

PRESS RELEASE

Project LightHinge+ – Additively Manufactured Components Production-Ready at 50% of the Weight

EDAG, voestalpine, and Simufact will present the results of their joint project for additive production at the IAA show

Project shows the potential of 3D printing for automotive production

Hamburg, Germany, September 12, 2017 – Under the umbrella of the joint project "LightHinge+", EDAG Engineering GmbH, voestalpine Additive Manufacturing Center, and Simufact Engineering GmbH have joined forces to demonstrate the practical use and potential of additive manufacturing technologies in automotive production. LightHinge+ is an additively manufactured hood hinge that combines lightweight construction and increased safety in a single construction. The partners will present the project results at the EDAG IAA exhibition stand in Frankfurt/Main, Germany.

"Engine hood hinge systems are very complex because of the high demands on safety and functionality," says Dr. Martin Hillebrecht, Head of Competence Center Lightweight Construction, Materials and Technologies at EDAG Engineering GmbH. "This means that lightweight construction is still on the line. That is why, together with voestalpine and Simufact, we have set ourselves the goal of rethinking the hinge by means of generative production."

The EDAG engineers have re-designed the hinge system. In the second step, the topology optimization of the complex component structure followed to achieve the desired weight advantage. Using bionic principles, EDAG engineers were able to determine the minimum material requirements and achieve a 50% weight advantage over the reference. The subsequent optimization of the support structures was carried out in close cooperation with the voestalpine Additive Manufacturing Center.

"The topology optimization calculates the minimal material requirements of the hinge," explains Dr. Eric Klemp, Managing Director of the voestalpine Additive Manufacturing Center in Duesseldorf, Germany. "The resulting components geometries require a high proportion of support structures, which we could then minimize to a minimum in the project," says Dr. Klemp.

An important step in the design and production of additive components is the simulation of the actual build process in the 3D printer. Here, Simufact came into its own with its software solution "Simufact Additive", specially developed for additive production. "In the additive manufacturing process, the concentrated heat input with high heating and cooling rates causes distortion and residual stresses in the component," says Dr. Patrick Mehmert, Product Manager Additive Manufacturing at Simufact. "A non-distortion-compensated hinge can thus deviate from one to two millimeters to the reference geometry respectively."

With Simufact Additive, the actual printing process and the subsequent process steps can be simulated and thus distortions and residual stresses can be predicted. "On the basis of simulated distortion, we have negatively deformed the component geometry so as to minimize the shape deviations of the printed hinges to the target geometry," Mehmert

describes the procedure in the project.

The fact that this method also achieves the desired results was shown by the adjustment of the distortion-compensated components following the printing of the parts: A three-dimensional optical measurement performed by AICON 3D Systems (www.aicon3d.de) proved the dimensional accuracy of the components.

The simulation of the build process has contributed significantly to the improved design, protection and distortion optimization of the additively manufactured LightHinge+ hinge. Expensive and time-intensive production tests could be prevented.

In the end, the voestalpine Additive Manufacturing Center achieved an economical, resource-saving production with low rework. The hinge is thus as good as ready for use after the laser melting process.

"The LightHinge+ hood hinge fully exploits the potential of additive manufacturing by means of efficient software-assisted engineering," Dr. Martin Hillebrecht summarizes. "An ultimate weight reduction and integration of a pedestrian protection function, in distortion and self-tension optimized tool-less production with little rework for small series is achieved."

For more information on the LightHinge+ project, please visit the project partners at the EDAG IAA stand in Hall 5.1, Booth B04.

Press pictures: <https://www.simufact.com/news-detail/lighthinge-plus-.html>

Videos: <https://www.simufact.com/lighthinge-plus.html>

About Simufact

Simufact Engineering – an MSC Software company – is a global operating software company providing process simulation products and services to manufacturing industries. Today, after more than 20 years of developing and supporting simulation solutions for the design and optimization of manufacturing techniques in metal processing, the Hamburg (Germany) headquartered company has established as one of the leaders in this business area. Simufact succeeds in extending its global market share backed up by a dynamically growing customer base exceeding a number of 700 customers. A strong and continuously growing network composed of local offices and channel partners ensures global support. The software primarily aims at the automotive industry, mechanical engineering, aerospace industry and their respective suppliers. Typical fields of application for Simufact software are hot forging, cold forming, sheet metal forming, rolling, ring rolling, open die forging, mechanical joining, heat treatment, different welding processes, and most recently additive manufacturing.

For more information about Simufact Engineering, please visit www.simufact.com.

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