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Informative Article on Wood Plastic Composite Door

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Abstract: ***Solid wood doors or natural wood doors have been in use for number of decades. But as time changed other doors such a hollow core door, Laminated Core Flush Door, Framed and Panelled Doors came into picture. Though these doors may look good they are not viable on long run for countries like India because of varying climatic condition, wood tends to expand and contract when subjected to heat and another drawback of using solid wood is that wooden doors suffer from termite exposure. The production and use of alternative materials such as plastic as a composite material in wood represents a great opportunity to ensure greater sustainability in the construction sector. An alternative use of wooden door will be wood plastic composite door which is resistant to exposure of termite.The first company in the world that invented and patented the process to create WPC was Covema of Milan in 1960, founded by Terragni brothers (Dino and Marco). Plastic is an excellent alternative material to the existing solid wood doors.In today's world the waste generated from industries is the huge concern for the environment, health, and cause for land filling. Recycling of plastic wastes and using them in construction materials appears to be viable solution not only to the pollution problem but also an economical option in construction.***

Keywords: Plastic, sustainability, Pollution, composite door

1. Introduction

Plastic is a name given to different synthetic materials like that are based of polymers. The construction industry uses plastic for a wide range of applications because of its versatility, strength-to-weight ratio, durability and corrosion resistance. Unlike wooden or other kind of Door frames, WPC Door Frames are waterproof, distortion resistant, and have great adaptability to outdoor conditions.Plastic is a name given to different synthetic materials like that are based of polymers. The construction industry uses plastic for a wide range of applications because of its versatility, strength-to-weight ratio, durability and corrosion resistance.
markets value for wood plastic compositeare increasing and new applications are being pursued. Doors and window parts, deck handrails and fencing are alternative markets segments for the WPC trade. The WPC characteristics and products performance have potential for a various new application. WPC is expected to increase in near future because of need of environment friendly construction material and more recyclable products. WPC also helps to upcycle the plastic into usable construction material.

2. Wood Plastic Composite (WPS)

It is a new material that has many potential applications. These are compositions of thermoplastic polymers and wood particles in certain ratio depending upon application. The wood and thermoplastics are typically compounded above the melting temperature of the thermoplastic polymers and after that further prepared to make several shape and sizes for desired door frames.

WPC market all over the world is expected to grow at an excellent double digit CAGR (Compound annual growth rate) opportunity during period of 2016 to 2021. Recovering the construction industry and high focus towards use of environment friendly materials are another booster of the global WPC market. Hence India is on the same path of growth in WPC market, and increasing acceptance in building construction as well as furniture industry widening the road for WPC. But major driver for the WPC is its superior Physical and mechanical properties which makes more compatible product over any other traditional product in segments.

3. Application of WPC

WPC can be produced in multiple colours with various surface textures as per the customer requirement and it has multiple applications like Door Frames, Window frames, railings, fences cladding and siding, moulding and furniture, flooring, lawn and garden etc. [1] As a recent application UV resistant WPC door are available in the market to protect our exterior door.WPC material can be recycled and reused. WPC comes under the concept of 3R's Reduce, Reuse, Recycle.

4. Production of WPS

WPC are produced by mixing of ground wood particles with heated thermoplastic resin. Common method involved inWPC is injection moulding. Injection moulding is amanufacturing process for producing parts from both thermoplastic and thermo set plastic materials. [1]

Wood plastic pellets is fed into a heated barrel, mixed, and are forced into a mold cavity where it cools and hardens to the particular mold cavity. Operating condition of the injection moulding temperature of the cylinder is about 200^0C, temperature of the mould 50 ^{0}C and holding pressure up to 10 sec is 500 bar.Polyethylene-based WPCs are by far the most common.

Additives such as colorants, coupling agents, UV stabilizers, blowing agents, foaming agents, and lubricants help tailor the end product to the target area of application. Extruded WPCs are formed into both solid and hollow profiles. A

large variety of injection molded parts are also produced, from automotive door panels to cell phone covers.Some manufacturing facilities produces pellets of the new material. [2]The pellets are then re-melted and formed into the final shape. Other manufacturers complete the finished part in a single step of mixing and extrusion.Due to the addition of organic material. WPCs are usually processed at far lower temperatures than traditional plastics during extrusion and injection moulding. WPCs tend to process at temperatures of about28 °C lower thanunfilled material. Most will begin to burn at temperatures around (204 °C). Processing WPCs at excessively high temperatures increases the risk of shearing or burning and discoloration resulting from pushing a material that's too hot through a gate which is too small, during injection moulding. The ratio of wood to plastic in the composite will ultimately determine the melt flow index (MFI) of the WPC, withlarger amounts of wood generally leading to a lower MFI.

5. Advantages and Disadvantages of WPC Doors

Advantages	*Disadvantages*
Good insulation	Shortcoming of plastic
Moisture-proof	Looks artificial
Resistance to Termite and Fungus	Notresistant to high temperature
Durable and long life	Less popularity
Fire retardancy	High cost
Low moisture content	Lack of production industries to produce WPC doors
Long life	
Less maintenance	
Easy of processing	

6. Conclusion

From the above we can infer that wood plastic composite door has its own pros and cons. With respect to the current Scenario it is viable for engineers and manufacturers to opt for Wood polymer composite doors because it will help us reduce plastic pollution in an effective way as plastic is being upcycled.

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