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Development of the recommendations on selection of glass-fiber reinforced polyurethanes for vehicle parts

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Abstract

© Research India Publications. Advanced polymer composites have essential features: high specific strength ratio, resistance to aggressive substances (water, fuel, oil, lubricants, weak alkalies and acids), wide operation temperature range (from -60 to +80 °C), sufficient durability (up to 10 years), high aesthetic qualities. The use of polymer composites for vehicle parts significantly reduces the curb weight of a vehicle, improves its dynamic behavior, increases its payload capacity, reduces its fuel consumption and emissions. The research was focused on the parts made of rigid glass-fiber reinforced polyurethane. The samples were made using the system based on polyol component A and isocyanate component B in a ratio of 1,75:1 (A:B). As a filler the glass fiber roving was used in the amount of 25 weight parts per 100 weight parts of the matrix component. The glass-fiber reinforced polyurethane parts were manufactured by spraying. The paper describes the comprehensive research of the glass-fiber reinforced polyurethane properties including the evaluation of thermal resistance, impact resilience, temperature resistance, Shore D hardness, acoustic absorption coefficient with the state-of-t-e-art test procedures and research equipment. The recommendations were developed to select glass-fiber reinforced polyurethanes for vehicle parts: for parts where the material is under high load during operation (temperature, impact resilience, etc.) it is recommended, whenever possible, to use the materials with larger thickness; for the parts where hardness is subject to special requirements – the materials with smaller thickness; during part production it is necessary to precisely carry out the operations of part manufacturing process to avoid any defects which are stress raisers and reduce the material strength.

Keywords

Acoustic absorption coefficient, Comprehensive research, Glass-fiber reinforced polyurethane, Impact resilience, Polymer composite, Shore D hardness, Temperature resistance, Thermal resistance