CUSTOMER STORY

Sirris and ASCO

Aerospace

ASCO INDUSTRIES N.V. is a Belgian aerospace company located in Brussels. It is recognized as a world leader in the development of mechanisms for the actuation of slats (Leading Edge) and flaps (Trailing Edge) and in the machining of high strength steels, titanium, and aluminum alloys. ASCO is also known for its extensive capabilities in manufacturing and assembly to create precision and cost effective solutions for landing gears and structural components of fuselage frames and engine attachments. Among other things, the R&D department of ASCO works on advanced designs for laminar wing profiles, which was the first project where ASCO decided to make use of 3D printing. For this project, ASCO partnered with Sirris, which successfully guided the company as it explored this area for the first time.

Sirris is the collective center for and by the technological industry. It is a non-profit organization that offers Belgian companies three key assets to help them remain innovative: years of experience and comprehensive expertise in a wide range of industries, high-tech testing infrastructure spread across the country; and an extensive network of partners. The goal of Sirris is to help large and smaller players in the Belgian industry make the right technological choices and achieve sustainable economic growth. Sirris offers individual support at every step along the way, from the drawing board stage right through to prototype development and pilot tests for finished products.

For its first foray into the 3D printing world, ASCO approached Sirris to help it explore the implications that 3D printing will have for the aerospace industry. During the pilot project, the team focused on a gooseneck bracket. This static bracket is surrounded by other, moving components of the Krueger flap, which is stowed as part of the wing during cruise conditions and is deployed during take-off and landing to increase the level of lift when the aircraft is flying at lower speeds. The original bracket, designed by ASCO was a machined version made of high strength corrosion resistant steel and weights 2005g.

INDUSTRY

Aerospace

CHALLENGE

Redesign a gooseneck bracket from an aircraft Krueger flap actuation mechanism with the goal of decreasing weight while achieving the necessary strength to withstand the aerospace loads it will incur.

SOLUTION

An updated design process utilizing solidThinking Inspire to design a reduced weight part for manufacturing with 3D printing.

RESULTS

- Weight reduction of 31%
- Integration of three parts into one
- Buy-to-fly ratio reduced from 17 down to 1.5
- Significant reduction of machining time

ASCO selected this particular bracket for redesign as it is very complicated to machine and has a poor buy-to-fly ratio. ASCO called in Sirris to examine how the gooseneck bracket could be manufactured and refined using 3D printing.

SOLIDTHINKING INSPIRE IN THE DESIGN PROCESS

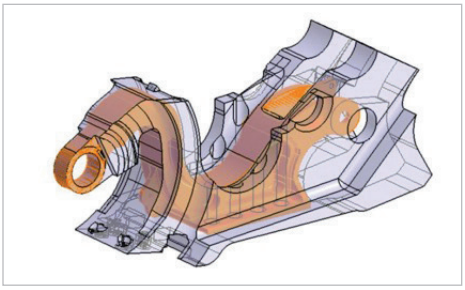
Having used the simulation driven design tool, solidThinking Inspire in the past to design lightweight concepts for additive manufacturing, the team at Sirris knew this would be the perfect tool for the project. Adhering to strict design guidelines, Sirris' Additive Manufacturing team utilized solidThinking Inspire while working with ASCO's R&D team on developing various 3D concepts for the gooseneck bracket. After reviewing all loading conditions and final design concepts, the final design was prepared for production via a process called selective laser melting, in which a laser melts layers of metal powder into a single unit. To prepare the final part for manufacturing, the team at Sirris used Inspire's PolyNURBS tools to refine the optimization results into a solid geometry that would be appropriate for printing. The final parts were printed by SLM Solutions on its SLM 500 (quad) and SLM 280 (twin) machines. The geometry of this new design was then thoroughly examined to check whether it affected the post-processing of the component.

RESULTS

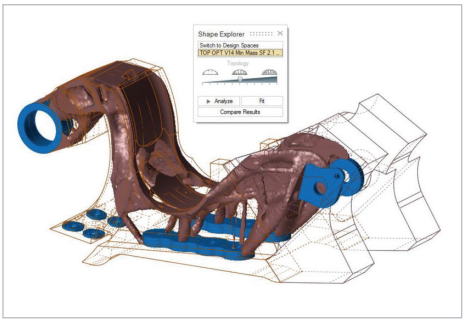
The newly designed and manufactured part not only helped ASCO to simplify the manufacturing and machining process, but it also resulted in the integration of three different parts into one. On top of this, the new part resulted in a 31% weight reduction and a buy-to-fly ratio reduction from 17 down to 1.5.

WHAT'S NEXT?

The redesign of the gooseneck bracket using solidThinking Inspire was clear proof to ASCO that additive manufacturing is a viable option in the aerospace industry. Not only did it help to create a more lightweight part (which is imperative in the aerospace industry), but it also helped to reduce the amounts of material used, as well as a reduction in complicated manufacturing processes. ASCO is now working with Sirris to explore the possibility of adopting 3D printing throughout its production chain.



Original Gooseneck Bracket within available design space



Optimized Gooseneck Bracket in solidThinking Inspire

Final 3D Printed Bracket

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