

Mach Solid Drill Plus CFRP

MSD Plus CFRP



Mach Solid Drill Plus for machining CFRP

Optimized tool for CFRP hole making

- ▣ **Increased Wear Resistance**

KORLOY's new diamond coated grade ND2100 offers excellent wear resistance

- ▣ **Remarkable Quality of Holes**

The high rake cutting edges reduces burrs when machining CFRP



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The increased use of CFRP for weight reduction in the automobile and aerospace industries requires the development of applicable grades and tool design for machining this material.

Specifically, CFRP materials create burrs around the drills holes entrance and discharge point; while also causing rapid wear of the drills used.

MSD Plus CFRP can reduce the amount of burrs generated during hole making due to its two-stepped point shape. The new diamond-coated grade ND2100, improves wear resistance and durability. These facets improve machined workpiece quality.

We can proudly say MSD Plus CFRP is the ideal tool for high efficiency and high quality hole making of CFRP workpieces.

- Diamond-coated grade, ND2100**
 → **Increases tool life**
- High rake cutting edges**
 → **Reduces burr creation**
- Optimized design for CFRP hole making**
 → **Improves machinability**

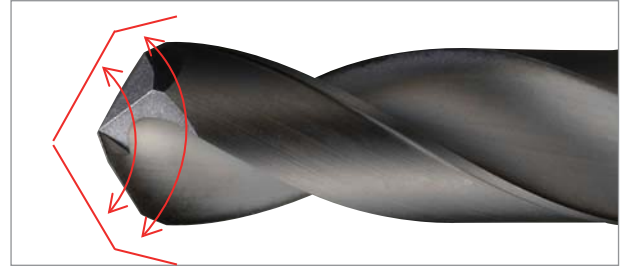
⇒ Code System

		Special type						
MSDP	060	-	5	C	-	100L	-	6S
Mach Solid Drill Plus	Drill dia. 060: Ø6.0 (One decimal place marked)		Standard type Aspect ratio (L/D)	Applications C: CFRP		Overall length 100L: 100 mm		Shank dia. 6S: Ø6
			Special type Flute length 100: 100 mm					

⇒ Features

- Reduced thrust around corners due to the 2-step point angle
- Reduced burrs when drilling CFRP due to high rake cutting edges

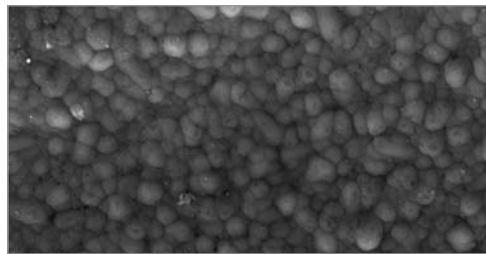
- Fewer burrs
- Longer tool life thanks to improved wear resistance



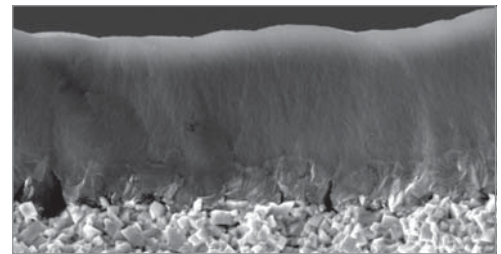
- Improved wear resistance and surface finish by applying high hardness diamond coating of low friction factors

Diamond Coating

- Diamond coating specialized in CFRP machining
- Exclusive substrate for diamond coating optimized for CFRP cutting



→ High hardness diamond coating maintains well-cut shapes



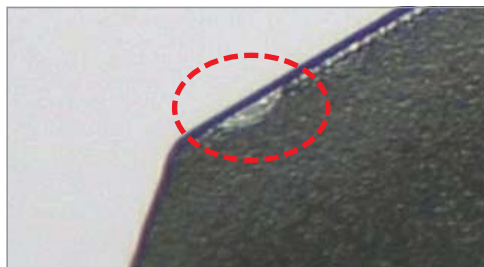
→ Diamond coating's strong adhesion to the substrate

⇒ Common Problems When Machining CFRP

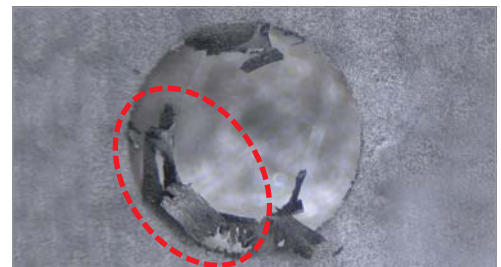
- Wear and flaking on the relief surface due to continuous friction during machining
- Burr creation due to flaking of coated layers and deterioration in surface roughness

- Burrs and deformation of cutting edges caused by wear and flaking

1. Wear and flaking

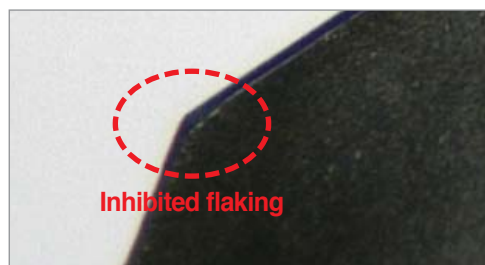


2. Burrs

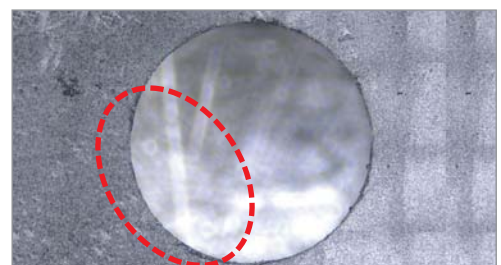


⇒ Development Effect

1. Less wear and flaking on the rake surface



2. Fewer burrs on workpieces



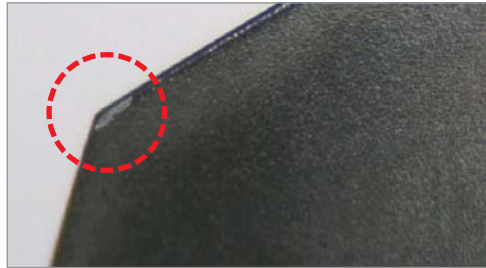
- Inhibited burr creation by keeping cutting edges in good shape

⇒ Performance Evaluation

- Excellent resistance to flaking and improved performance quality in drilling CFRP

Improved performance quality

- Workpiece CFRP
- Cutting conditions vc (m/min) = 100, fn (mm/rev) = 0.05, ap (mm) = 10, air
- Cutting length 7.2m (720 holes)
- Tools MSDP060-5C (ND2100)



[Competitor]

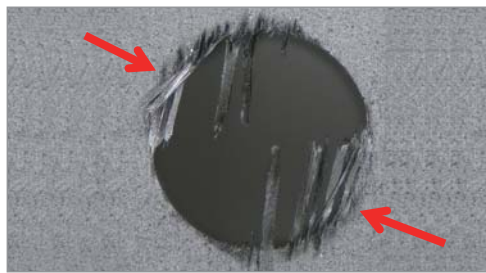


[MSD Plus CFRP]

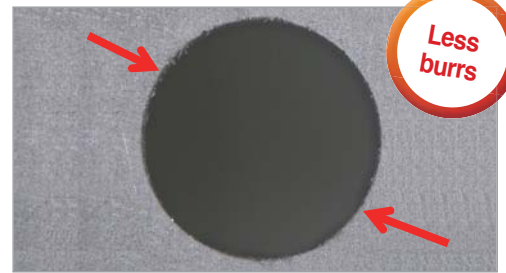
- Reduced burrs produces high quality hole making

Machinability in high quality hole making

- Workpiece CFRP
- Cutting conditions vc (m/min) = 100, fn (mm/rev) = 0.05, ap (mm) = 10, air
- Tools MSDP060-5C (ND2100)



[Competitor]



[MSD Plus CFRP]

⇒ Application Examples



Wing Tail

- Workpiece CFRP
- Cutting conditions vc (m/min) = 100, fn (mm/rev) = 0.05, ap (mm) = 10, air
- Tools MSDP060-5C (ND2100)

MSD Plus CFRP	1080 holes (10.8m)
Competitor	720 holes (7.2m)

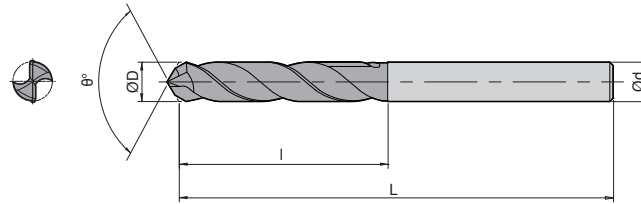
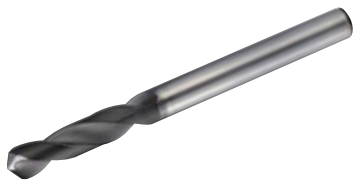
33% more

➔ 50% longer tool life compared to the competitor

⇒ Recommended Cutting Conditions

Workpiece	Grade	Cutting speed vc (m/min)	Feed (Depth of cut = 5D)		
			Feed rate (mm/rev) per drill dia. (mm)		
			Ø2.5~Ø4.0	Ø4.1~Ø8.0	Ø8.1~Ø12.0
CFRP	ND2100	100 (100~150)	0.03~0.07	0.03~0.07	0.03~0.07

MSDP-5C



Specification	C
Grade	ND2100
Tolerance (Drill dia.)	m7
Tolerance (Shank dia.)	h6
Point angle (θ°)	118°
Twist angle	30°
Thinning	X type
Coolant	External

CFRP

(mm)

Designation		ØD	Ød	5C	
				l	L
MSDP	030-5C	3	6	28	66
	040-5C	4	6	36	74
	0476-5C	4.76	6	44	82
	050-5C	5	6	44	82
	060-5C	6	6	44	82
	0635-5C	6.35	8	53	91
	070-5C	7	8	53	91
	0794-5C	7.94	8	53	91
	080-5C	8	8	53	91
	090-5C	9	10	61	103
	0952-5C	9.52	10	61	103
	100-5C	10	10	61	103
	110-5C	11	12	71	118
	1111-5C	11.11	12	71	118
	120-5C	12	12	71	118
127-5C	12.7	14	77	124	

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