

Transportation & Lightweighting

This session reveals how Transvalor Solutions contributes to the lightweighting objective especially but not limited to the transportation area.

29. The Lightweighting Forging Initiative Contribution of Simulation Software in the Development Phase of high-strength Components

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Modern technical systems – in the automotive, aviation and aerospace sector as well as in mechanical engineering and the field of energy technology – often involve high-performance forged components. Their key role is based on the one hand on their enormous load-bearing capacity required for the transmission of high forces and momentums. On the other hand, it can be observed that in times of increasingly scarce resources there is a growing demand for efficient industrial production processes – as is the case for forging. Especially in the automotive industry, increasing demands with respect to lightweight design and power density call for the ever more intensive optimization of components, which requires the careful matching of alloy, component geometry and the many parameters along the entire design and manufacturing process chain. By involving the supplier in the product development process and in engineering partnerships early on, favorable conditions are created for finding economical solutions that benefit both parties.

In the course of full utilization of mechanical-geometrical potentials at ideally lowest costs, vigorous application as well as continuous development of advanced design tools gains great importance. Thanks to long-standing know-how and software-tools as CAD, topology- and shape-optimization as well as elasto-plastic FEA the Hirschvogel Automotive Group is in a position to reliably design components on the basis of requirements and design-rules of customers. Furthermore, Hirschvogel recently has acquired numerous further competences and refined these together with industrial and academic partners (e.g. regarding understanding of micromechanical material-mechanisms). Lately, tools for computational layout have been enhanced by software in the section of fatigue analysis. Thanks to the modeling of material behavior on basis of so-called Haigh-diagrams, differences regarding mean stress sensitivity (i.e. different load-bearing capacity under tension versus compression) can be considered. Beyond that, in future the predictive accuracy of computations in this section can even be improved through advancements with respect to consideration of production-induced product properties: With regards to local strain hardening of the material due to prior plastic deformation, only now the full lightweight potential can be achieved - as far as layout of autofrettaged injection and engine components is concerned.

Biography

Studies: Jochen Heizmann holds a Bachelor of Arts, Business & Technology from Fachhochschule für angewandtes Management, Erding. He is a certified technician in Mechanical Engineering at DAG Technikum, Essen. He is also a Tool & Die Maker, Stamping & MetalForming.

Working experience: He joined Hirschvogel Automotive Group in February 2001 in FEA Administration & Development for the Corporate Research & Development Department. Since May 2013, he is has been in Business Development at the Corporate Advanced Engineering.
