

Advantages of Pultrusion in comparison to other manufacturing process:

1. Stronger than similar product manufactured by hand lay up, injection moulding etc
2. Tension due to pulling aligns the fiber, hence more strength
3. Fiber density is high even up to 70 % by weight
4. Can be manufactured in highest and constant quality and in least cost
5. Cost of raw material is up to 90% of total fabrication cost hence machine and labour cost is fractional
6. Quality is dependent only on raw material's quality and not on the motivation of technician
7. Automated process helps in easy process control.
8. Fabrication using fiber and resin is easy. New profiles can be prepared by using new die

Advantages of FRP Pultruded Profiles

- **High strength to weight ratio:**

FRP profiles have great strength properties which surpasses structural steel. Hence it can be used to make structural members like beam, platform, flat board etc. Its strength to weight ratio is higher than steel, hence it finds wide application where weight is to be reduced. As FRP is basically a plastic hence its specific gravity is only 20-25% that of steel and 70% that of aluminium. Even in normal requirements of construction, low weight helps reduce freight, cost of labour, lifting and installation.

- **High Impact Resistance:**

FRP sections have high impact resistance and it takes blow without substantial damage. Its structural flexibility and non ductility causes the member to return to original position without any permanent deflection or distortion. Thus any impact less than its damage strength does not cause any damage.

- **Corrosion Resistance:**

One of the foremost reasons for the usage of FRP is its corrosion resistance. It resists a broad range of chemical environments such as acid, alkali, organic media etc. Hence it finds usage in vast number of industries like chemical plants, sewage water treatment plants, power plants, sugar mills etc.

- **Good Thermal Properties:**

It has a low coefficient of thermal expansion and low thermal conductivity. Thus it is quite free of temperature changes. More over these materials can work in very large temperature variations like -70°C to $+80^{\circ}\text{C}$ without failure. This makes it ideal for piping material.

- **Good Electrical Insulation:**

Its electrical insulating property makes it an excellent material to use in electrical environment and for making cable trays and housing electrical components.

- **Fire Retardant:**

FRP materials can be given great flame retardant properties. Different resins give different flame retardant properties. The oxygen data of FRP pultruded profiles (flame retardant type) is equal or above 32 (GB8924) for normal usage, by using phenolic resins, the data is equal or above 65 (GB8924) and the rate of flame propagation is equal or below 5 (ASTM E-84) and the smoke den-

sity is 10. Hence it can be successfully used in hazardous areas like mines, power plants, chemical factories, oil and gas etc.

- **UV Protection:**

By adding special additives FRP can be made UV Protected which increases its life.

- **Freedom of color choice:**

FRP sections can be given desired colour which can match with the colour of rest of the unit. The colour selection of Pultruded FRP profiles is realized by adding different pigments in the resin mixture.

- **Non-skid Surface:**

Epoxy surface encapsulating grit or glass beads gives it anti skid property highly suited for human access area. With all these properties it is very easy to design FRP based application which suits the user's requirements in cost effective manner.

- **Long Life and Weatherproof:**

The lifespan of Pultruded FRP profiles is very high, even after its exposure to the atmosphere.

- **Environment Friendly:**

Pultruded FRP remains in service for a very long period and it generally replaces wood and metal, it proves to be very environment friendly. After usage it does not release harmful chemicals and can be recycled effectively.

- **Cooling Tower Structure**

Pultruded FRP based cooling towers have structures of proven Braced Frame Design. These structures are connected to ground with steel angles and base plates anchored and grouted to the basin. Hardware used at all the places are stainless steel. No piers and pilasters are used in the structure. Frame, Casing, Fan deck, Fan cylinder, staircase, railing, light poles, ladders etc. are all of FRP. Wherever necessary anti-skid surfacing is used for safety of Operation and Maintenance personnels. The cell size that can be been designed is 18x18 meters and capable to handle fan motor power 250 HP/cell.

Advantages of Pultruded FRP in Cooling Tower

1. Strong and light
2. Easy transportation
3. Easy erection
4. Easy handling hence lesser handling equipment required
5. Accident less site because of lesser weight
6. Decay less
7. Painting not required for surface protection and corrosion
8. Can handle acidic and sea water
9. Does not decay due to fungi, hence more durable
10. Accident less as failure less likely
11. High temperature range for pipes of FRP
12. Not prone to alternate wet and dry condition as in timber cooling tower
13. Flame retardant-can be used in refinery, petrochemical, power plant and other hazardous areas
14. Long life span hence customer satisfaction