

An Introduction to Structural Foam Molding

There is often confusion as to what structural foam is, what a part looks like, and why it is used. Structural foam is not a material, but actually a method that is employed to process thermoplastic resins.



A custom structural foam container with urethane inserts provides an excellent solution for product protection.

Best thought of as a subset of the injection molding process, structural foam molding is a low pressure method of processing thermoplastics, with the most commonly used resin being HDPE (high density polyethylene). The end product is typically a rigid part with a relatively hard surface. Structural foam should not be confused with expanded polystyrene (EPS), which can be associated with the white disposable foam blocks that package and protect new appliances and electronics.

The key element in structural foam molding is low pressure. Unlike conventional injection molding, which utilizes extremely high pressures to force materials into a mold's cavity, structural foam molding takes advantage of a part's configuration, its generally thick wall sections (that act as runners), and the foaming action (supplied by either chemical reaction within the resin blend, or the introduction of a compressed, inert gas into the mold), to allow the molten resin to flow much further, and with far lower pressure, than the typical injection molding process would allow.

But why is low pressure and structural foam molding desirable?

First, low cavity pressure suggests that tooling can be produced from materials that have lower yield strengths and are softer (and lighter) than tool grade steels. Typical structural foam molds are produced in aluminum, which can be machined up to three times faster than tool steel, creating large savings in the tool cost, especially when considering the size of many structural foam molds and parts. In addition, aluminum tools will weigh approximately one third the weight of an equivalent steel tool, making lifting and handling less difficult and time consuming.

Second, by having longer resin flow lengths, parts can be molded that are much larger in size and weight than would typically be produced in a conventional injection molding process.

Finally, because tooling can be produced very cost-effectively for structural foam molding, the opportunities to produce custom molds for relatively low quantity applications, such as those found in the returnable packaging and material handling markets, increases.

Even for those who are already familiar with structural foam, there are two common perceptions that should be addressed.



Molding large, custom returnable packaging and material handling products on one of Creative Techniques' structural foam machines.

Many people are under the impression that all structural foam applications are manufactured with HDPE, and this is not the case. While HDPE is often the choice for many applications, including containers and dunnage, it is not the only one. HDPE is a popular commodity resin that offers good performance and chemical resistance in many applications, as well as the most competitive price point available (an important consideration, when looking at parts that may weigh twenty or thirty pounds or more). However, other materials, including ABS and PPO, can be utilized in structural foam applications where higher levels of performance, including stiffness and dimensional repeatability, are required.

Second, many people are under the impression that all structural foam parts are molded in black. While black is a preferred color when using regrind materials, structural foam parts can be molded in nearly any color (just as injection molded parts are). However, it can take quite a bit of material to purge out a structural foam machine for a color change, so be sure you really need it before asking.

That's a general introduction to structural foam molding, a versatile and flexible method of processing thermoplastics that can allow you to create large and unique parts for your returnable packaging and material handling needs.