POLYSTYRENE MOLDS

FORTUS 3D PRODUCTION SYSTEMS

Time Required ■□□ Cost ■□□ Skill Level ■□□

PPSF withstands high temperatures to manufacture helmet liners.

REAL CHALLENGE

Gentex requires EPS (expanded polystyrene) parts in different shapes, sizes and densities to manufacture helmets. The EPS parts are typically manufactured in low-volume production runs, making traditional aluminum molds costly and inefficient. The molding process employs pentene gas and steam, so a durable material was required. Also, the PPSF parts had to be accurate to minimize post process machining, to fit into the molding press precisely, and to produce accurate EPS parts that would fit the final helmet product.

REAL SOLUTION

Three separate builds were required – a cavity, core and frontal insert. Sizes were 14.8 x 13.4 x 7.8 inches for the cavity and core, and 10 x 4.1 x 3.2 inches for the insert. Fortus PPSF material was selected because of the application temperature (250°F), chemical resistance and abrasion resistance.

A high-temperature primer paint was used to fill in "stepped" spots on the parts. This allowed sanding and kept the PPSF part dimensions intact, preserving the overall accuracy of the part.

When Gentex received the mold pieces, they drilled and press-fit approximately 20 stainless steel vents into each mold half. The average out-of-tolerance measurement was 0.006 inches, which exceeded the demands of this application.

The mold pieces were also cycled through an autoclave system to test the PPSF material for future tooling processes. Again, the PPSF withstood the temperature and pressure without distortion.

REAL RESULTS

Gentex saved $3,360 to $6,360 per mold assembly and shaved four weeks off the manufacturing process, compared to traditional CNC aluminum molds. Material selection, build envelope size, part accuracy and durability were key factors in choosing FDM. The ease of design iterations and flexibility for tooling design allowed for future projects.

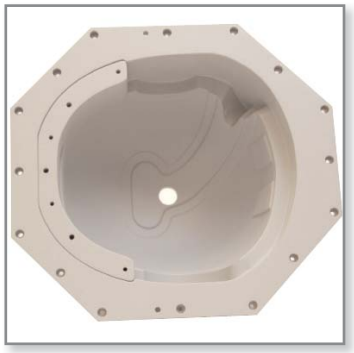

Figure 1: The cavity

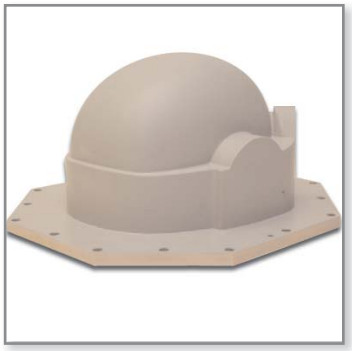

Figure 2: The core and frontal insert.

FDM PROCESS DESCRIPTION

Fortus 3D Production Systems are based on patented Stratasys FDM (Fused Deposition Modeling) technology. FDM is the industry's leading Additive Fabrication technology, and the only one that uses production grade thermoplastic materials to build the most durable parts direct from 3D data. Fortus systems use the widest range of advanced materials and mechanical properties so your parts can endure high heat, caustic chemicals, sterilization, high impact applications.

The FDM process dispenses two materials—one material to build the part and another material for a disposable support structure. The material is supplied from a roll of plastic filament on a spool. To produce a part, the filament is fed into an extrusion head and heated to a semi-liquid state. The head then extrudes the material and deposits it in layers as fine as 0.005 inch (0.127 mm) thick.

Unlike some Additive Fabrication processes, Fortus systems with FDM technology require no special facilities or ventilation and involve no harmful chemicals and by-products.

For more information about Fortus systems, materials and applications, call **888.480.3548** or visit **www.fortus.com**

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