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the future of forging



Forging technologies in new mobility

Project TRANSFUGE

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Pierre-Emmanuel ABA-PEREA is a PhD and a Material Engineer working as a metallurgical expert at IRT M2P (French technological research institute for metallurgy, materials and processes). He has dedicated his research work to the study of metallurgical features resulting from materials processing. His work aims to improve the understanding of microstructural evolution, residual stresses distribution and mechanical performances induced by manufacturing processes such as casting, forging, additive manufacturing, heat treatments and thermochemical treatments. His recent projects have been focusing on aircraft and automotive mechanical parts for transmission and engines.



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Abstract

Stellantis has participated for a project concerning new gears for the future. This project gathered different partners in automotive manufacturing but also naval and aeronautics activities. This project was called TRANSFUGE. One of the items, piloted by automotive partners, was to find solution to reduce the price of the component and also the CO2 footprint with the same functional behavior.

The work on this project allowed to test cold forging and warm forging for gear for the objective to directly integrate the teeth in the forging operation (near net shape) and to replace carburizing heat treatment by induction hardening process.

The results were totally in accordance with the objectives and all the modalities was tested in fatigue and bending tests and evaluate by an LCA analysis.

This project showed the new possibility to continue the forging but more adapted with the actual constrains to reduce price and CO2 emissions.