

**MITSUBISHI**

MITSUBISHI CARBIDE

**TOOLS NEWS**

B057G

**DLC COATING END MILL**

***DLC-2MA***



## **DLC Coating End Mill**

High performance and long tool life for non-ferrous materials



# CARBIDE END MILLS

# DLC-2MA

Medium, 2 flute, For Non-ferrous material

## Feature

**DLC coated end mills is suitable for machining of non-ferrous materials.**

Due to applying DLC coating with superior anti-adhesion, high performance is realized in milling of non-ferrous materials such as Al-alloy, GFRP, CFRP, Copper-alloy and graphite.

**Applying for new developed DLC coating.**

**The hardness of film such as diamond is realized with high adhesion.**

Adhesion used to be the weak point of DLC coating. We developed original DLC coating with obtains superior adhesion level (Co-developed with NAGATA SEIKI CO., LTD.).

**High performance shows with suitable design and applying for original carbide material.**

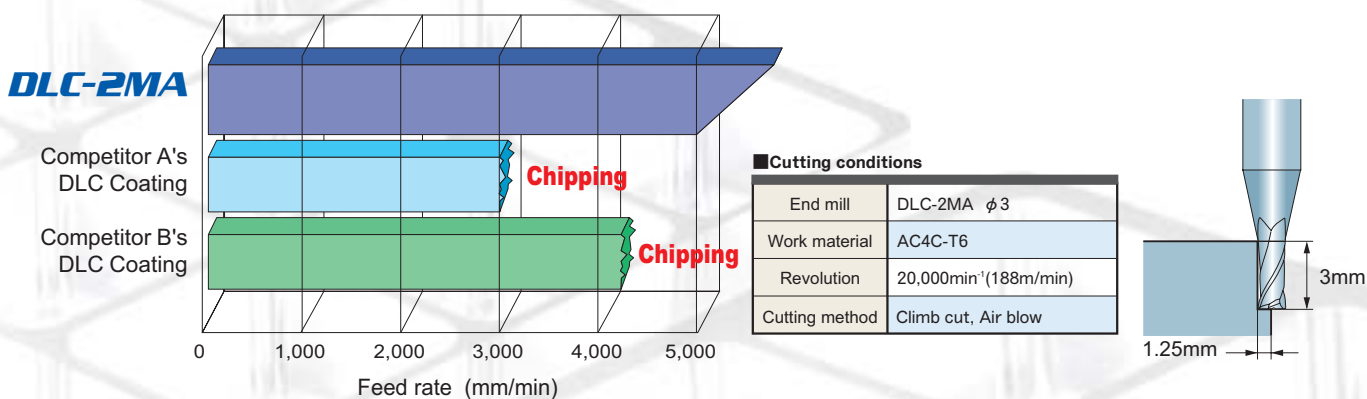
Applying most suitable original design for non-ferrous materials and carbide material, low cutting force and good chip disposability are realized.

## Close hardness Diamond

### Characteristic of DLC coating

	<b>DLC</b>	Competitor's DLC	Diamond	TiN
Hardness (HV)	<b>6,000-7,000</b>	1,000-7,000	7,000-10,000	2,000
Wear Coefficient	<b>0.1</b>	0.1	0.4	0.4

## Machining example



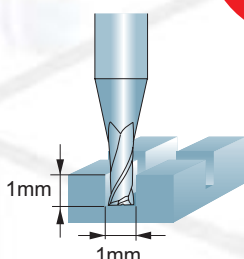
## Performance report (1)

### Al-alloy

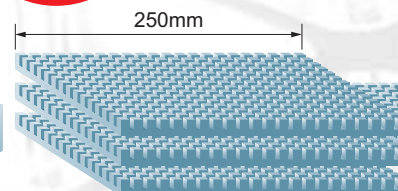
**Tool life is 3 times**  
as competitor's DLC coating

#### ■ Cutting conditions

End mill	DLC-2MA φ1
Work material	A5052
Revolution	10,000min <sup>-1</sup> (31m/min)
Feed rate	150mm/min
Cutting method	Slotting, Oil



Number of work piece  
**3** items



**DLC-2MA**

Number of work piece  
**1** items

**Coating exfoliation**

Competitor's DLC Coating

# DLC-2MA

Medium, 2 flute, For Non-ferrous material



$D_1 \leq 12$  -0.020  
 $12 < D_1$  -0.030



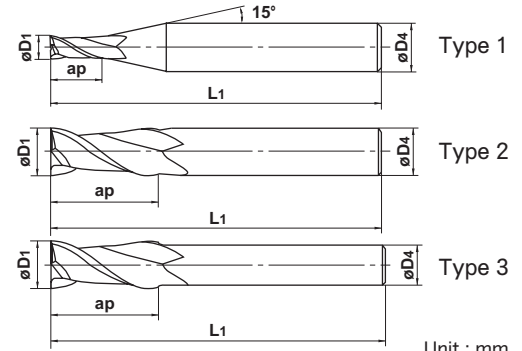
$D_1 < 3$

$3 \leq D_1$

$D_1 < 3$

$3 \leq D_1$

● Due to applying for DLC coating with superior anti adhesion, high performance is realized in milling of non-ferrous materials such as Al-alloy, GFRP, CFRP, Copper-alloy and graphite.



Unit : mm

Order Number	Dia. D1	Length of Cut ap	Overall Length L1	Shank Dia. D4	No. of Flute N	Stock	Type
DLC2MAD0100	1	2.5	40	4	2	●	1
DLC2MAD0150	1.5	4	40	4	2	●	1
DLC2MAD0200	2	6	40	4	2	●	1
DLC2MAD0250	2.5	8	40	4	2	●	1
DLC2MAD0300	3	8	45	6	2	●	1
DLC2MAD0400	4	11	45	6	2	●	1
DLC2MAD0500	5	13	50	6	2	●	1
DLC2MAD0600	6	13	50	6	2	●	2
DLC2MAD0800	8	19	60	8	2	●	2
DLC2MAD1000	10	22	70	10	2	●	2
DLC2MAD1200	12	26	75	12	2	●	2
DLC2MAD1400	14	26	75	12	2	●	3
DLC2MAD1500	15	30	80	16	2	●	1
DLC2MAD1600	16	32	90	16	2	●	2
DLC2MAD1800	18	32	90	16	2	●	3
DLC2MAD2000	20	38	100	20	2	●	2

● : Inventory maintained.

## Performance report (2)

### GFRP (Glass Fiber Reinforced Plastic)

## High efficiency milling

### DLC-2MA



Cutting length 1,064m

Number of work piece  
**12 items**

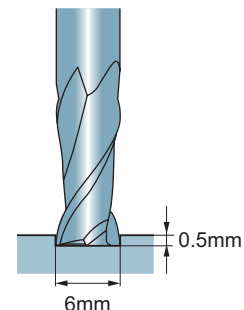
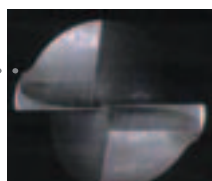


### (Ti,Al)N Coating



Cutting length 266m

Number of work piece  
**3 items**



#### Cutting conditions

End mill	DLC-2MA φ6
Work material	GFRP
Revolution	8,000min <sup>-1</sup> (151m/min)
Feed rate	2,000mm/min
Cutting method	Air blow

**DLC-2MA**

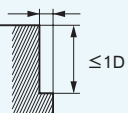
Medium, 2 flute, For Non-ferrous material

**Side milling**

Work material	Aluminum alloy A7075		Aluminum cast AC4B	
Cutting speed	300m/min		240m/min	
Dia. (mm)	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)
1	40,000	600	40,000	460
2	40,000	1,100	38,000	850
3	32,000	1,400	25,000	950
4	24,000	1,500	19,000	1,000
5	19,000	1,600	15,000	1,000
6	16,000	1,900	13,000	1,100
8	12,000	1,900	9,500	1,200
10	9,500	1,900	7,600	1,200
12	8,000	1,900	6,400	1,200
16	6,000	1,900	4,800	1,200
20	4,800	1,500	3,800	1,000

Depth of cut

≤0.2D (D < φ3)  
≤0.5D (D ≥ φ3)



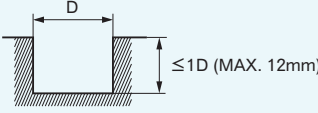
≤1D

D: Dia.

**Slotting**

Work material	Aluminum alloy A7075		Aluminum cast AC4B	
Cutting speed	240m/min		200m/min	
Dia. (mm)	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)	Revolution (min <sup>-1</sup> )	Feed rate (mm/min)
1	40,000	460	40,000	350
2	38,000	850	32,000	550
3	25,000	950	21,000	600
4	19,000	1,000	16,000	650
5	15,000	1,000	13,000	700
6	13,000	1,100	11,000	750
8	9,500	1,200	8,000	800
10	7,600	1,200	6,400	800
12	6,400	1,200	5,300	800
16	4,800	1,000	4,000	720
20	3,800	970	3,200	660

Depth of cut



≤1D (MAX. 12mm)

D: Dia.

- 1) If the rigidity of the machine or the work material installation is very low, or chattering and noise are generated, please reduce the revolution and the feed rate proportionately.
- 2) If the depth of cut is shallow, the revolution and feed rate can be increased.
- 3) For milling of GFRP, please reduce the revolution and feed rate to 50% of the table figure (Al-alloy).  
Please adjust the depth of cut according to the quality of GFRP.
- 4) Water-soluble cutting fluid is recommended.
- 5) Climb cut is recommended for side milling.

**MITSUBISHI MATERIALS KOBE TOOLS**



JQA-2522  
JQA-EM0941

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