



CASE STUDY

ASCO AND NIKON SLM SOLUTIONS

A CASE STUDY ON HOW METAL 3D PRINTING
MANUFACTURED A GOOSENECK KRUEGER FLAP
ACTUATION BRACKET



ASCO INDUSTRIES



ASCO is a Belgian aerospace company located in Brussels. It is recognized as a world leader in the development of mechanisms for the actuation of stats (Leading Edge) and flaps (Trailing Edge) and in the machining of high strength steels, titanium and aluminum alloys. ASCO combines its expertise in the engineering of aviation structural manufacturing with the unique advantages of Nikon SLM® technology: filigree and bionic geometries are created in the shortest possible time; Lightweight structures, close to contour channels and the integration of new functions enable real added value for the products.

With the unique the Nikon SLM® technology, the company also opens up new supply chain resources in aviation industry. Application examples include an additively manufactured gooseneck krueger flap actuation bracket.

CURRENT SITUATION

Structural component from a Kruegerflap actuation mechanism

Krueger flaps are considered a viable alternative for stats on the leading edge of an aircraft for future laminar wing platforms. The gooseneck bracket is a structural component from a Krueger flap actuation mechanism designed by ASCO in the scope of theAFLoNext project.

The bracket functions as a hinge between the Krueger flap and the fixed leading edge. Its elegant shape is the result of stringent space allocation requirements and high interface Loads. Initially designed for machining by ASCO, the machined version of the bracket is made of high strength, corrosion resistant steel and weighs 20osg. The complicated manufacturing process and poor buy-to-fly ratio of the component made it a target for optimization.



FUTURE – ORIENTED SOLUTIONS WITH **NIKON SLM SOLUTIONS**



In the course of this optimization project ASCO and Nikon SLM Solutions have chosen a collaborative approach to achieve the best design of the new Gooseneck Bracket. Nikon SLM application engineers were involved in the review of the different design steps to ensure manufacturability.

The twin laser technology helped to reduce the build time from 82 hours down to 48 hours. Nikon SLM Solutions managed successfully to set-up a process that handled the stresses and heat transfer inherent with large titanium parts.

Since there is little added value to print a part that was designed for machining, the gooseneck bracket was redesigned for with the design principals of Design for Additive Manufacturing (DfAM), utilizing topology optimization. The target of the optimization was to minimize the weight while achieving the necessary strength to withstand the aerodynamic loads defined in the AFLONext project. Moreover, two additional parts were integrated into the final component. The previous assembled component weight 2050g, which was reduced to 1416 g through additive manufacturing, saving 31% in weight while also reducing total assembly time.



1
 MACHINE
SLM®280

2
 LAYER THICKNESS
30 µm

3
 MATERIAL
Ti6Al4V

4
 BUILD TIME
1D 19H 11MIN



SELECTIVE LASER MELTING

Additive manufacturing encompasses a variety of processes to build, however, they are all based on the same principle of adding material to create opposed to traditional methods that subtract material. Specifically, in selective laser melting a layer of metal powder is spread onto a substrate plate. Then lasers selectively melt powder to create the first layer of the build. A fresh layer of metal powder is evenly distributed over the build surface and the lasers melt each successive layer to the layers underneath until the desired component is produced. Unlike laser sintering, selective laser melting completely melts each layer into the previous for completely dense metal parts. Compared to traditional manufacturing methods, additive manufacturing enables parts with complex geometric shapes and hollow structures to be produced.



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Nikon SLM Solutions leads the way on return on investment with maximum efficiency, productivity, and profitability.

NIKON SLM SOLUTIONS

is a global provider of integrated metal additive manufacturing solutions. Leading the industry since its inception, it continues to drive the future of metal AM in every major industry with its customers' long-term success at its core. Nikon SLM Solutions is home to the world's fastest metal additive manufacturing machines boasting up to 12 lasers and enabling build rates up to 1000ccm/h. With a portfolio of systems to suit every customer's needs, along with its team of experts closely collaborating at every stage of the process.

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Nikon SLM Solutions believes that additive manufacturing is the future of manufacturing and has the desire and capability to take its customers there - right now.

Nikon SLM Solutions is a publicly-traded company headquartered in Germany, with offices in Canada, China, France, India, Italy, Japan, Singapore, South Korea, and the United States.

Further information is available on www.nikon-slm-solutions.com