Bamboo Fiber Plastic Composites

Bamboo is a member of the grass family and is one of the fastest growing plants. Bamboo cultivation is free of pesticide and fertilizer and does not require a lot of water to grow. Bamboo fibers are blended into a thermoplastic matrix (like Polypropylene) to produce bamboo fiber reinforced plastic that provides various advantages.

- Bamboo fiber is a fast-renewablenon-food biological resource
- It is a low-cost material improving economics of the end product
- It is strong yet light weight - improving strength & reducing weight of composite
- Bamboo fiber is hydrophobic (repels water), rot proof, anti-bacterial, anti-allergic and has good fire resistant.
- Bamboo fiber provides an excellent resistance to compression and flexion.
- Due to its hollow structure bamboo fiber provides natural odour removal capacity
- Bamboo fiber is naturally bio-degradable

Bamboo fiber composite (BFC) is an ideal engineering material to replace mineral filled plastics products with lower cost and better performance. It is an environmentally positive material since it is fast renewable non-food agricultural product and helps in reducing the carbon footprint. Bamboo fiber loading can be as high as 50 % by weight of the polymer. Bamboo fiber reinforced plastics can be processed by injection moulding or extrusion and end application areas are huge like Table ware (bowls, plates, trays, glass, cutlery etc.), Kitchenware, Containers, Household appliance housing, toothbrush stems, flower pots, toys, Automotive interior trims, Furniture items (stools, chairs, table etc.), handles, combs, motorcycle seat etc.

Production of Bamboo Fiber

There are broadly two methods of producing bamboo fibers namely Mechanical methods& Chemical methods. Chemical methods are of two types, the first - bamboo Viscose Rayon method (chemical cooking & spinning) and the second the Lyocell method (an organic solvent spinning process). Both the chemical methods are not environment friendly and / or suitable for producing low cost fiber. Hence, mechanical methods are preferred to produce bamboo fibers used for reinforcing plastic compounds.

The basic mechanical process involves immersing the green bamboo culms in water for better machine workability. The softened green bamboo culms are then chopped through a chipper and the chips are transformed into fiber bundles through a hammer mill. The bamboo fiber bundles are then air-dried and filtered by means of a sifter through a suitable size mesh screen. Main constituents of bamboo fiber are cellulose60%, lignin 32% and hemicellulose. Minor constituents are resins, tannins, waxes and inorganic salts.

Dried Bamboo Fiber

Bamboo Fiber Plastic Composite Pellets

Injection Moulded Bamboo Fiber PP Composites

Typical values comparing BFC with other materials

NO	Item	Density	Hardness	Tensile Strength	Flexural Strength	IZOD Impact Notched
		g/cm³	D	MPa	MPa	KJ / m^2
1	30% Bamboo fiber reinforced PP	1.04	65	32	51	11
2	40% Bamboo fiber reinforced PP	1.04	71	45	79	6
3	50% Bamboo fiber reinforced PP	1.04	73	50	84	4
4	Polypropylene	0.97	65	20 - 35	10 - 25	2 - 20
5	50% Hemp fiber reinforced composites PP	1.08	75	62	89	5
6	30% glass fiber reinforced PP	1.13	95	75	100	8
7	30% Calcium Carbonate filled PP	1.13	--	28	48	4

Various industry sources

We can provide technical know-how of the manufacturing process on industrial scale. As a first step we can prepare a Techno Economic Project Feasibility Report that will provide a realistic picture and help you to take an informed business decision. Typical contents of the project feasibility report are given below.

1.0 Natural fiber thermoplastic composites
2.0 Different types of NFPCs and their advantages & disadvantages
3.0 Why bamboo fiber is preferred natural fiber for composites
4.0 Suggested production volume & project parameters
5.0 Production process & technology
5.1 Production flow diagram
6.0 Main plant & machinery with basic specifications and indicative price
7.0 Utilities & Support facility with basic specifications and indicative price
8.0 Quality Control & Testing Lab with indicative prices
9.0 Estimated Project Cost
10.0 Manpower requirement & cost
11.0 Estimated Product Cost (raw material, additives, production, overheads)
12.0 Estimated Turnover, Profitability & Project Payback Period
13.0 Working Capital requirement
14.0 Factory area & building requirement
15.0 Product guiding specifications & test standards
15.1 Product pricing vis-à-vis mineral & glass fiber filled Polypropylene
15.2 Product characteristics vis-à-vis mineral & glass fiber filled Polypropylene
16.0 Key market segments and end applications
17.0 Market potential and growth prospects
18.0 Key market segments – volume and growth prospects

One you decide to go ahead we can provide complete assistance for the project implementation i.e. selection and sourcing of plant & machinery, plant layout and factory design, selection & sourcing of utilities and support equipment, recruiting technical manpower, commissioning of plant, sourcing of raw material and chemicals, process know-how, quality control and testing systems, product technical qualification, target market segments, end application know-howetc.

Best regards,

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