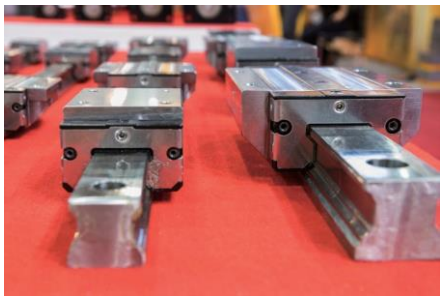
Futaba

Reference exhibition

CFRP PLATE

Application

Linear guide



Equipment arm

Die set for high speed press machine

Characteristic

Strength

It has the same strength with half the specific gravity of aluminum alloy （A7075）.

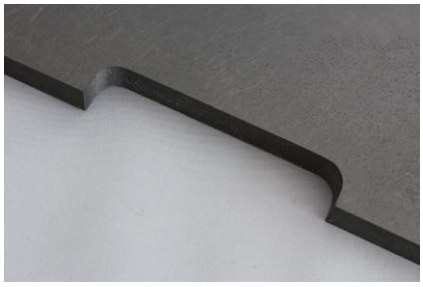
Specification	
Thickness	～40mm (40mm or more by adhesion)
Size	Up to 400mm□
Fiber content （Vf）	33 vol.%

Physical property	
Flexural strength	500MPa
Flexural modulus	36GPa
Tensile strength	360MPa
Tensile modulus	35GPa
Glass transition point	100～120℃
Coefficient of thermal expansion	7.5×10^{-6}/℃
Thermal conductivity	1.5W/(m･K)
Electrical resistivity	6Ω･cm

Processability

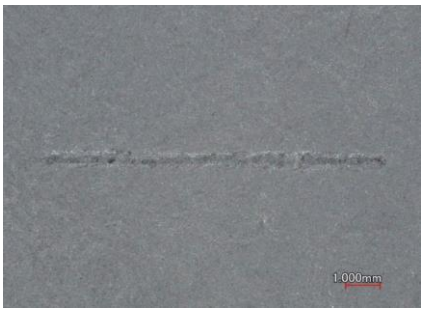
It can be replaced with the same design as conventional metal parts.

Processability		
Milling	Flatness	0.02mm (250x280x40mm)
	Surface roughness	1.02μm
Grinding	Flatness	0.01mm(250x280x40mm)
	Surface roughness	0.51μm
Wire electrical discharge machining		Impossible
Finished hole processing		H7(φ10mm)
Finished hole roundness		7.0μm

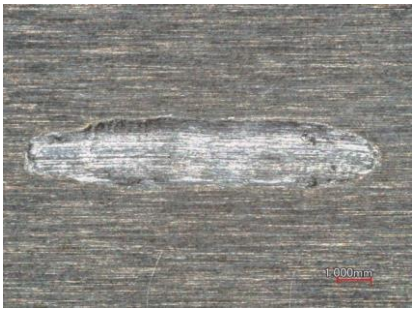


Wear resistance　It has higher wear resistance than aluminum alloys.

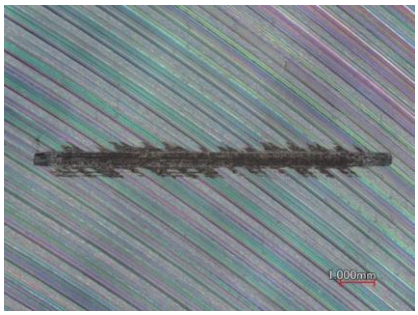
CFRP



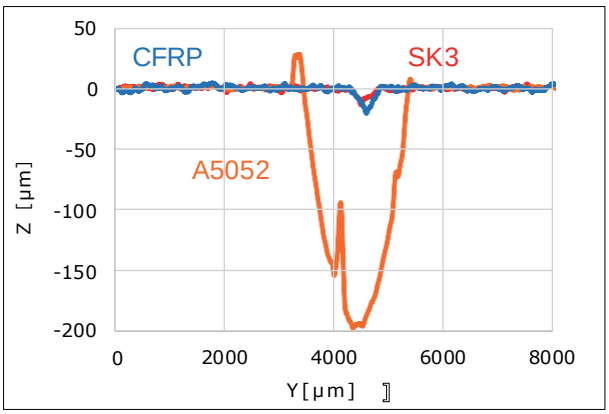
A5052



SK3



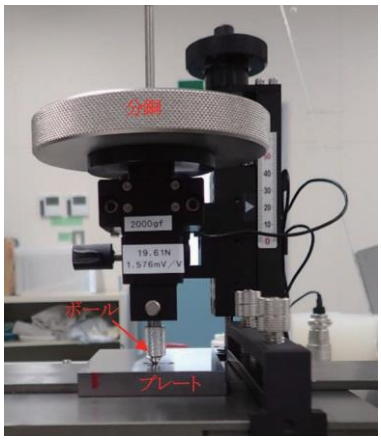
【Test results】



【Test conditions】

Load	9.8 N
Sliding speed	50 mm/s
Sliding distance	10 mm
Number of round trips	1000
Total slip distance	200 m
Sample rate	100 Hz
Number of tests	n=1
Temperature	22～23 ℃
Humidity	45～51%RH

【Testing machine】



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Futaba

Introduction of Futaba CFRP block

***C**arbon*

***F**iber*

***R**einforced*

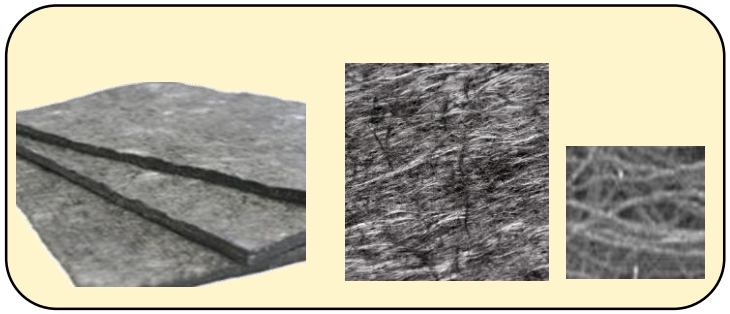
***P**lastic*

ACT Europe

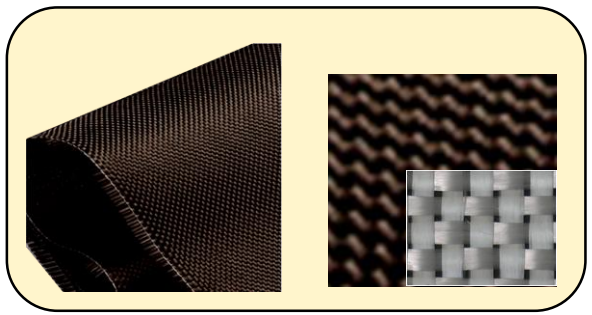
Introduction of Futaba CFRP block

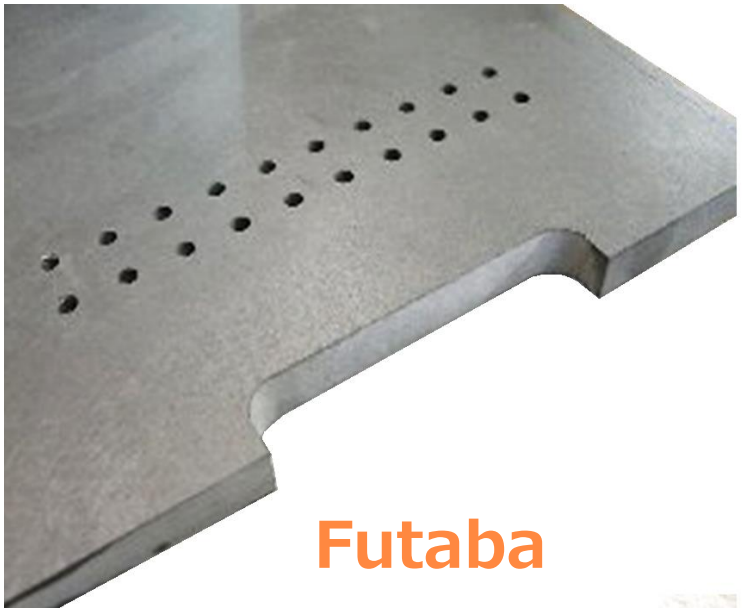
CFRP: Carbon Fiber Reinforced Plastic

Non-woven Carbon Fiber



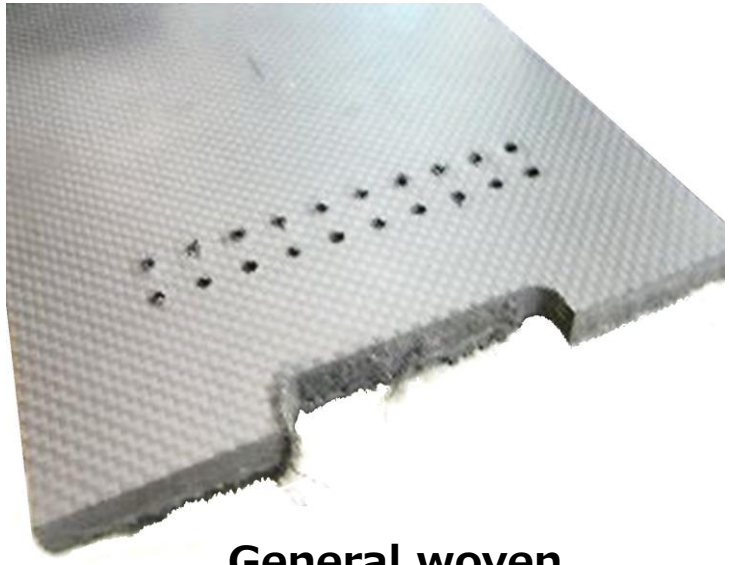
Woven Carbon Fiber





Futaba

Suitable for milling and drilling

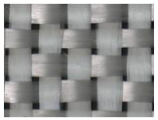
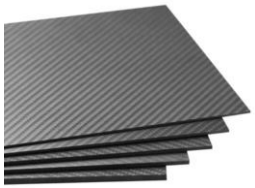
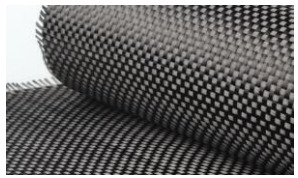


General woven

Not suitable for milling and drilling

Futaba positon in CFRP market

Comparison Non-woven & Woven

	Non-woven 	Woven 	
Type	Thick block  Futaba	Plate 	Sheet 
Thickness	**Thick layers**	Thin layers	1 layer
Material strength	**Alu comparable**	Iron comparable	Iron comparable
Machining	**Suitable**	Not suitable	Not suitable
Advantage	• **Light weight (1/2 of Alu)** • **Ready to mill and drill** • **Cost friendly**	• Commonly available • Luxury appearance	Free form
Disadvantage		• Machining dificulties • Expensive when thick	Forming work necessary

Light weight

USP Futaba non-woven CFRP

❑ Because Futaba CFRP is a light weight material (1/2 of alu, 1/6 of steel)

- Quick movements in automation machines possible (Reduction of inertial mass)
- Increase of applicable loads thanks to the reduced weight of robot arms (Heavier material transport possible)
- Integration of a new device possible (Light CFRP earns weight assignment for another device)
- Easy exchange of tools and jigs in factories possible (e.g. injection mould tooling)

❑ Because Futaba CFRP is non woven

- Milling and drilling are no problem. Precise processing possible

❑ Because Futaba CFRP is non metal

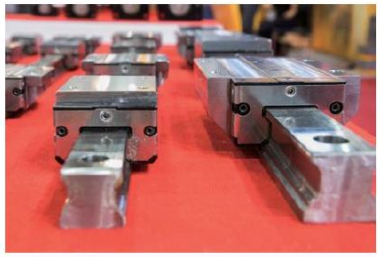
- Suitable for devices with electron beams (No interferance in electro magmetic field)
- Protection of your electrobox from reception of electromagnetic energy (EMC) possibe
- Rust free, suitable for maritime activities

❑ Because Futaba CFRP has low thermal expansion

- Smooth replacement with invar (nickel–iron alloy) possible

❑ Because Futaba CFRP can be thick

- Thickness up to 45mm possible (length 450mm x 450m)



USP Futaba non-woven CFRP

- Screw threads no problem, smallest size M3 screws have been tested
- Metal spring threads are recommended for high frequent screw removal
- Futaba CFRP suitable for precise milling and drilling

Charactoristics Futaba non-woven CFRP

Mechanical property

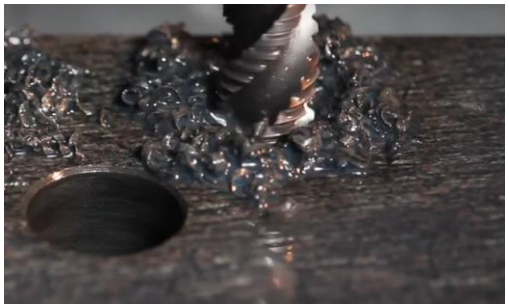
Flexural strength	500 MPa
Flexural modulus	36 GPa
Tensile strength	360 MPa
Tensile modulus	35 GPa
Glass transition point	100 - 120 °C
Coefficient of thermal expansion	7,5 x 10−6 /°C
Thermal conductivity	1,5 W/(mK)
Electrical resistivity	6 Ωcm

Machining ability

Milling ability	Flatness	0,02 mm (250 x 280 x 40 mm)
	Surface roughness	1,02 µm
Surface grinding ability	Flatness	0,01 mm (250 x 280 x 40 mm)
	Surace roughness	0.51 µm
Finished hole processing		H7 (φ10 mm)
Finished hole roundness		7.0 µm

M8 & M10 Tapping (dry and wet)

https://www.youtube.com/watch?v=RBWxi2c5EQI



Drilling and end milling

https://www.youtube.com/watch?v=-SNJYSR9vOI