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Thermal characterization of a thermoplastic resin for resin transfer molding in process conditions. Demonstrating of the feasibility of the technology

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Composites materials pieces based on thermoplastics resins are suitable candidates to replace iron parts in the automotive sector for the purpose of reducing weight and hence to reduce CO₂ emissions. But, the use of such composite material used in the automotive sector is notably determined by the total cost of the pieces. So, new materials such as low viscosity thermoplastics or reactive thermoplastics resins are developed to give an answer. These materials needs also the development of adapted processing methods like resin transfer molding (RTM) and compacting resin transfer molding (C-RTM). In this presentation we deal with the thermal characterization of low viscosity resin, and more specially its crystallization kinetics, in wide temperature range with an Avrami model. The study of its density evolution during crystallization, according to the pressure and the temperature, is also presented. Then we present new devices developed to prove the feasibility of thermoplastics resins processing by RTM. The experimental thermal measurements during an injection demonstrate the accuracy of our thermal model and of its thermal parameters.

Biography

Jean-Luc Bailleul is working on composite material processing since twenty year. Specially on the mastering of thermal cycle to control final pieces qualities in terms of their final mechanical properties and in terms of cycle time. Thus, he has developed a phenomenological model to describe heat generation during thermosets resins transformation. The specificity of his laboratory is the development of experimental tests benches to understand the physical phenomena that occurs in composite materials during their transformation. Since ten years he develops also some works on composites materials recycling. The result of all his works is that he has now a good hindsight on thermal phenomena influence on polymer processing.

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