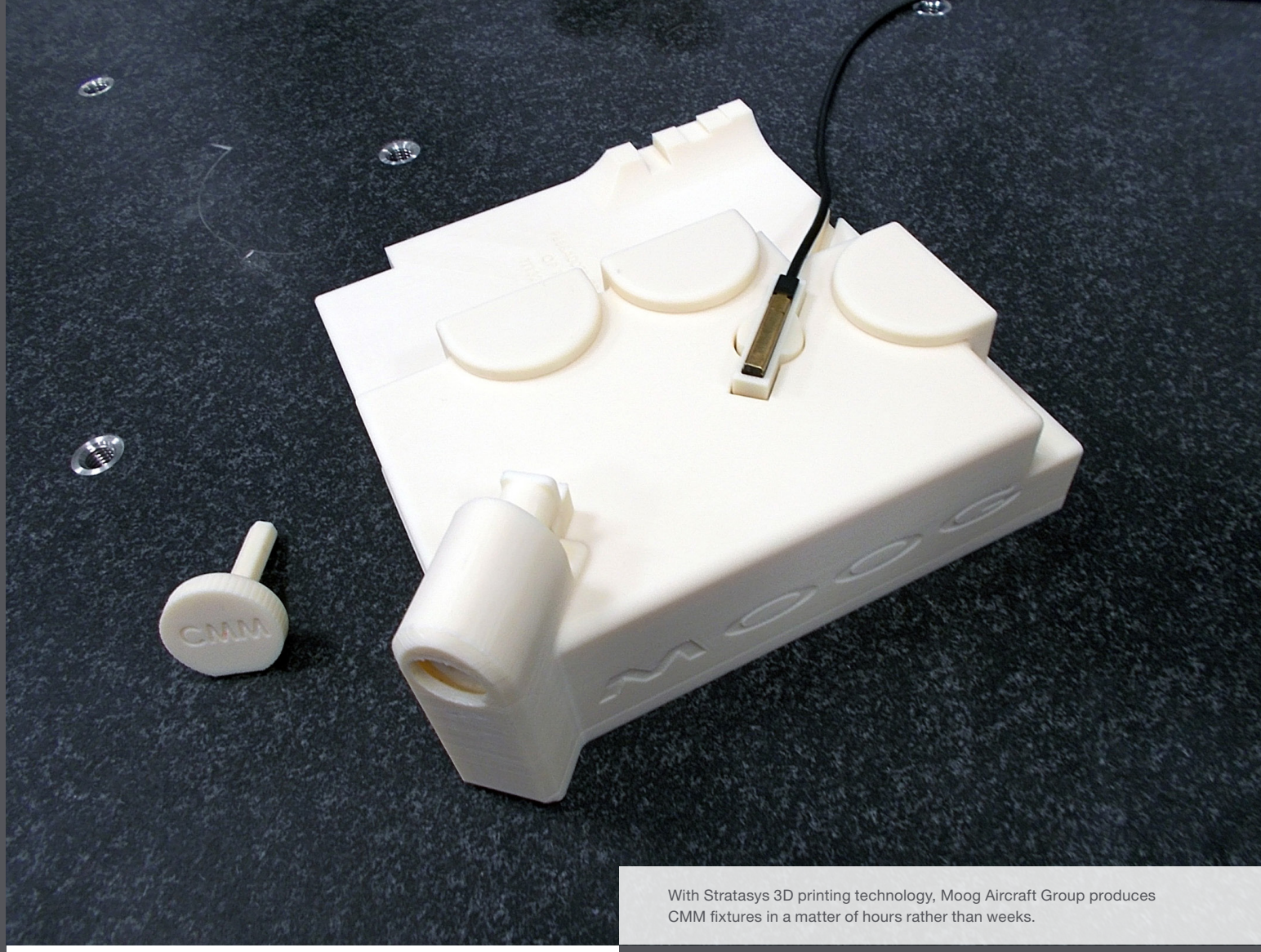


With Stratasys 3D printing technology, Moog Aircraft Group produces CMM fixtures in a matter of hours rather than weeks.

Insourcing Delivers Impressive Efficiency

Moog Aircraft Group Cuts Fixture Costs and Lead Times with FDM 3D Printing

stratasys

Case Study

“The ability to try a design idea, test it and redesign it accordingly in a matter of hours, rather than weeks, has seen us improve work holding and reduce the occurrence of manual handling damage throughout the production processes.”

James Stuart-Young

Moog Aircraft Group

Insourcing Delivers Impressive Efficiency

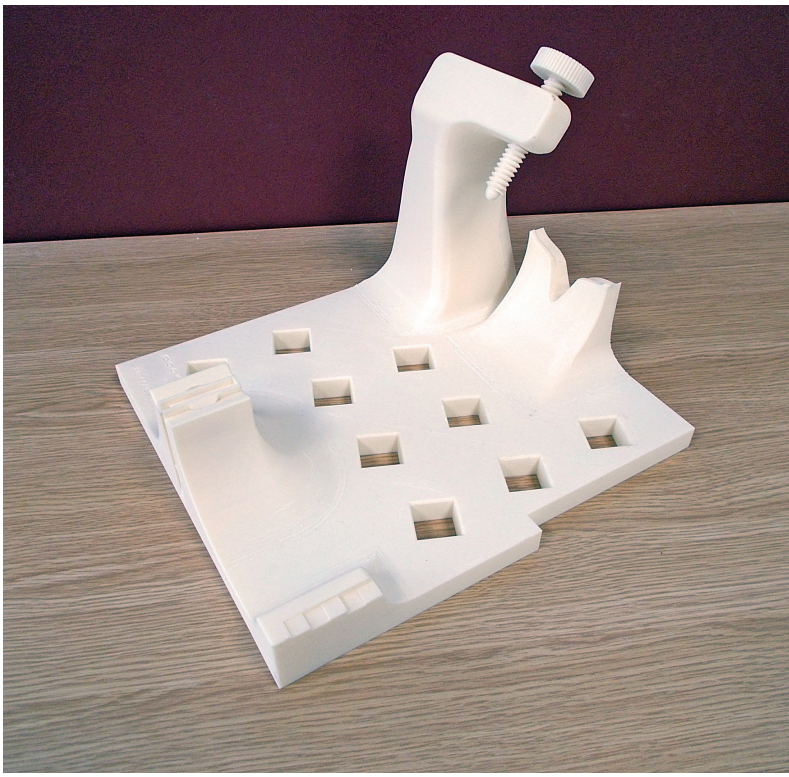
Moog Aircraft Group (Moog) has been supplying engineering and advanced technologies to the military aircraft market since its inception in the 1950s. Today, the company is considered a world leader in manufacturing advanced solutions for the world's highest-performance aircraft.

Choosing More Efficient Methods

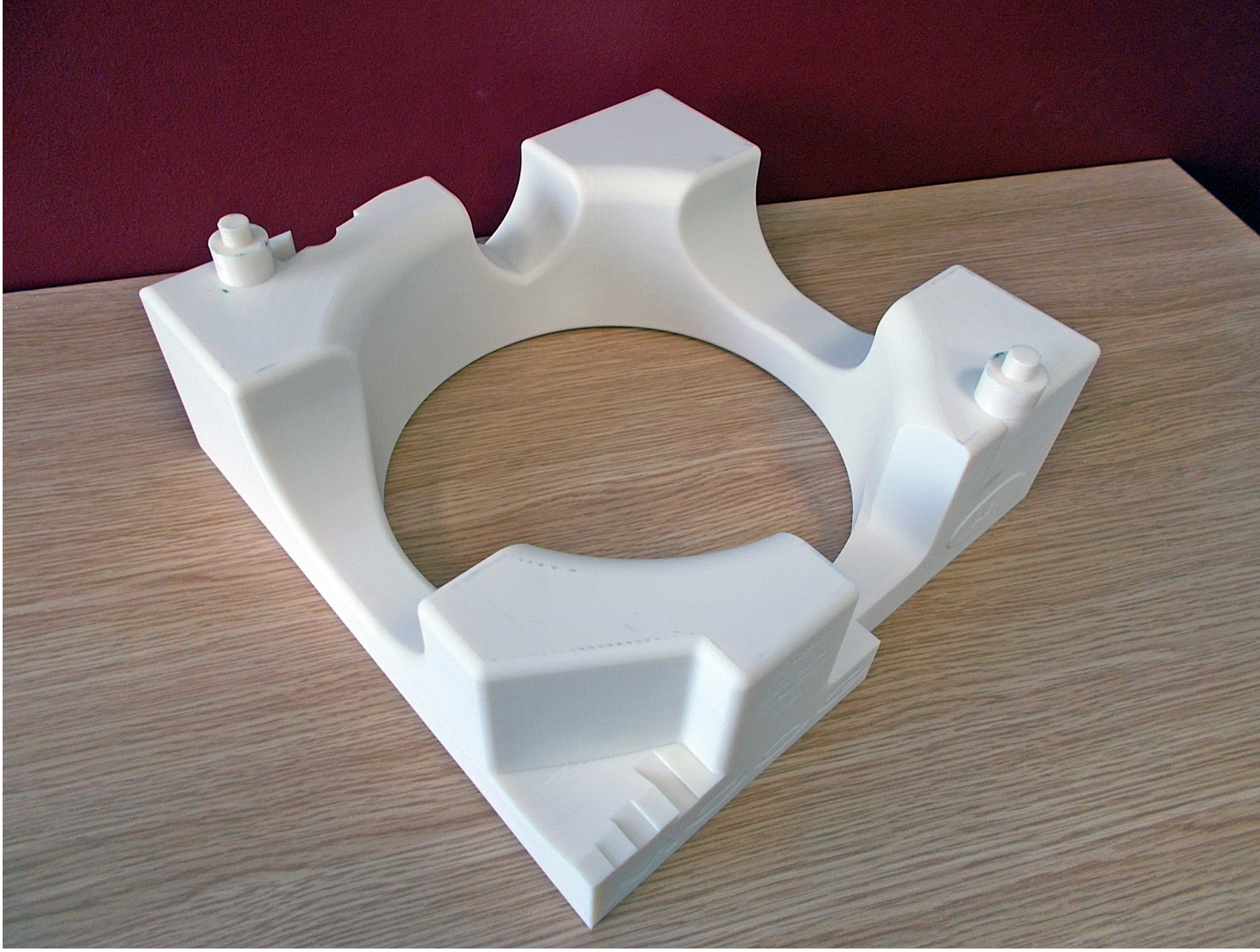
Moog's Wolverhampton facility decided to make a substantial commitment to improving its internal capabilities for CMM inspection. This included using a dedicated fixture for each machined part's inspection operation. Traditionally, fixturing and part-alignment tooling was outsourced to external suppliers, where it was made from tool steel.

"Based on the number of fixtures involved in the CMM improvement project, this would have represented significant expenditure," explains James Stuart-Young, Manufacturing Engineering Manager, Moog Aircraft Group. "In addition, the outsourcing process always had a lead-time of four to six weeks from drawing release to receipt of a finished fixture. Following a cost-versus-benefit analysis, we evaluated ways to produce these fixtures in-house that would reduce planned lead times. 3D printing was the preferred method of manufacture due to the speed of production and low part costs."

Moog reviewed many options during the evaluation phase and chose the Stratasys Fortus 3D Printer because it met all the required technical standards. "The FDM process of the Fortus produced a more stable part through the sampling process," said Stuart-Young. "Furthermore, the build envelope and printing materials satisfied our needs, and the price was within our budget."



Moog produces a dedicated CMM fixture for every machined component produced on-site at Wolverhampton.



The FDM process of the Stratasys Fortus 3D printer was selected because it produces a more stable component.

Insourcing Delivers Impressive Efficiency

Getting the Measure of Inspection

Moog's Fortus has reached near-full utilization in the production of CMM inspection fixtures. CAD technology enables the modelling of complex shapes so parts can be oriented in a way that's advantageous to a variety of features in a single setup.

With regard to material selection, Stuart-Young said, "There is a need for the fixtures to be stable to temperature and ultraviolet light, which led us to choose ASA ivory." ASA is a UV-stable production grade thermoplastic that offers strength and a high-quality surface finish.

Insourcing Delivers Impressive Efficiency

From Outsourcing to Insourcing

Prior to the introduction of 3D printing, Moog subcontracted the production of all tooling and fixtures. CAD technology enables the modelling of complex shapes so parts can be oriented in a way that's advantageous to a variety of features in a single setup.

"The ability to produce in-house has put us back in control of prioritizing production to suit the demands of the customer program," said Stuart-Young. "Build times vary due to the range of parts we are printing, but for the CMM fixtures it is approximately 20 hours. What's more, fixtures that cost in excess of £2,000 in the past can now be made for a few hundred pounds."

Automated and Hands-Free Removal

For even greater prototyping and production efficiency, Moog uses Stratasys SR-30 and SR-100 soluble support materials for automated, hands-free removal.

"We put printed parts into our cleaning tank to dissolve the soluble support material," said Stuart-Young. "The fixtures are then stored close to the CMM machines for ease of access."

Today, Moog's Fortus 3D printer runs almost 24 hours a day, seven days a week. Additionally, departments such as Assembly & Test and Development Engineering have realized the time-saving benefit of making complex tooling and fixtures. Using the 3D printer, engineers are able to deploy different layer thicknesses to change the print time accordingly.

"The ability to try a design idea, test it and redesign it accordingly in a matter of hours, rather than weeks, has seen us improve work holding and reduce the occurrence of manual handling damage throughout the production processes," concluded Stuart-Young.

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