Microcellular Plastic Foam Processes for Personal and Consumer Care Products and Packaging

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Patent applied for.

The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing microcellular injection molding processes for personal and consumer product manufacturing.

OVERVIEW

Many personal and consumer products and packages are made from plastic using methods such as injection molding, blow molding, extrusion or thermoforming. Although such processes are used widely, drawbacks continue to exist. For example, high quality injection molded components can be produced with complex molds in large volumes at high speeds. However, resin costs for these components are high and expected to increase continually with the price of oil. To reduce costs, it is desirable to reduce both raw materials and processing time. Reducing raw material also reduces the amount of plastic waste eventually discarded into the environment in the case of disposable consumer goods. However, mechanical properties indicative of structural integrity are compromised if part thickness and weight are reduced beyond a certain threshold value.

In microcellular injection molding techniques, the amount of resin and weight of a component can be reduced by adding gas to produce a “foamed” component. By introducing gas into heated resin material before injection and taking advantage of the process benefits and design freedoms, a component can achieve a lower weight and cost while maintaining adequate mechanical properties. Unfortunately, conventional microcellular injection molding processes are generally incapable of producing thin-walled parts such as feminine hygiene devices and other personal and consumer care products with acceptable surface quality. An improved method of microcellular injection molding that is applicable to thin-walled personal and consumer care products is needed.

THE INVENTION

UW–Madison researchers in collaboration with industrial partners have developed a system and methodology for producing personal and consumer care products and packaging using microcellular plastic foam processes. An improved method of injection molding produces a microcellular material that can be molded into various thin-walled structures such as feminine hygiene devices while maintaining the desirable surface quality. In this method, a polymer is melted and blended with an optimal amount of
supercritical fluid to produce a single-phase polymer-gas solution, which is injected through a nozzle and into a mold. The gas emerges from the polymer solution after injection as the polymer solidifies, facilitating formation of a smooth surface and the subsequent nucleation and growth of cells and resulting in a foam material with a unique microcellular structure and surface. The researchers also developed a specific method for injection molding a feminine hygiene device fabricated from a foamed polymer using conventional injection molding equipment.

APPLICATIONS

- Microcellular foam injection molding process for manufacturing a wide array of high-volume, high-quality, complex parts

KEY BENEFITS

- Reduces overall cost of production by reducing raw material needed for manufacturing components while maintaining mechanical properties
- Enables manufacturing with a variety of polymer resins and production of parts with improved surface quality compared to regular microcellular parts
- Allows translation of existing conventional products and processes to efficient microcellular foam processes with minimal expense
- Enables production of parts at lower temperature and clamp pressure levels than conventional methods, promoting higher productivity and faster cooling times

STAGE OF DEVELOPMENT

The development of this technology was supported by the WARF Accelerator Program. The Accelerator Program selects WARF’s most commercially promising technologies and provides expert assistance and funding to enable achievement of commercially significant milestones. WARF believes that these technologies are especially attractive opportunities for licensing.

ADDITIONAL INFORMATION

Related Portfolios
WARF Accelerator Program Technologies
Gas-Laden Pellet Microcellular Injection Molding Foaming Technology Portfolio

Related Technologies
For more information about a high-quality, efficient method of producing microcellular foamed plastic components, see WARF reference number P110013US01.

Tech Fields
Materials & Chemicals - Polymers

CONTACT INFORMATION

For current licensing status, please contact Emily Bauer at emily@warf.org or 608-960-9842.