

Pichai Jariyathammanukul 2008: Design and Development of Injection Mold for Determination of Fiber Orientation in Injection Molded Part. Master of Engineering (Mechanical Engineering), Major Field: Mechanical Engineering, Department of Mechanical Engineering. Thesis Advisor: Ms. Anchana Wongsto, Ph.D. 92 pages.

This research was to study the application of CAD/CAE/CAM in designing and manufacturing the plastic injection mold which can be changes into various characteristic such as different thickness of specimen, types and positions of gate and flow direction of molten polymer, respectively. The effects of weld line and thickness of specimen on the fiber orientation and mechanical properties of polypropylene filled with 30 wt% glass fiber was also investigated from this plastic injection mold.

The 2.5 and 3-D analysis results from the simulation program were compared to the actual flow inside the mold. Good agreement of the flow pattern and the fiber orientation were shown from the 3-D simulation results. Effect of weld line tended to decrease tensile and impact strength significantly due to the perpendicular orientation of glass fiber to the flow direction including voids inside the weldline area. Considering the effect of specimen thickness on the tensile and impact strength, it was found that tensile strength decreased with an increase of thickness, while no change in the impact strength. This is due to an increase of core layer as the thickness of specimen increase. The results also showed that the tensile and impact strength of specimen with weld line were independent on thickness of specimen. This associated with the ratio between thickness of core layer and thickness of specimen was constant at the weld line area.

Student's signature

Thesis Advisor's signature

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