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>
> Jude Zils, Technology Manager / Composites Center of Excellence at SSL

A 3D printed lay-up tool capable of high-temperature and high-pressure autoclave cure cycles.

CASE STUDY

Rapid-Response Tooling

SSL CUTS LEAD TIME FOR CUSTOMIZED COMPOSITE TOOLING BY EMBRACING 3D PRINTING.

CHALLENGING THE NORM

Over the last 30+ years, composite materials have become increasingly relevant to a number of industrial sectors with applications that demand the high strength of metals without their associated weight. Although the composites industry has made significant breakthroughs in material science and production methods over the years, producing complex composite parts can still be a lengthy and challenging task that requires specific knowledge and expertise. Traditional production methods for high-temperature composite tooling involve the expensive and time-consuming process of CNC machining. Although machining is a repeatable and reliable production method, the need for an operator and the subtractive nature of the process

result in high costs, long lead times and significant material waste. Stratasys FDM® technology can address all of these pain points.

Evolving Innovation

SSL, based in Palo Alto, California, is a premier designer, manufacturer, and integrator of satellite systems. They work at the forefront of satellite and composite technology. Maintaining industry leadership means SSL is continually innovating and evolving their approach to composite part and spacecraft fabrication with improvements to materials, processes and techniques.

In partnership with Stratasys and using Fortus® 3D Printers, the latest technique that SSL has implemented is additive manufacturing for rapid-response, customized, high-temperature lay-up tooling. Although often overlooked, tooling applications are proving to be among the most effective use cases for realizing significant and immediate value with additive manufacturing, and SSL has implemented the technology for many such applications.

A Game Changer for Tooling

For years, SSL has used FDM technology for prototyping and even some production parts. More recently, the SSL team benefited from using 3D printing to produce customized high-temperature lay-up tooling in situations that are highly time-sensitive, require rapid response, and necessitate complex, custom geometries. In one such case, Stratasys was able to provide SSL with a highly tailored lay-up tool capable of the required 350 °F (180 °C), high-pressure autoclave cure cycle in less than 48 hours (shipping time included), a 50% reduction in lead time. The time savings was critical in this case, highlighting one of the core advantages of 3D printing.

According to Jude Zils, SSL Technology Manager, “Stratasys additive composite tooling solutions have allowed SSL to respond to design releases and changes with unprecedented speed at significantly reduced cost, without compromising part quality or performance. This game-changing technology is facilitating a level of customization and rapid response that our customers can really appreciate.”

Additive manufacturing allows SSL to eliminate the high costs and lengthy lead times typically associated with composite tool production. In situations that are extremely time-sensitive, lead time is measured in hours and days rather than the typical weeks or months for traditional composite tooling. Depending on part complexity and size, a tool build can take just a few days, and quite frequently less than 24 hours. This, compared with many days or even multiple weeks for traditional machined tool assemblies, affords SSL unprecedented levels of flexibility. These time savings not only permit SSL to meet the increasing demands of shorter customer lead times, but also allow much greater design freedom and shorter product iteration cycles that result in superior levels of part performance and functionality.

SSL uses 3D printed tooling in their satellite development.

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