Mechanical & Industrial Engineering
UNIVERSITY OF TORONTO

Thesis Projects (MIE498 H/Y) 2018–2019

Title: Polymer/Composite Coextrusion Foaming

Description:

Most new polymeric products contain two or more polymers and functional additives resulting in desired properties contributed from each component. The multilayer coextrusion process is a single-step process starting with two or more polymeric and hybrid materials simultaneously extruded and shaped in a single nozzle to form a multilayer structure. Recently, micro-/nano-layer (MNL) coextrusion has been used to manufacture unique optical, mechanical, and gas barrier films, such as brightness-enhancement filters for electronic screens, ultra-strong safety and security window films, and elastomeric barrier films for cushioning bladders in athletic shoes, consisting of hundreds of layers each less than 100-nm thick. Foams can be prepared from any type of plastic by introducing a gas or SCF within the polymer matrix. The applications of microcellular plastics containing billions of tiny bubbles less than 10 microns in size have broadened due to the lightweight characteristics, excellent strength-to-weight ratios, superior insulating abilities, energy absorbing performances, and the comfort features associated with plastic foams, as well as their cost-effectiveness and cost-to-performance ratios. This project will involve developing a novel MNL coextrusion foam manufacturing system for fabricating multiphase lightweight composites.

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