**Introduction**

Carbon fiber is used in industries where high strength and rigidity are required in relation to weight such as motorsports, space, and sports equipment. (It is usually stronger than regular aluminum and steel.) Carbon fibers are generally used together with epoxy. The motorsport industry strives to use carbon fiber. However, costs prohibit manufacturers from using it. Carbon fiber is becoming more affordable, yet its production remains labor and technology intense.

A clear comparison between carbon fiber and steel or aluminum is almost impossible. Steel and aluminum are isotropic (Isotropic ensures the same physical properties in every direction.) Carbon Fiber is subject to a multitude of variations and additions at every stage of its manufacture, and certainly not isotropic. The variations of carbon fiber’s strength and rigidity is created by positioning fabrics in a specific way. This presents opportunities for the manufacturer but also requires great knowledge and expertise.

In general, compared to aluminum and steel, carbon fiber offers 2 to 5 times more rigidity. In the case of specific components that will be stressed only along one plane, made from one-direction carbon fiber, its stiffness will be**5-10 times more than steel or aluminum (**of the same weight).

Depending on the orientation of the fiber, the carbon fiber composite can be stronger in a certain direction or equally strong in all directions. A small piece can withstand an impact of many tons and still deform minimally. The complex interwoven nature of the fiber makes it very difficult to break.

**Characteristics/Properties of Carbon Fibers**

1.      Physical strength, specific toughness, light weight.

2.      Good vibration damping, strength, and toughness.

3.      High dimensional stability, low coefficient of thermal expansion, and low abrasion.

4.      Electrical conductivity.

5.      Biological inertness and x-ray permeability.

6.      Fatigue resistance, self-lubrication, high damping.

7.      Electromagnetic properties.

8.      Chemical inertness, high corrosion resistance.

Top of Form