

Long Fibre Reinforced Thermoplastics

Introduction

The lightweight construction aspect has been the primary driving force behind the use of fiber reinforced composite materials as replacements for metal materials [1]. Composite materials comprising of a polymer matrix with fibre reinforcements have given a completely new dimension to the use of plastics in automobiles. As compared to their metal counter parts, plastic composites are easier and economical to process, lighter in weight and have comparable impact resistance, thus giving a better stiffness to weight ratio than metals. Because composites are composed of fibre and polymer matrix, they can be individually formulated to meet the needs of the specific application. Another advantage with composites is that, it is also possible to reinforce the weak areas of the structure by using uni-directional reinforcements.

What are Long Fiber Reinforced Thermoplastics?

The term Long Fibre Reinforced Thermoplastic (LFRTTP) is referred to a type of reinforced plastic material in which the matrix is a thermoplastic material like polypropylene, polyamides, polycarbonate, styrenics like ABS and blends, while the reinforcing members are fibres, generally glass, carbon or even natural fibres.

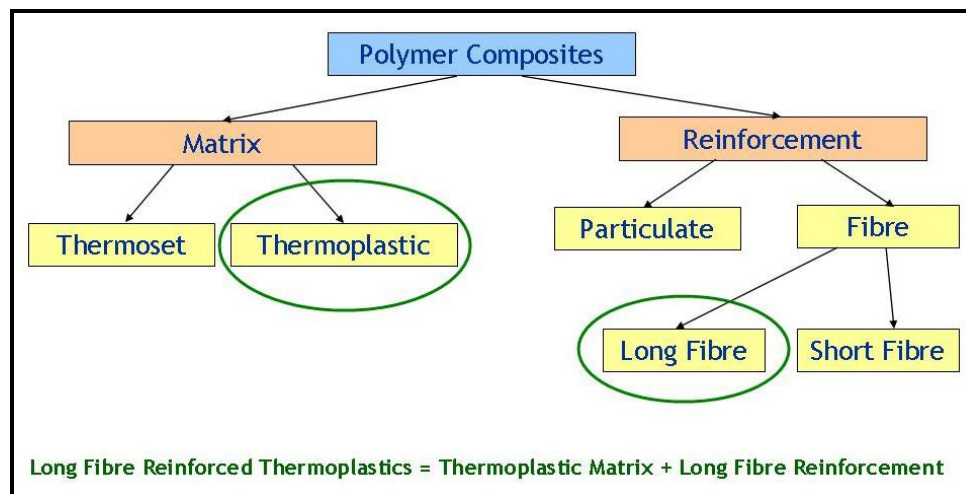


Figure: What are Long Fibre Reinforced Thermoplastics (LFRTTP'S)?

LFRTTP's can be processed by various processes like compression moulding, injection moulding and injecto - compression moulding [2].

Depending on the process used to manufacture a part from LFRTTP, the fibre length can be varied. Fibre length in a compression molded LFRTTP part is generally larger than the fibre length in an injection molded LFRTTP part and can be characterized by dispersed, random fibres.

The most significant feature of LFRTTP materials is their high impact strength. Other than good impact strength, LFRTTP materials offer other advantages such as ease of function integration, design freedom, light weight due to very low density (1.2 g/cc) as compared to steel and recyclability. As a result, long fibre reinforced thermoplastic materials are generally applied as materials in semi structural components in automobiles such as front end carriers, instrument panel carriers, under body panels, spare wheel well covers etc[2].

It is due to their advantages that LFRTTP materials are the materials for the future.

References:

- [1] O.Geiger, R. Brüssel ; Tailored LFT's developed for series production - Results of the "SMART PART" R&D project; AVK-TV Tagung - Paper A 9; Baden- Baden ; 2003.
- [2] Durgesh Bakshi ; Evaluation of Potential of using Long Fibre Thermoplastics as a material for an Automobile Rear Bumper Beam ; Master Thesis - Applied Polymer Science, Martin Luther Universität - Halle Wittenberg and Fraunhofer ICT, Pfinztal - Berghausen ; 2006