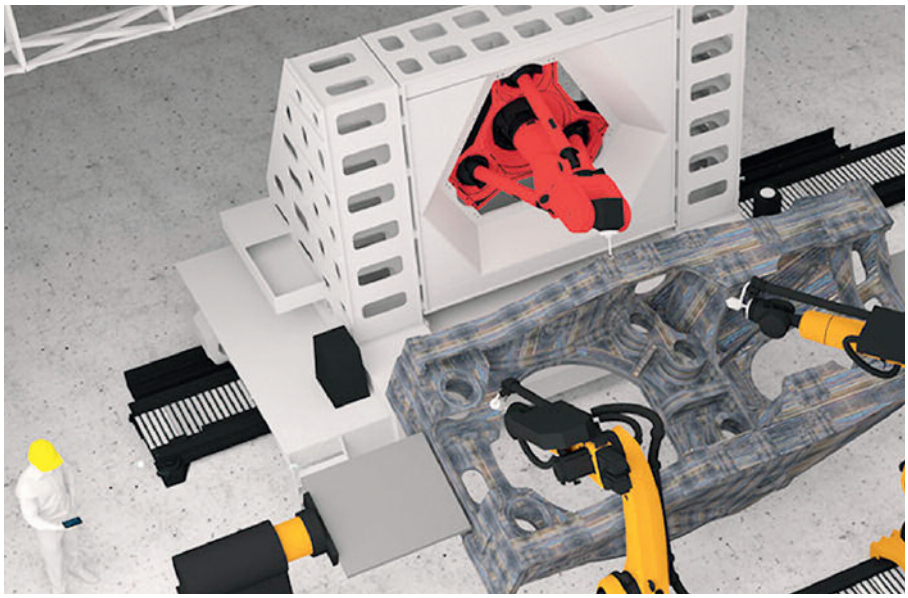
The "LASIMM" project: development of novel hybrid approaches for additive and subtractive manufacturing machines



Reducing costs, improving efficiency and production flexibility are core pillars to improve Europe's industrial competitiveness. The "LASIMM" project (Large Additive Subtractive Integrated Modular Machine) aims to address this need through the development of large scale and flexible all-in-one hybrid machines, based on a modular architecture that is easily scalable, and ensuring that the properties of the material produced surpass those of a forged material.

It will enable the production of a part/product directly from computer-aided design (CAD) models within a reduced time frame and without the need of post-processing steps. The machine resulting from this project will be equipped with both subtractive and additive manufacturing technologies, as well as featuring additional capabilities for machining, cold-work, metrology and inspection that will provide the optimum solution for the hybrid manufacturing of large engineering parts, with cost benefits of more than 50% compared to conventional machining processes.

Specifications will create new opportunities and applications for additive manufacturing

In order to produce large scale engineering structures, material needs to be deposited at a relatively high rate, with exceptional properties and excellent integrity. To achieve such result, the deposition process will be based on wire + arc additive manufacture (WAAM). Another unique feature of the machine will be the capability for parallel manufacturing, featuring either multiple deposition heads or concurrent addition and subtraction processes.

This parallel manufacturing process requires that the machine architecture is based on robotics. To ensure that the surface finish and accuracy needed for an engineering components is obtained, a parallel kinematic motion (PKM) robot is employed for the subtractive step. This robot is also used for application of cold work by rolling between passes. This ensures that material properties can be better than those of a forged material. A key part of this project is the development of the ICT infrastructure and toolboxes needed to programme and run the machine. The implementation of parallel manufacturing is extremely challenging from a software perspective and will require a strong focus within the project.

Project partners

There are ten partners engaged on this ambitious project, comprising six companies, including the entire supply chain needed to produce such a machine, two universities and two research institutes. Project partners include the European Federation for Welding, Joining and Cutting, BAE Systems (Operations) Ltd., Foster + Partners Limited, Vestas Wind Systems A/S, Cranfield University, Global Robots Ltd., Loxin2002, S.L., Helmholtz-Zentrum, Geesthacht Zentrum für Material- und Küstenforschung GmbH, Delcam Ltd. and Instituto Superior Técnico.

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