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Structural Foam Injection Molding

RESOURCE GUIDE

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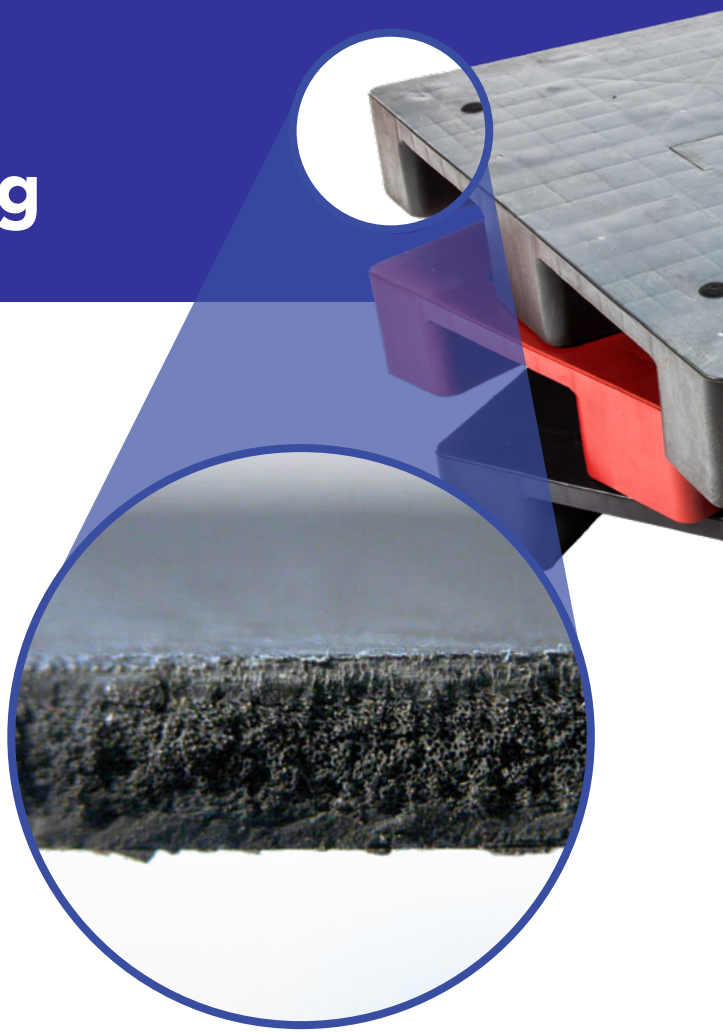
Custom Structural Foam Injection Molding



How can anything called foam be considered strong?

Custom structural foam injection molded parts provide an engineered thermoplastic solution that is lighter, stronger, and more economical when compared to traditional metal or plastic components.

However, the key to using structural foam parts successfully is in the ability to incorporate them into today's complex custom designs. When the design is right, the result is high productivity, cost savings, and lighter plastic components that are exceptionally rigid on the exterior and foamed at the core.

There are numerous advantages to structural foam-molded plastic parts including:

- When high volumes are required and an easily repeatable process is needed, structural foam can replace many types of materials, including metal, wood, concrete, and fiberglass while providing a high stiffness-to-weight ratio.
- Enables parts to be lighter in weight without sacrificing rigidity and strength.
- Many available resins can be used for structural foam molded parts.
- High dimensional stability provides resistance to weather and temperature changes.
- Low mold cavity pressure requires less power, saving energy.
- Environmentally friendly manufacturing, with lower carbon footprint than metals.

VIEW INFOGRAPHIC

In this guide, you will learn:

- What is structural foam injection molding?
- When to use structural foam molding instead of traditional injection molding?
- How does structural foam molding a produce parts that are lighter, stronger, and lower cost?
- Case Study: Getting It Right Takes More than Just Blowing Bubbles
- What value-added services for structural foam parts does Ferriot offer?
- Explore additional resources that will help make your structural foam project a success.

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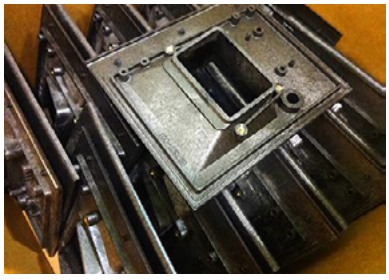
What is **Structural Foam** Injection Molding?



Structural foam molding is an option available to manufacturers who are looking for a way to create stronger, more rigid plastic parts. It is also a method used to reduce potential part weight for larger parts. Almost any type of resin can be used with this type of injection molding. Structural foam injection molding uses lower pressure and a foaming agent mixed in with the resin. The foaming agent expands within the resin, leaving a dense outer and inner wall with a foam or honeycomb-like center. This cellular core in the part is what contributes to the decreased part weight. During the expansion process, internal shrinkage or "sink" is reduced which creates a more uniform and aesthetically pleasing part. This process can also contribute to less internal stress in the part with better stability.

Is Structural Foam Injection Molding Cost Effective?

Overall, structural foam methodology provides a more economical solution than other techniques. First, lower pressures can be used, enabling larger parts to be made with smaller machines. The lower pressure also uses less energy. Additionally, structural foam uses less resin because of the blowing agent that is added, creating the foam and voids in the part. Finally, aluminum molds can be used if desired and are cheaper than standard steel molds. It should be noted that performance of aluminum molds is not as good as steel because it is a softer material and cannot run for as many cycles.

The process accommodates intricate designs quite well because of the honeycomb interior. With this kind of interior, parts manufactured using this process exhibit an increased stiffness-to-weight ratio as well as higher strength-to-weight ratios. Depending on the design, engineering capabilities, and other variables like material choice, the overall weight of the part can be reduced by up to 20%.

Structural foam injection molds incorporate some unique properties that make them favorable. This technique often makes use of aluminum—rather than steel molds—for parts up to several hundred pounds. If they're properly maintained, these aluminum molds can be used for runs in excess of one hundred thousand parts. So, what accounts for the longer life span? The low pressure required for the structural foam molding process minimizes wear and tear on the components. Plus, the ability to design molds with multiple gate points optimizes processing and overall tonnage requirements.

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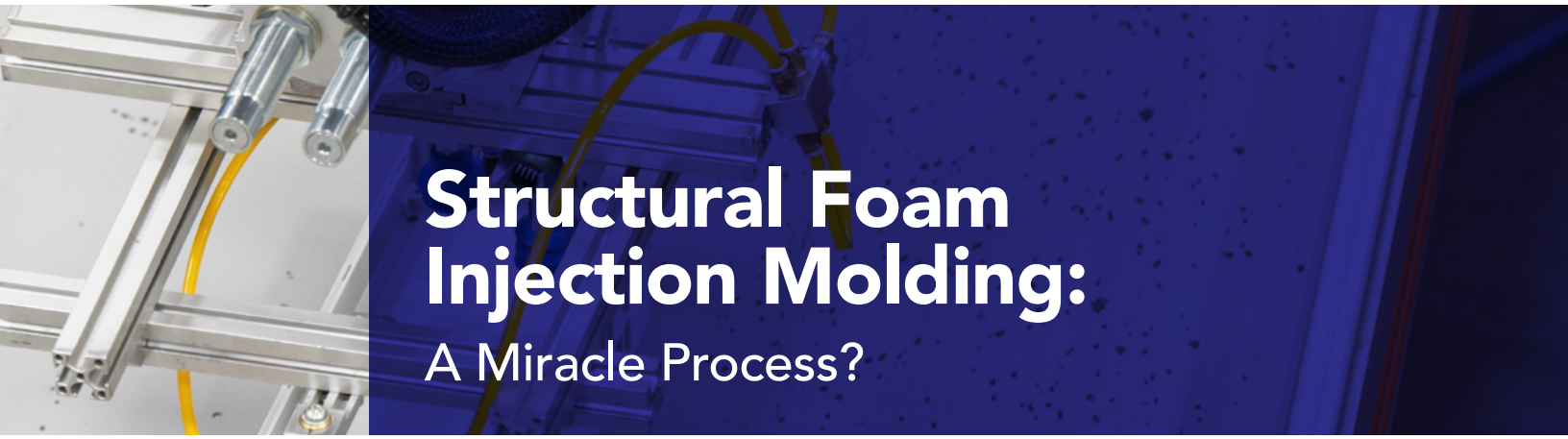
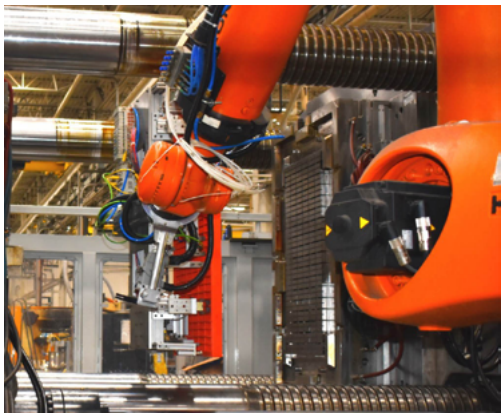


Structural Foam Injection Molding:

A Miracle Process?

Perhaps, but let's look at the structural integrity of metal or wood, with lower weight and production costs

If you're considering a switch to plastic from metal, wood, concrete, fiberglass or other traditional materials, structural foam injection molding may be just the process for you.



So What is Structural Foam Molding?

Structural foam molding is an injection molding process whose injection stage is basically the same as traditional injection molding, but the packing stage is augmented by a chemical blowing agent mixed with the thermoplastic material to create thermoplastic foam. That chemical blowing agent is triggered by heat and expands the material by creating a microcellular structure to form the part against the mold.

The advantages of converting to structural foam injection molded plastics are just as varied as the many products that can be made successfully by this process. They include higher stiffness-to-weight ratios (parts made with structural foam molding can weigh 10 to 30 percent less than other parts, while retaining durability), lower material costs, lower tooling costs, smoother finished part surfaces for easy painting and cleaning, and a wide range of design flexibility.

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Structural Foam vs. Injection Molding

Expanding Your Options

Structural foam molding offers an alternative to traditional injection molding.

Structural foam molding is ideal for large enclosure applications such as ATM machines or Gas pumps.

Here at Ferriot, we've been proud to be a leader in thermoplastic injection molding since the 1940s. Our clients turn to us for professional assistance with contract manufacturing, custom injection molding, painting and assembly. Structural foam molding is another capability we offer when traditional injection molding may not meet part design requirements. The structural foam process creates parts with a high strength-to-weight ratio, and is often used for large parts and in metal to plastic replacement.

Traditional injection molding is typically done in two stages. There's an injection stage where melted thermoplastic is injected into a mold, and a packing stage where pressure is built and the plastic is formed into the shape of the mold. In structural foam molding, the injection stage is basically the same, but the packing stage is augmented by a chemical blowing agent mixed with the material. That chemical blowing agent is triggered by heat and expands the material by creating a microcellular structure at the core with an integral outer skin. For example, when converting metal to plastic, structural foam is frequently the method of choice due to the need for thicker walls and lighter weight parts.

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Structural Foam Molding Produces Lighter and Stronger Parts **at Lower Cost**

Structural foam molding has become a highly evolved technique. Today, thermoplastic resin can be mixed with a chemical blowing agent to expand the melted resin and produce high-strength parts for use in industrial applications. The thermoplastic microcellular structure weighs 10% to 30% less and is stronger and more resilient than traditional injection molded parts.

The Brave New World of Structural Foam Molding

Modern structural foam molding vs injection molding differs significantly. "Structural foam" describes the result of the blend of thermoplastic resin and blowing agent when activated by heat. The blowing agent creates a foamed microcellular structure that fits itself into the form of the mold.

Structural foam molding can be conducted at lower pressures than injection molding creating less stress on the formed parts and therefore, less warping. This low-pressure technique also allows for the use of much less expensive tools. Long-lasting molds can be made of aluminum rather than tool steel. Structural foam molded parts are stronger and lighter than parts created with traditional injection molding techniques because they aren't as dense.

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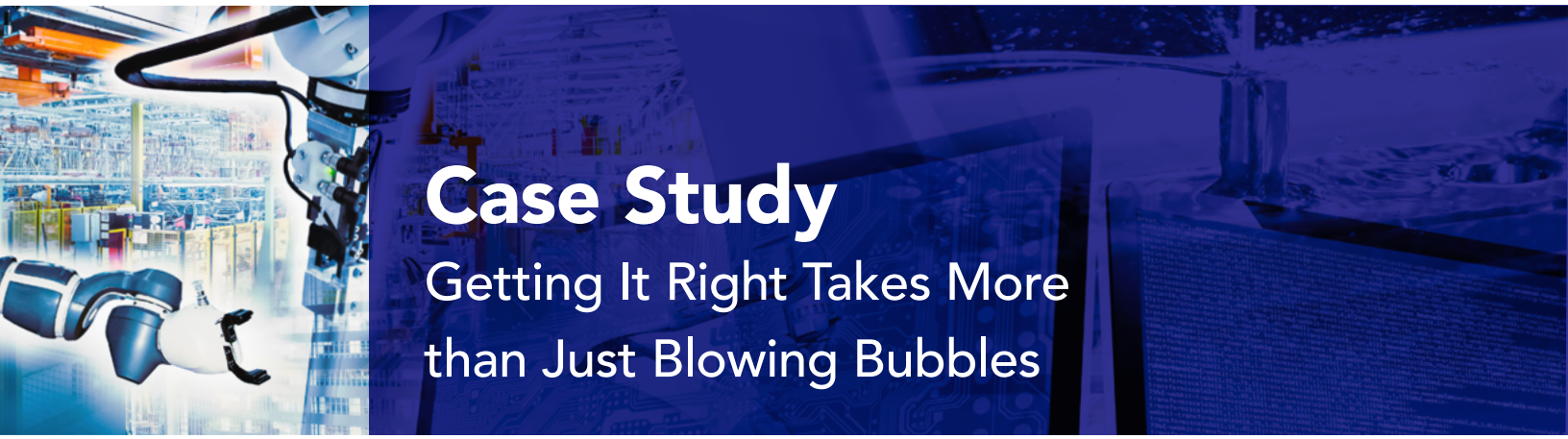

Case Study

Getting It Right Takes More than Just Blowing Bubbles

Advantages of Structural Foam Molding

One of the biggest challenges in any new product development effort is identifying skilled people who can contribute significantly to the project, including the vendors who support the process. Ensuring the success of a new product demands the freedom to use new materials and new suppliers, as complex design and production challenges arise. At ILC Dover, the process of developing the Xtrakt™ system, which wrings high viscosity materials out of shipping and transfer tote liners, has reinforced how important it can be to work with the right suppliers when fine-tuning a product's design and production.

ILC DOVER
creating what's next

ILC produces a broad range of personal protective equipment, infrastructure protection products, containment systems for pharmaceutical and biopharmaceutical manufacturers, large inflatables, as well as processing equipment and protective packaging products used in the food, cosmetics, chemicals, and pharmaceuticals industries. ILC's packaging products include large, high-strength, form-fit liners for intermediate bulk containers (IBCs). Roughly the size of a cube of a pallet, IBCs are stackable, reusable industrial containers that hold a disposable liner used for transporting bulk materials. The double-wall liners designed by ILC for use with the Xtrakt™ drive unit have a flexible, specially textured surface and are made to hold up to 300 gallons of high-viscosity materials like lotions, creams, gels, and slurries.

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Value Added Services

for Structural Foam Molded Parts

Finished Painting

Add the perfect final touch to your structural foam parts by having them painted to match your brand.

- Primer, Color to Finished Texture
- High-Volume Low-Pressure (HVLP) Application
- Multiple Paint Booths
- 24-hour Operations

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Ultrasonic Insertion

Ensure strong final enclosures using ultrasonic insertion in the structural foam part's assembly.

- Strong, Reusable, Permanent Threads
- Allow for easy assembly
- Multiple installation methods
- Post-molding operation

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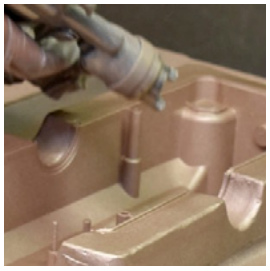

EMI/RFI Shielding

Protect sensitive electronics housed in your structural foam molded enclosures from electromagnetic interference.

- Electromagnetic Shielding
- Radio Frequency Shielding
- Medical Equipment
- Prevent electronic malfunction and interference

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Final Assembly

Complete your molded parts project with final assembly and kitting.

- Around the clock operation
- Controlled manufacturing process
- Quality auditors validate product quality during production

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More from Ferriot

Learn more with these resources

Designing Injection Molded Parts

A handbook for designers and engineers

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Seven Ways to Cut Costs on Injection Molded Parts

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Injection Molding Resin Selection Workbook

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The Tips, Tricks, and Traps of Injection Molding Resin Selection

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