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Stratasys & Autodesk Produce First Full-Scale Turbo-Prop Aircraft Engine Model with 3D Printing

Propeller Blade-Span is over 10 feet;
Project Demonstrates how far 3D modeling has Advanced

MINNEAPOLIS--(BUSINESS WIRE)-- Today at Autodesk University 2009, Stratasys (NASDAQ: SSYS) and Autodesk unveiled the world's first full-scale turbo-prop aircraft engine model. It was produced using Stratasys FDM (Fused Deposition Modeling(R)) technology.

The engine's design was created using Autodesk Inventor 2010 mechanical design and engineering software, and it was produced on both Fortus 3D Production Systems and Dimension 3D Printers from Stratasys. The engine model sets a new precedence in scale, and it showcases the potential of 3D printing.

"Our Inventor software with FDM technology takes design innovation to an entirely new level of sophistication," says Autodesk's Gonzalo Martinez, office of the CTO. "Today at Autodesk University we've shown that with FDM, you can create realistic 3D models of nearly any design. We believe that Stratasys FDM technology is the future of 3D printing and production."

The engine's gear box includes two sets of gears, which operate two sets of propellers that move in counter rotation to each other. With an engine length of over 10 feet, a blade-span of 10.5 feet, and 188 components, the engine model is massive in size. It includes several large parts, such as six propeller blades, each measuring 4.5 feet.

Building this physical model with FDM helped improve its design by identifying four opportunities to make components fit or operate with better precision. Assembling a physical model helps design engineers be certain of component form, fit, and function.

The turbo-prop engine was designed by Nino Caldarola, a freelance designer for Autodesk. He shared his concept with Autodesk who wanted to bring a full-scale model to life using Inventor software and FDM technology. Caldarola's design is a hybrid of newer engine and classic engine design and was partially inspired by the Piaggio Avanti II aircraft engine, the TP 500. Caldarola worked with engineers at RedEye On Demand prototyping and production service, a business unit of Stratasys, to make adjustments that would ensure an accurate physical model.

97% Cost Reduction; 83% Time Reduction
All 188 components were produced in 4 weeks and assembled in 2.5 weeks for a total production time of 6.5 weeks. Using conventional fabrication processes, such as machining and casting (with in-house and outside resources) a manufacturer would expect to spend 9

months or more producing a model like this. Using the FDM process in-house, a manufacturer could expect costs of roughly $25,000, versus an estimated $800,000 to $1 million for conventional processes. These numbers represent about a 97% reduction in production costs and 83% reduction in production time.

With conventional fabrication processes, the full gearbox assembly would be composed of metal. For this turbo-prop model, the components were produced from ABS plastic, which provided the strength to support the large, heavy gear assembly. The model was built in Minneapolis and shipped across the country, which made a tough, durable construction material essential.

"It was spectacular seeing my computer design brought to life with a 3D model," says Caldarola. "I worked under a tight timeline and across geographies with both Stratasys and Autodesk, and I am very proud of the collaborative process and result. Just a few years ago, a project of this scale would have never been attempted."

"This project shows that 3D printing has made the progression to large format," says Stratasys CEO, Scott Crump. "Hopefully this project will help make manufacturers aware that a designer can conceive and design a product this significant, and then have it physically modeled in about 6 weeks."

After creating complex models with additive fabrication, manufacturers can then use the CAD files to create perfect-mating jigs and fixtures to support production processes. "Having a full-scale physical model is a powerful communication tool for both the production-machining and production-tool-creation processes," says Crump. "And manufacturers can realize incredible ROI for both of these processes."

Autodesk University (AU), held Dec. 1-3, 2009 in Las Vegas, is the annual user conference and exhibition for Autodesk, Inc., the world leader in 2D and 3D design software for the manufacturing, building and construction, and media and entertainment markets.

Stratasys, Inc., Minneapolis, manufactures additive fabrication machines for prototyping and manufacturing plastic parts under the brands Fortus 3D Production Systems and Dimension 3D Printers. The company also operates RedEye On Demand, an online service for part prototyping and production. According to Wohlers Report 2009, Stratasys supplied 43 percent of all additive fabrication systems installed worldwide in 2008, making it the unit market leader for the seventh consecutive year. Stratasys patented and owns the process known as FDM.(R) The process creates functional prototypes and manufactured goods directly from any 3D CAD program, using high-performance industrial thermoplastics. The company holds more than 250 granted or pending additive fabrication patents globally. Stratasys products are used in the aerospace, defense, automotive, medical, business & industrial equipment, education, architecture, and consumer-product industries. Online at: www.Stratasys.com

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