

◉ Carbon Fider Reinforced Plastic ◉

# CVB

To be  
released  
from M3  
in turn.

## Carbon + Vinyl Ester Resin + Bolt

"BOLT+" creates a new possibility for bolts.  
CVB, our new product has excellent chemical resistance,  
lightweight and high strength.

High Strength

Chemical Resistance

Lightweight

X-ray Transmission

Non-magnetic

Rust Prevention



Carbon fiber(2.5M)



Vinylester



Thermosetting resin



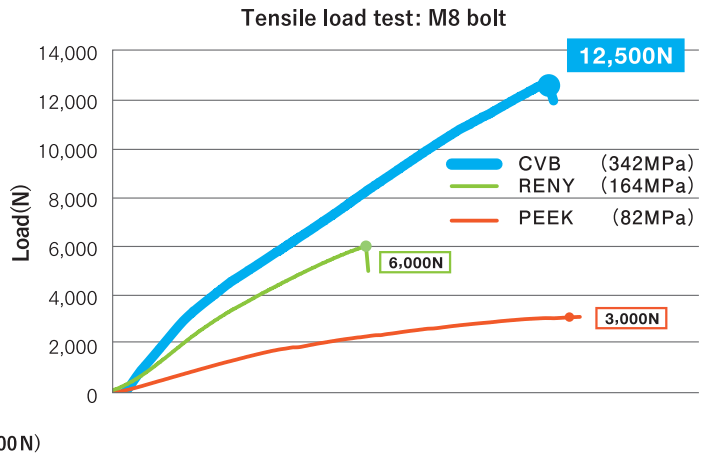
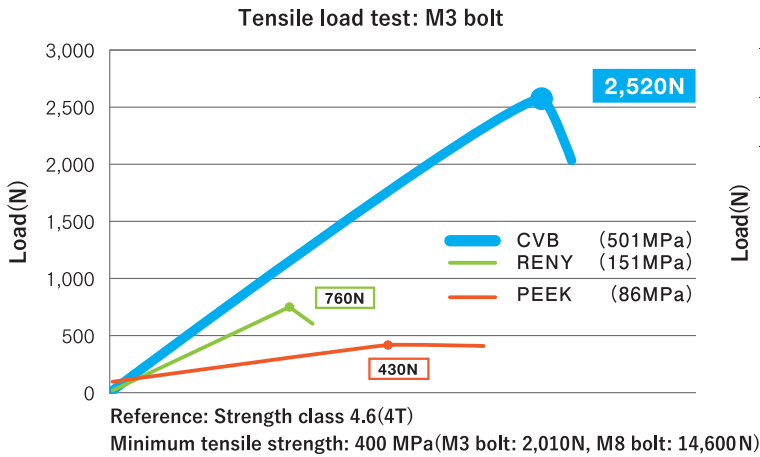
M8 bolt

Using our original Fiber Flow molding technique,  
we molded it without cutting the carbon fiber.

## Performance

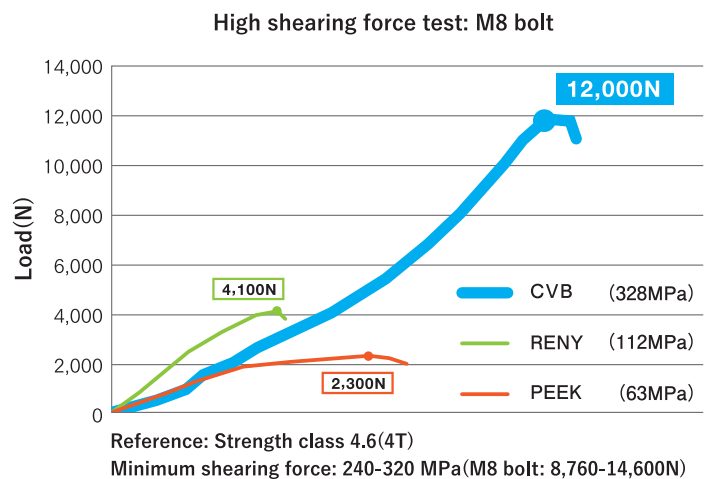
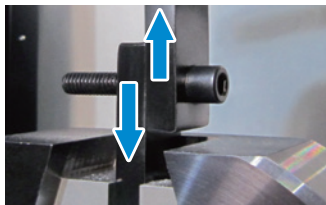
### High Tensile Breaking Load

We established a molding method that does not cut the carbon fiber, thus achieving high tensile load by maintaining the strength of the screw axis.



### High Shearing Force

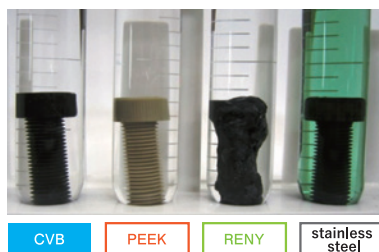
By molding carbon fiber along the axial direction of screw, we achieved a high shearing force which is about three times that of RENY. RENY, which has high strength and rigidity, has come onto the market.



### Chemical Resistance

Uses thermosetting resin having good chemical resistance, equivalent to or better than PEEK which is widely used for chemical resistance.

Test results for chemical resistance



Conditions: sulfuric acid 50%, immersion for 1 week

Chemical resistance of CVB

Chemical name	Concentration	Maximum usable temperature (°C)
Nitric acid	40%	40
Sulfuric acid	50%	80
Hydrochloric acid	37%	65
Hypochlorous acid	20%	90
Hydrofluoric acid	20%	40
Sodium hydroxide	48%	100

Evaluation of vinylester used for CVB

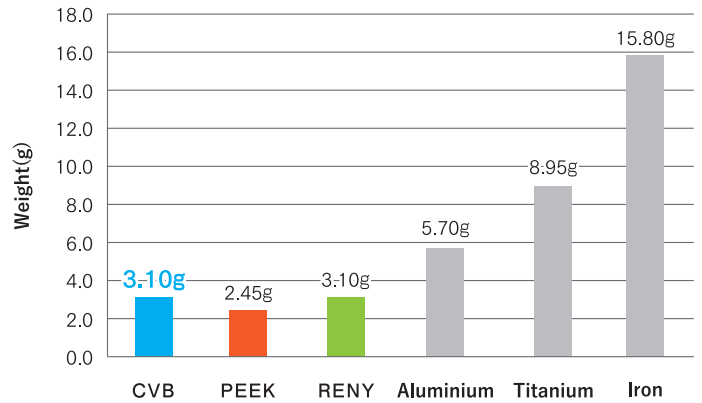
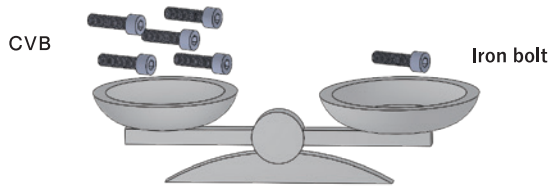
PEEK : Polyether ether ketone

RENY : High-Performance Polyamide resin. A registered trademark of Mitsubishi Engineering-Plastics.

Strength class 4.6 (4T): Strength of typical iron bolts on the market

## Lightweight

We use fiber reinforced plastic for the bolts. The mass is 1/5th that of iron bolt.

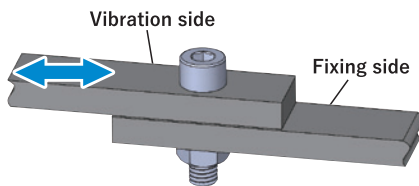


## Screw Looseness Test

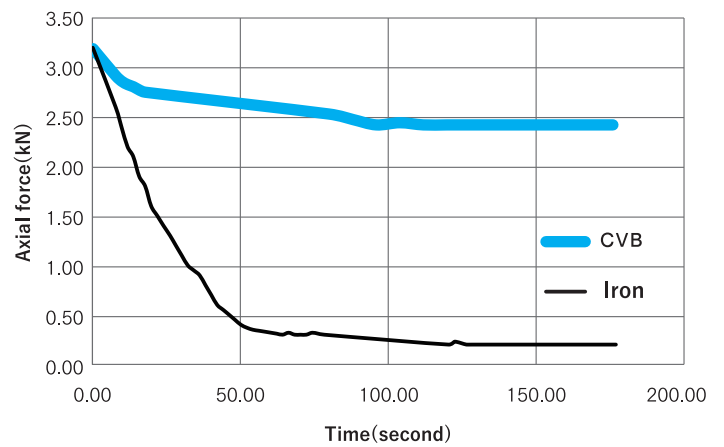
Reduces the decline in axial force in an environment with vibration thanks to its lightweight and low functional resistance.

\*Junker vibration test

The screw is fastened to a test device, the seat surface of the screw is vibrated, and the axial force of the screw is measured between vibrations.



Junker vibration test: M8 bolt



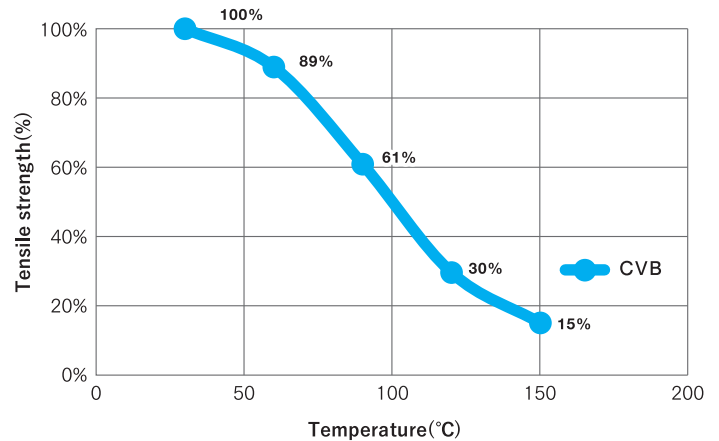
## Heat Resistance Test

Tensile break test under high temperature environment. Including resins, strength decreases at high temperature.

Glass transition point: 130°C

※Strength performance is decreased at high temperature. Always carry out tests under performance conditions similar to actual conditions in advance.

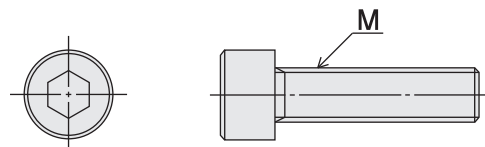
Heat resistance test: M8 bolt



## Shape and size

Head Shape : Hexagon socket head

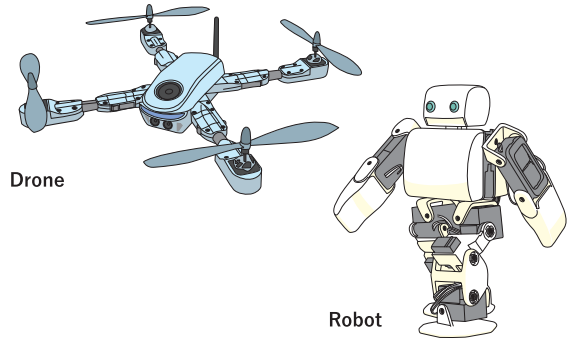
Size : M3 · M4 · M5 · M6 · M8



## ○ Applications

### Lightweight

Despite being as light as plastic, CVB has a strength classification of 4.6 (4T). Possible to save weight of machines. Furthermore, reduce electricity consumption, allowing high-speed operation, and reduce overload and save energy cost during operation.

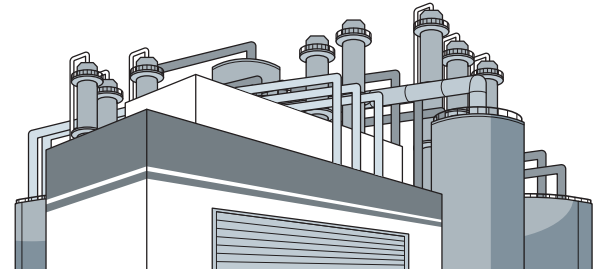


Drone

Robot

### Chemical Resistance

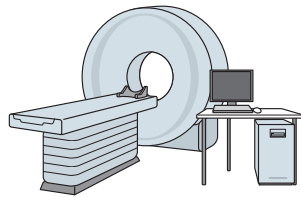
CVB has the same chemical resistance as PEEK bolts but five times higher strength. The bolt tightening force ensures secure fixing, contributing to safety and security. Furthermore, possible to make devices compact by using smaller size of CVB.



Chemical plant

### X-ray transmission

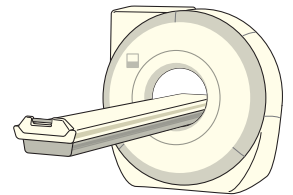
Carbon fiber transmits X-rays, Suitable for CT scanners, etc.



CT scanner

### Non-magnetic

It is suitable for applications such as MRI devices and machine rooms, since the carbon fiber composite material is nonmagnetic.



MRI



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Takai Corporation has been producing various bolts for 65 years. Our products have evolved with the times and finally created a new value that delivers not only strength but also can be used in strongly acidic or alkali environments as well as X-ray environments.

**"BOLT+" creates a new possibility for bolts.**

Our technology made it possible to form three-dimensional molding of reinforced fiber and thermosetting resin. We can create bolts with various characteristics to meet customers' needs by changing the combination of R&D fiber, resin and 3D FRP material.

Takai Corporation will continue to create new value through idea and technology.