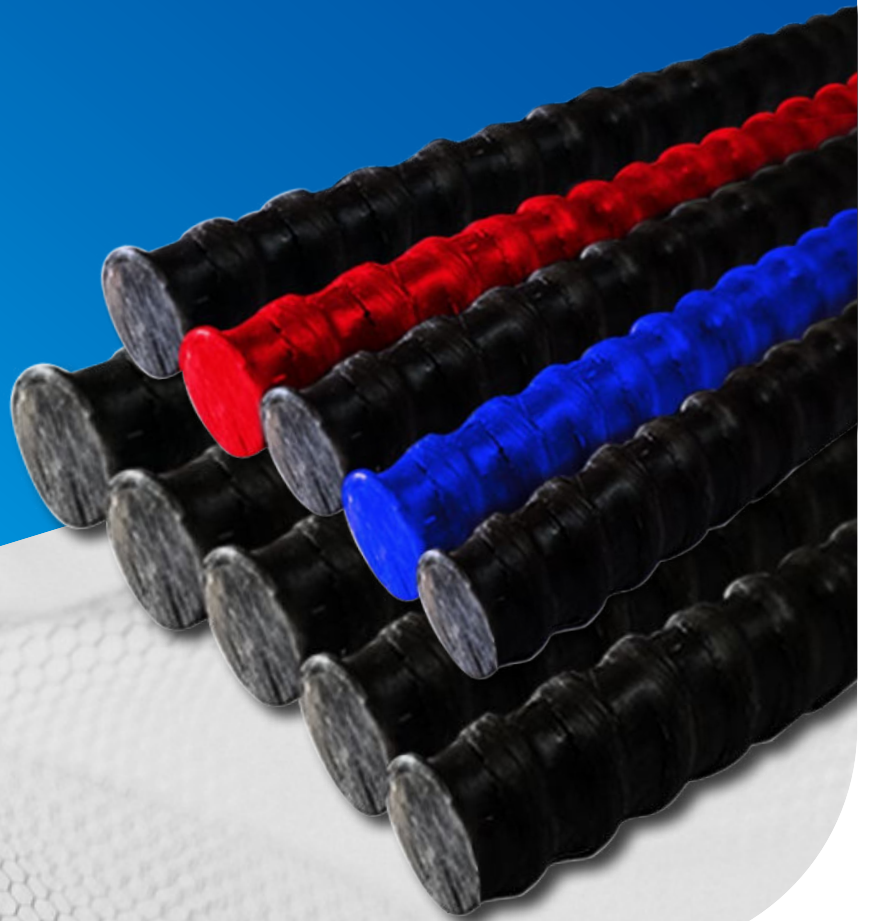


# GFRP & CFRP REBAR

Glass (Carbon) Fiber Reinforced  
Polymer Rebar  
Complex new material product  
for an industrial purpose





## Welcome

Established in 2001, NOW E&S Co., Ltd. has manufactured a variety of products for industrial areas of Electricity and electronics, such as the automated control systems of large construction machines, PLANT equipment, and switchboard. With the development of a semi-permanent centrifugal-type cleaning system for an industrial purpose, our company has also developed products and technologies in general industries and environmental industries. By expanding product items, our company contributes to the growth and development of domestic Electrical and mechanical industries.

These days, based on the experiences and technologies having been accumulated in the areas of Electricity, machine, and construction since the establishment, our company has developed the automated equipment and products for making GFRP Rebar and CFRP Rebar. Such developed products serve their roles in the development projects of high-strength and low-weight structures without corrosion in order to improve the quality and lifespan of building concrete structures in the domestic construction and civil engineering market. To grow as one of main enterprises in the 4th industry, our company continues to develop products and conduct R&D for new products.

In order to achieve the quality improvement goal for the development of national industries and customer impression, all executives and employees of NOW E&S Co., Ltd. promise to make ceaseless efforts to serve society and grow as a reliable enterprise by performing ESG management.

Thank you.

CEO





NOW E&S Co., Ltd.  
specializes in manufacturing  
equipment and products in  
the area of complex material  
as a futuristic new material

NOW E&S Co., Ltd. develops the equipment and products for GRFP/CFRP Rebar made of the fiber reinforced complex material that is stronger than steel (a main material of buildings or structures), lighter than aluminum, and rust-resistant, and has good processing feature. The company provides the developed equipment and products for domestic and foreign offshore structures, construction, and relevant industries.



Implementation of human-oriented convenient smart technology



Implementation of the smart technology for improving people' living space and quality of life



Implementation of eco-friendly manufacturing technology and smart system



Training of human resources leading the global market



Implementation of the value of the global market

GFRP/CFRP REBAR

Glass (Carbon) Fiber Reinforced Polymer Rebar  
Complex new material product for an industrial purpose





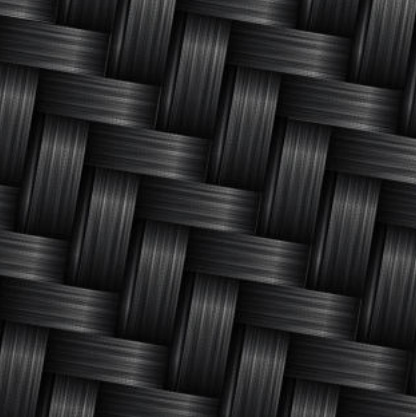


Now Electronics and solutions

# GFRP/CFRP Rebar

Glass (Carbon) Fiber Reinforced Polymer (GFRP/CFRP) Rebar

The next-generation construction material produced in combination of the molding and engineering technologies of the glass (carbon) fiber material with rust-resistance, high strength, and low weight, which makes it possible to expand the lifespan of buildings and structures and to improve quality and productivity

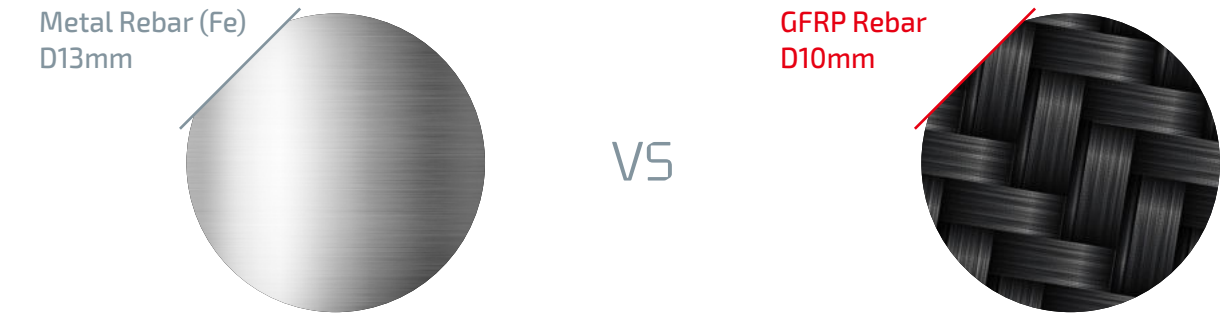


**Glass Fiber Reinforced Polymer (GFRP) Rebar Product**

Glass Fiber Reinforced Polymer (GFRP) Rebar has such advantages as more strength (three times) and lower weight (1/9) than steel based rebar, corrosion resistance, low maintenance cost, and lifecycle (over 80 years) cost reduction. Therefore, with the material, it is possible to prevent deterioration of concrete structures and expand their lifespan. As a new material product, GFRP Rebar has actively been used for civil engineering, construction, bridges, tunnels, roads, railways, wind power and offshore structures, and others in advanced countries since the 2000s

➤ Glass Fiber Reinforced Polymer (GFRP) Rebar

(GFRP) Rebar (comparison between GFRP Rebar and steel (Fe) Rebar)



Metal Rebar (Fe) D13mm	GFRP Rebar D10mm
Rust and corrosion, vulnerable to salt	Excellent corrosion-resistance and chemical-resistance
Low tensile strength	About three times stronger tensile strength than steel rebar
Heavy unit weight (995g/m)	Light weight (150g/m, about 15% of the weight of steel rebar)
High construction cost (trailer transportation, etc.)	Construction cost saving (11t truck transportation, work efficiency improvement)
Possible fluctuation and rise of rebar price	More than 25% lower cost than that of rebar (flexible depending on the market price of rebar)
Expansion and contraction as thermal conductor (heat conductivity: 46W/m℃)	Non-conductor without thermal conductivity (heat conductivity: 0.35W/m℃) No heat transfer due to insulation,, and safe
Vibration delivery, and vulnerable to earthquake	Shock absorption, strong for earthquake, and reduction in noise between floors

➤ CFRP & GFRP Buildings and structures applied industrial areas







GFRP G-Bar Production Line

Features and advantages of G-Bar production equipment

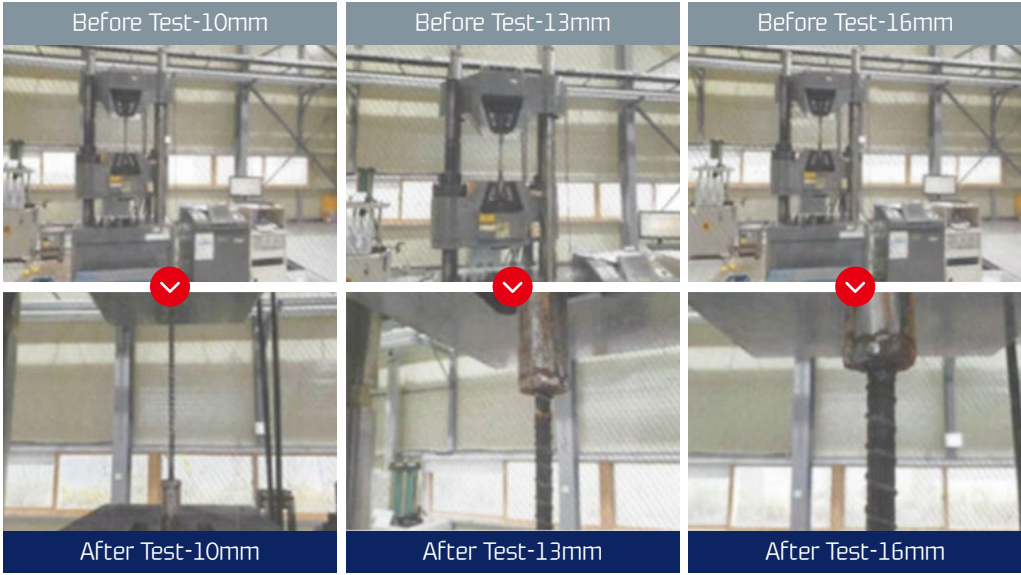
Product spec	the products whose outside diameter ranges from 7mm to 32mm (discussion for special specifications)
Applied technology	patented technology based on pultrusion
Material property	High-strength and low-weight product compared to steel rebar, due to glass fiber complex material
Product features	No corrosion, high tensile strength, and improved quality and lifespan of buildings
Applied areas	Civil engineering, buildings, offshore structures, roads, railways, bridges and tunnel construction, etc.

Mechanical Properties of G-Bar

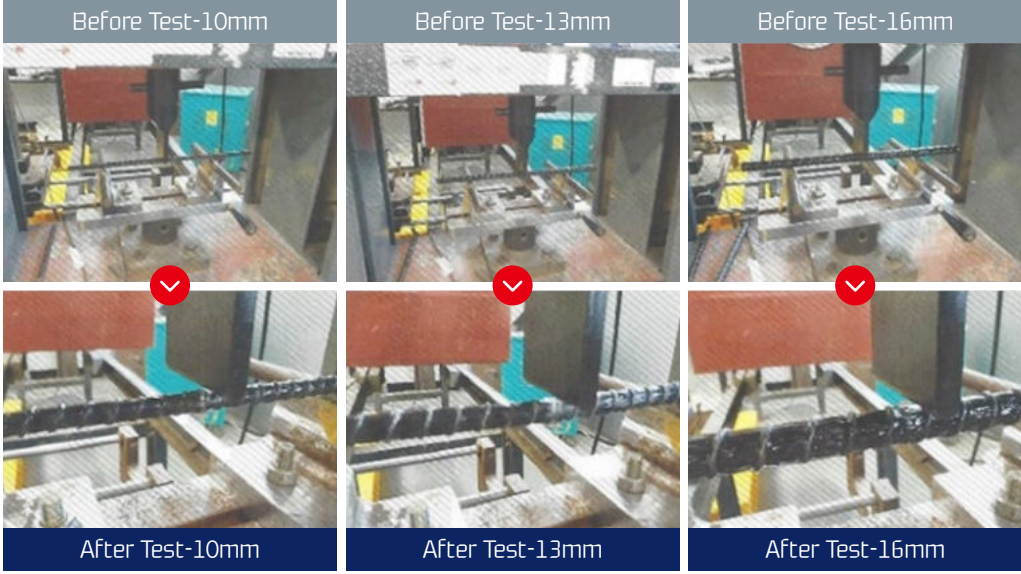
Type	Unit	G10	G13	G16
Complex Material	Glass Long Fiber + Unsaturated Polyester Resin			
Tensile Strength	MPa	800 ~ 1,300		
Tensile Stiffness	GPa	49	50	49
Max. Load of Tension	kN	88	151	245
Flexural Strength	MPa	912	791	645
Flexural Stiffness	GPa	41	44	29
Weight	g/m	150	250	400
Thermal Expansion Coefficient	xE-6/°C		6.95	
Fiber Volume Rate	%		60.7	
Porosity	%		0.8	
Fiber Density	g/cm³		2.54	
Resin Density	g/cm³		1.2	
Flexural Max. Load	N	871.2	2481	4176.2

※ The mechanical properties are different depending on materials (glass fiber, carbon fiber, etc.) and specifications (G10, G13, G16, etc.).

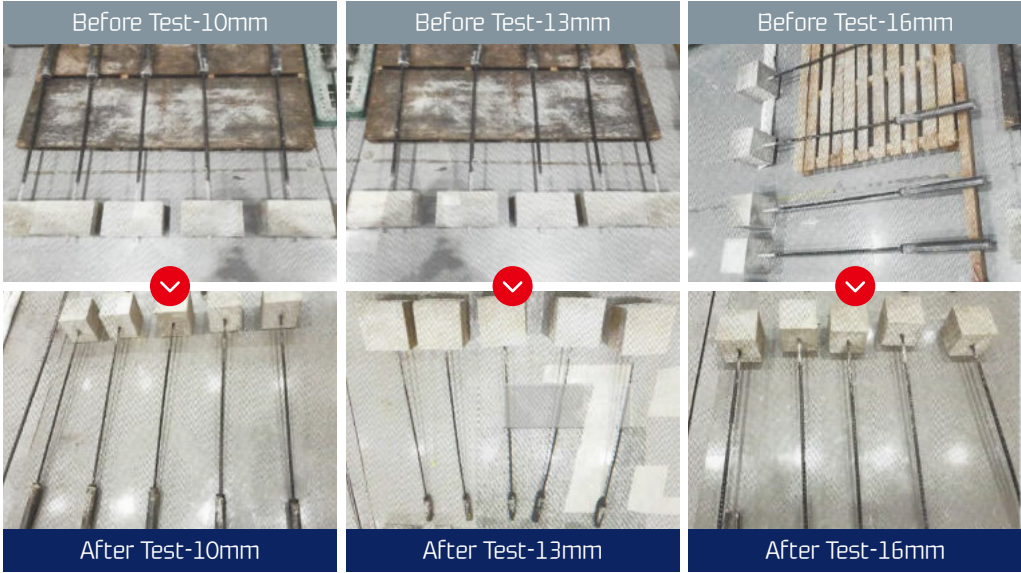
Tensile Strength Test(ASTM)



Flexural Strength Test(KSF3113)



Attachment Strength Test(ASTM)



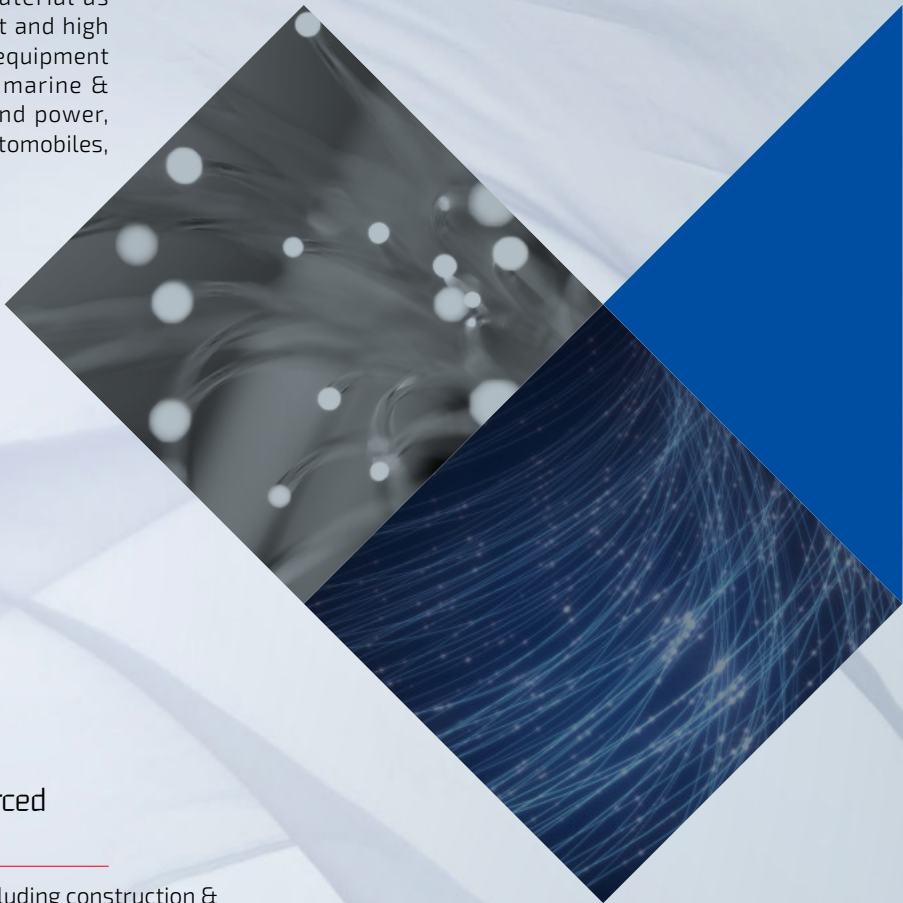


Now Electronics and solutions

# GFRP, CFRP

Industrial complex new materials

Based on the product molding technology and engineering technology of fiber reinforced complex material as the next generation material with low weight and high strength, they are products and production equipment suitable not only for construction, but for marine & offshore structures, onshore & offshore wind power, bridge and road construction, solar power, automobiles, ships, aerospace, national defense, and others

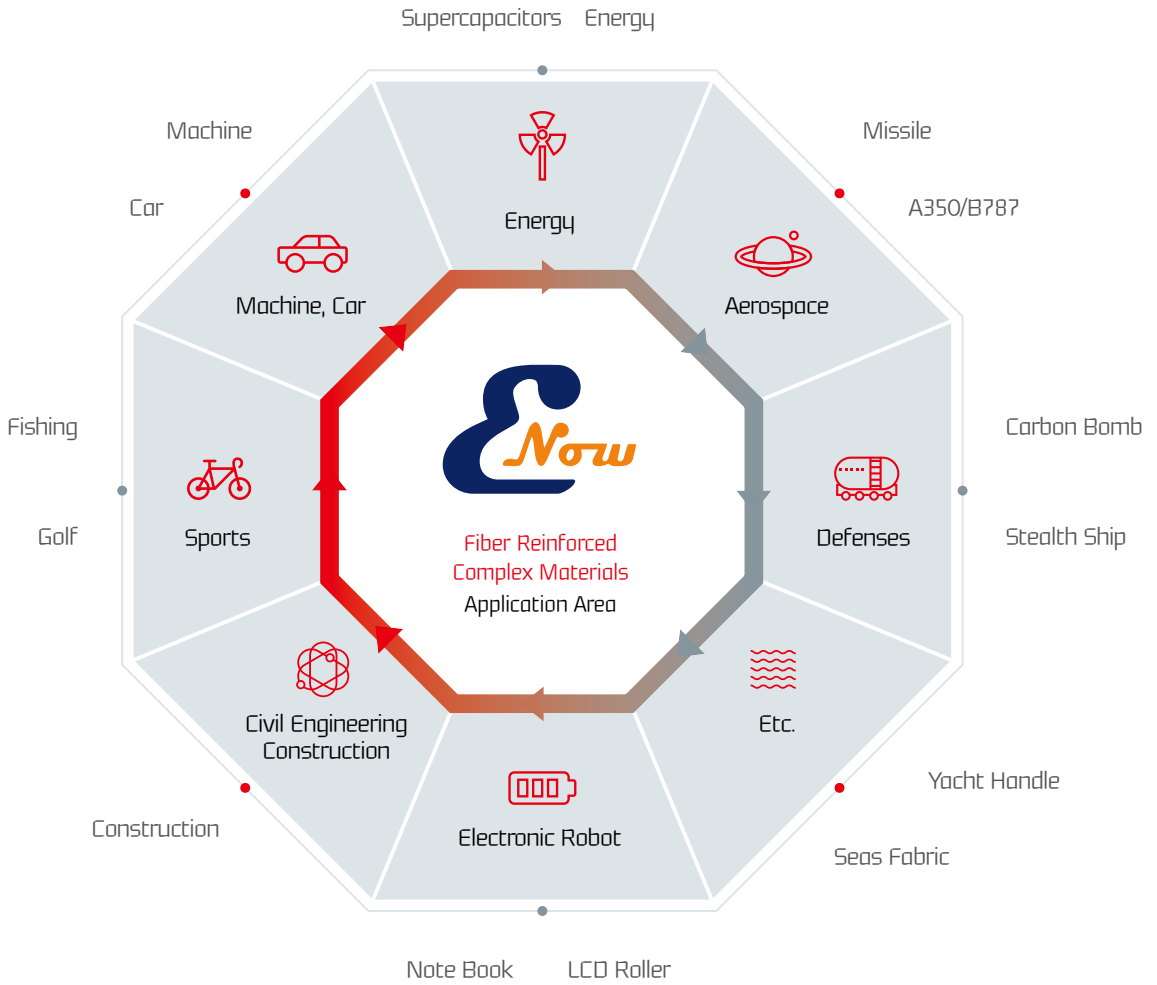


## Applied industrial areas of fiber reinforced complex materials (GFRP & CFRP)

These materials are applied to various areas, including construction & civil engineering structures, wind power, solar power, ships, railways, roads, bridges, medical accessories, and national defense

Strong points of fiber reinforced complex materials

Low weight & high strength	transport cost & maintenance cost saving
Chemical properties	insulation, corrosion resistance, salinity tolerance
Low thermal expansion coefficient	useful in a place with a high temperature difference
Easy manufacturing method	near net shape processing with almost no need of processing



**Aerospace and national defense**  
weight reduction and low thermal expansion coefficient



**Sports leisure**  
Bicycle frame, etc. using the property of low weight and high elasticity

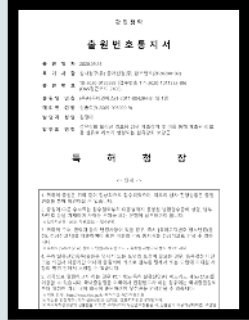


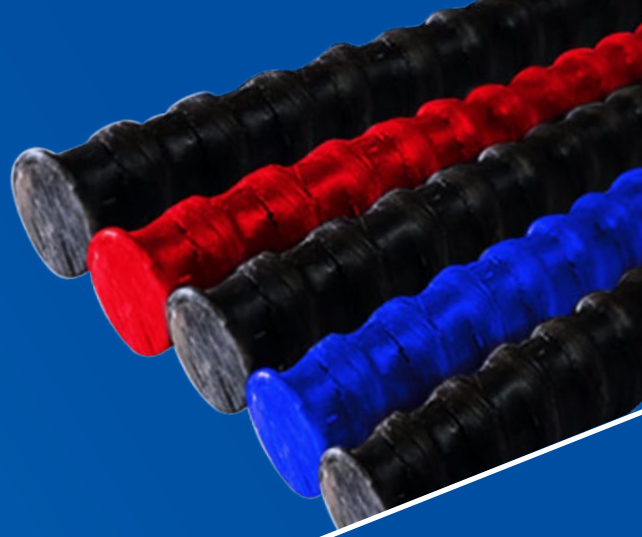
**Automotive**  
bumper, shaft, tire, fuel tank, frame, etc.



**Others**  
interior & exterior materials of medical accessories, wind turbine blades, ships, railways, etc.

## Certificates





CFRP & GFRP Buildings  
and structures applied industrial areas

Offshore  
structures



Onshore  
wind power



Offshore  
wind power



Solar power  
structures



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