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Glass-Filled Polyurethane in Manufacturing

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Abstract—The physicomechanical and operational properties of glass-filled polyurethane obtained by long fiber injection molding (LFI) and fiber composite spraying (FCS) are investigated. It is clear that glass-filled polyurethane may be used in producing components with different surface texture (dashboard, door trim, armrests) in the auto industry.

Keywords: glass-filled polyurethane, physicomechanical properties, operational properties, LFI, FCS

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Hundreds of grades of elastic and rigid polyurethanes are currently being produced from high-molecular compounds for use in manufacturing and construction [1]. By varying the composition, polyurethanes with a wide range of properties may be obtained. Polyurethanes are used in noise reduction and heat insulation, for exterior and interior components in the auto industry, and as decorative elements in construction [2–5].

Glass-filled polyurethanes are used in the production of large components with a multilayer structure (roof racks, dashboards, heat- and noise-insulating screens, etc.).

Currently, glass-filled polyurethanes are mainly produced by the following technologies [6]: long fiber injection molding (LFI); fiber composite spraying (FCS); reinforced reaction injection molding (RRIM); structural reaction injection molding (SRIM); and resin transfer molding (RTM).

Thanks to automation and the fallings costs of hardware and software, LFI and FCS are widely used in industry in the production of glass-filled polyurethanes [6, 7].

In the present work, we investigate the physicomechanical and operational properties of glass-filled polyurethane components produced by LFI and FCS [6]. Two types of samples produced by LFI are investigated: (1) samples consisting of a polyurethane facing, a frame of rigid glass-filled polyurethane, and an intermediate layer of semirigid polyurethane; (2) samples consisting of a single layer of rigid glass-filled polyurethane.

The samples produced by FCS consist of rigid polyurethane. Tables 1 and 2 present the properties of samples of types 1 and 2, respectively, produced by LFI. Table 3 present the properties of samples produced by FCS.

The tests indicate excellent properties of the glass-filled polyurethanes. Accordingly, glass-filled polyurethanes may be recommended as an alternative to traditional glass-filled materials in the production of components with different surface texture (dashboard, door trim, armrests) in the auto industry [6].

LFI improves the flexibility and quality of production; reduces production costs (especially for large products) thanks to high product quality and minimal production wastes; permits variation in fiber content and length; and produces external surfaces of high quality (even when using films and textiles).

FCS reduces production costs for large components and small batches thanks to the use of a single shaping element (the matrix); improves the product properties (even in the case of sandwich materials); and yields colored external surfaces of high quality (even when using films and textiles).