4.4	<0.1 <0.2	7°	● ●	● ●
Finishing	 Sharp edge Mirror surface finish	DCGT 070201MFP-SK 070202MFP-SK 070204MFP-SK	6.35	2.38	2.8	<0.1 <0.2 <0.4	7°	● ● ●	● ● ●
		DCGT 11T301MFP-SK 11T302MFP-SK 11T304MFP-SK	9.525	3.97	4.4	<0.1 <0.2 <0.4	7°	● ● ●	● ● ●

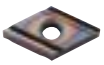
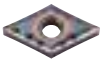
Shape		Description	Dimensions (mm) I.C.	Thick-ness	Hole diameter	Corner R (rε)	Relief angle	DLC coating PDL 010	PDL 025
Finishing	 Sharp edge Mirror surface finish	DCGT 070201MP-CK 070202MP-CK	6.35	2.38	2.8	<0.1 <0.2	7°	● ●	● ●
		DCGT 11T301MP-CK 11T302MP-CK	9.525	3.97	4.4	<0.1 <0.2	7°	● ●	● ●
Finishing-Medium	 Sharp edge	DCGT 11T304AH 11T308AH	9.525	3.97	4.4	0.4 0.8	7°	● ●	● ●
Finishing-Medium	Image shows right handed inserts  Sharp edge	DCGT 11T302$^{R}_{L}$-A3 11T304$^{R}_{L}$-A3 11T308$^{R}_{L}$-A3	9.525	3.97	4.4	0.2 0.4 0.8	7°	● ● ●	● ● ●
Finishing	Image shows right handed inserts  Sharp edge	DCET 0702005MR-F 070201M$^{R}_{L}$-F 070202M$^{R}_{L}$-F 070204M$^{R}_{L}$-F	6.35	2.38	2.8	<0.05 <0.1 <0.2 <0.4	7°	● ● ●	R ● ● ●
		DCET 11T3005MR-F 11T301M$^{R}_{L}$-F 11T302M$^{R}_{L}$-F 11T304M$^{R}_{L}$-F	9.525	3.97	4.4	<0.05 <0.1 <0.2 <0.4	7°	R ● ● ●	R ● ● ●
Low Feed	Image shows right handed inserts  Sharp edge	DCET 0702005MFR-U 070201MF$^{R}_{L}$-U 070202MF$^{R}_{L}$-U	6.35	2.38	2.8	<0.05 <0.1 <0.2	7°	● ●	R ● ●
		DCET 11T3005MFR-U 11T301MF$^{R}_{L}$-U 11T302MF$^{R}_{L}$-U 11T304MFR-U	9.525	3.97	4.4	<0.05 <0.1 <0.2 <0.4	7°	● ● R	R ● ● R
Finishing-Medium	Image shows left handed inserts  Sharp edge	TCGT 110302$^{R}_{L}$-A3 110304$^{R}_{L}$-A3 110308$^{R}_{L}$-A3	6.35	3.18	2.8	0.2 0.4 0.8	7°	● ● ●	● ● ●
Minute Depth of Cut	 Sharp edge Mirror surface finish	VPGT 110301MP-CF 110302MP-CF	6.35	3.18	2.8	<0.1 <0.2	11°	● ●	● ●
Finishing	 Sharp edge mirror surface finish	VPGT 080201MP-CK 080202MP-CK	4.76	2.38	2.3	<0.1 <0.2	11°	● ●	● ●
		VPGT 110301MP-CK 110302MP-CK	6.35	3.18	2.8	<0.1 <0.2	11°	● ●	● ●
Finishing-Medium	 Sharp edge	VCGT 160404AH	9.525	4.76	4.4	0.4	7°	●	●
Finishing-Medium	Image shows right handed inserts  Sharp edge	VCGT 160404$^{R}_{L}$-A3 160408$^{R}_{L}$-A3	9.525	4.76	4.4	0.4 0.8	7°	● ●	● ●

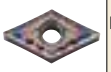
• Inserts with corner R (rε) dimension shown with inequality sign (ex: <0.1) indicates minus tolerance of corner R (rε).

●: Available
R: R-hand only
L: L-hand only

Inserts

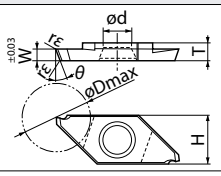
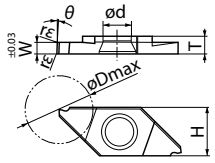
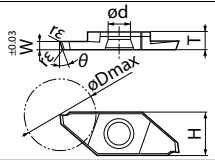
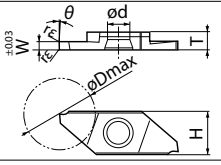
Turning inserts (Negative)

Shape (Handed insert shows right-hand)		Description	I.C.	Thick-ness	Hole diameter	Corner R (rε)	DLC coating PDL 010	DLC coating PDL 025
Finishing-Medium	 Sharp edge	CNGG 120404$^{R}_{L}$-A3 120408$^{R}_{L}$-A3	12.70	4.76	5.16	0.4 0.8	● ●	● ●
Medium-Roughing	 Sharp edge	CNGG 120404AH 120408AH	12.70	4.76	5.16	0.4 0.8	● ●	● ●
Medium-Roughing		CNMG 120404AH 120408AH	12.70	4.76	5.16	0.4 0.8	● ●	● ●
Finishing-Medium	 Sharp edge	DNGG 150404$^{R}_{L}$-A3 150408$^{R}_{L}$-A3	12.70	4.76	5.16	0.4 0.8	● ●	● ●
Medium-Roughing	 Sharp edge	DNGG 150404AH 150408AH	12.70	4.76	5.16	0.4 0.8	● ●	● ●

Shape (Handed insert shows right-hand)		Description	I.C.	Thick-ness	Hole diameter	Corner R (rε)	DLC coating PDL 010	DLC coating PDL 025
Medium-Roughing		DNMG 150404AH 150408AH	12.70	4.76	5.16	0.4 0.8	● ●	● ●
Finishing-Medium	 Sharp edge	TNGG 160404$^{R}_{L}$-A3 160408$^{R}_{L}$-A3	9.525	4.76	3.81	0.4 0.8	● ●	● ●
Medium-Roughing	 Sharp edge	TNGG 160404AH 160408AH	9.525	4.76	3.81	0.4 0.8	● ●	● ●
Medium-Roughing		TNMG 160404AH 160408AH	9.525	4.76	3.81	0.4 0.8	● ●	● ●
Medium-Roughing	 Sharp edge	WNGG 080404AH 080408AH	12.70	4.76	5.16	0.4 0.8	● ●	● ●

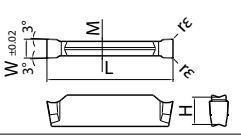
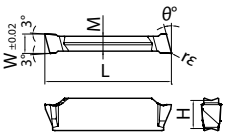
● : Available

Cut-off TKF

Shape (Handed insert shows right-hand)		Description	W	øD max	rε	T	H	ød	Angle θ	DLC coating PDL025
 With right lead angle		TKF12$^{R}_{L}$ 100-S-16DR 125-S-16DR 150-S-16DR 200-S-16DR	1.0 1.25 1.5 2.0	12	0.03	3	8.7	5	16°	● ● ● ●
		TKF12$^{R}_{L}$ 050-S 070-S 100-S 125-S 150-S 200-S	0.5 0.7 1.0 1.25 1.5 2.0	5 8 12 12 12 12	0.03	3	8.7	5	0°	● ● ● ● ● ●
 With right lead angle		TKF16$^{R}_{L}$ 150-S-16DR 200-S-16DR	1.5 2.0	16	0.05	4	9.5	5	16°	● ●
		TKF16$^{R}_{L}$ 150-S 200-S	1.5 2.0	16	0.05	4	9.5	5	0°	● ●

● : Available

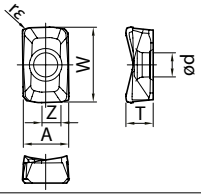
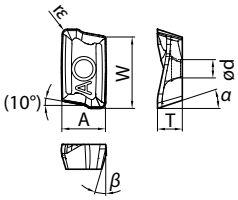
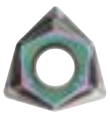
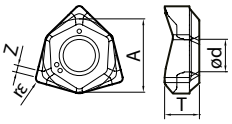
Cut-off GDG

Shape		Description	Edge width (W)	Tolerance	rε	M	L	H	Angle θ	DLC coating PDL025
 Low cutting force 2-edge		GDG 2020N-005PG 2520N-005PG 3020N-005PG	2.0 2.5 3.0	±0.02	0.05	1.7 2.1 2.3	20	4.3	0°	● ● ●
 15° lead angle Low cutting corce 2-edge		GDG 2020R-005PG-15D 2520R-005PG-15D 3020R-005PG-15D	2.0 2.5 3.0	±0.02	0.05	1.7 2.1 2.3	20	4.3	15°	R R R

● : Available
R: R-hand only

Inserts

Milling inserts (for MEW and MFWN cutters)

Shape		Description		Dimensions (mm)						Angle		DLC coating
				A	T	ød	W	Z	rε	α	β	PDL025
		LOGT	100408FR-AM	6.8	4.0	3.6	11.1	2.8	0.8	—	—	●
		LOGT	150508FR-AM	8.9	5.6	4.9	15.9	2.8	0.8	—	—	●
		BDGT	11T302FR-JA 11T304FR-JA 11T308FR-JA	6.7	3.8	2.8	11.0	—	0.2 0.4 0.8	18°	13°	● ● ●
		BDGT	170404FR-JA 170408FR-JA 170420FR-JA 170431FR-JA	9.6	4.9	4.4	17.0	—	0.4 0.8 2.0 3.1	18°	13°	● ● ● ●
		WNGT	080608FN-AM	14.02	6.65	6.2	—	1.5	0.8	—	—	●

● : Available

Recommended cutting conditions

Turning	Chipbreaker	Aluminum alloy	Cutting speed Vc (m/min)	Feed rate f (mm/rev)
Negative	A3	Si 10 % or less	400 – 500 – 800	0.1 – 0.3
	AH		200 – 300 – 600	0.1 – 0.35
Positive	SK	Si 10 % or less	100 – 150 – 300	0.03 – 0.12
	CK		100 – 150 – 300	0.03 – 0.12
	CF		100 – 150 – 300	0.02 – 0.15
	AH		100 – 200 – 300	0.05 – 0.25
	A3		100 – 200 – 300	0.05 – 0.2
	F	Si 10 % or less Cutting dia. ø10 or more	100 – 250 – 500	0.03 – 0.2
		Si 10 % or less Cutting dia. ø10 or less	100 – 200 – 300	0.03 – 0.2
	U	Si 10 % or less Cutting dia. ø10 or more	100 – 250 – 500	0.03 – 0.2
		Si 10 % or less Cutting dia. ø10 or less	100 – 200 – 300	0.03 – 0.2

Cut-off	Aluminum alloy	Cutting speed Vc (m/min)	Feed rate f (mm/rev)
TKF	Si 10 % or less	200 – 500	0.01 – 0.03
GDG		200 – 500	0.01 – 0.05

Milling Inserts	Aluminum alloy	Cutting speed Vc (m/min)	Feed rate fz (mm/t)
LOGT (For MEW cutters)	Si 13 % or less	200 – 900	0.05 – 0.3
	Si 13 % or greater	200 – 300	0.05 – 0.2
BDGT (For MEC cutters)	Si 13 % or less	200 – 900	0.05 – 0.3
	Si 13 % or greater	200 – 300	0.05 – 0.2
WNGT (For MFWN cutters)	Si 13 % or less	200 – 900	0.1 – 0.3
	Si 13 % or greater	200 – 300	0.1 – 0.2