The Analysis of Injection/Compression Liquid Composite Molding

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ABSTRACT

There are various manufacturing processes to produce reinforced plastics. Resin Transfer Molding (RTM) is one of the most important processes. In producing large-surface-area parts with low fiber permeability, long mold filling time is needed, i.e. the cycle time is large. Moreover, the resin might gel before the filling period ends. To prevent the short shot, increasing the injection pressure is a possible choice. However, the equipment cost is increased. Excessive injection pressure would also produce the fiber deformation or the fiber wash-out, and it affects the quality of the reinforced plastics. The main goal of the proposed research is to provide a novel approach , Injection-Compression Liquid Composite Molding, which can reduce the injection pressure and improve the part quality. The research will be conducted through modeling , numerical simulation and experimental analysis. Control Volume-Finite Element Method has been widely used in RTM simulation. This research is going to apply this numerical approach to simulate the Injection-Compression LCM processes. The process parameters, injection pressure, part thickness before and after the compression, the permeability and compressibility of the fiber preform, on quality of Injection Compression LCM parts will be investigated. The experimental results will be compared with the theoretical predictions. The quality test of the composite samples will be conducted through a three point bending test and by using microscopes .

Keywords : Reinforced Plastics ; Resin Transfer Molding ; Injection-Compression ; Fiber Preform

Table of Contents

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