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

Hamburg, Germany, September 13, 2017 – Under 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 applications. LightHinge+ is an additively manufactured hood hinge that combines lightweight construction and increased safety. The partners will present the project results at the EDAG IAA exhibition in Frankfurt/Main, Germany.

"Engine hood hinge systems are very complex because of their very strict requirements on safety and functionality," said Dr. Martin Hillebrecht, Head of Competence Center Lightweight Construction, Materials and Technologies at EDAG Engineering GmbH. "Together with voestalpine and Simufact, we achieved the goal of rethinking the hinge design by means of generative production to create an end-use part."

The voestalpine Additive Manufacturing Center used topology optimization to redesign the components. The team was able to achieve a weight reduction of 50% as compared to the original design. "The topology optimization calculated the minimal material requirements of the hinge," explained Eric Klemp, Managing Director of the voestalpine Additive Manufacturing Center in Duesseldorf, Germany. "The components geometry required a high proportion of support structures, which we then reduced to a minimum," said Klemp.

An important step in the design and production of additively manufactured components is the simulation of the actual build process in the 3D printer. Simufact simulation software solution, Simufact Additive, was 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," said Dr. Patrick Mehmert, Product Manager Additive Manufacturing at Simufact. "A distorted hinge can in turn deviate one to two millimeters from the targeted geometry."

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

A three-dimensional optical measurement performed by AICON 3D Systems validated the dimensional accuracy of the printed components as predicted by the simulation with Simufact Additive.

The simulation of the manufacturing process has significantly contributed to improving the design, increasing pedestrian safety, and eliminating distortion of the hinge while reducing expensive and time-intensive production tests.
More importantly, with this new process voestalpine managed to produce the hinge with fewer design iterations and less material resources, while still producing production-ready and mechanically-fit components after the laser melting process.

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

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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Contact:
Volker Mensing    Penelope Friebel
Director Marketing & Communications  Public Relations & Social Media
+49 (0)40 790128-160    +49 (0)40 790128-164
volker.mensing@simufact.de    penelope.friebel@simufact.de