Partner activities:

Airbus Operations

As the consortium leader of the HEMERA project, Airbus Operations is responsible for the overall coordination, system integration, and development of the entire panel architecture. This includes the definition of innovative architectural and design principles, as well as the tolerance concepts for the high-rate, stringer-stiffened fuselage panels. The goals are a significant reduction in weight and an increase in rate capability, cost efficiency, and sustainability of the processes. Furthermore, Airbus develops industrial tooling concepts, provides materials, and is specifically responsible for the "High-rate, precise machining of CFRP shells." Finally, Airbus leads the test and validation activities: this encompasses the definition of the test programs, the evaluation of the manufactured validators, and the execution of the life-cycle analysis for the final assessment of the project goals.

Airbus Aerostructures

Within HEMERA, Airbus Aerostructures GmbH (ASA) is developing technologies for the high rate production of stringer reinforced CFRP fuselage shells using co-curing architecture. This work encompasses the development of design and tolerance concepts in collaboration with Airbus Operations GmbH, as well as the transfer of existing repair and simulation methods to new materials and processes. ASA is leading the main work package for the development of high rate manufacturing methods for stringers, which focuses on the production of three-dimensional preforms, stringer integration into the layup tool, and in-process quality assurance. ASA is also supporting the improvement of the skin layup process and non-destructive testing methods. During the production of the technology demonstrator, ASA is verifying the industrial applicability of the technologies developed within the project.

Within the HEMERA project, DLR makes a significant contribution to the development of high-rate capable manufacturing processes and technology building blocks for the cost-efficient and resource-efficient production of stringer-stiffened CFRP fuselage structures. The activities include the definition and validation of requirements as well as the development of robust manufacturing and integration concepts aimed at significantly reducing weight, assembly effort, tolerance chains and overall process complexity. As lead of

a main work package, DLR is responsible for the development of high-rate capable skin manufacturing with tight geometric tolerances. This includes automated fiber placement and co-curing processes with integrated stringer placement on male mould tools, as well as process-integrated quality assurance. In addition, DLR develops a high-rate capable, couplant-free non-destructive testing (NDT) method for large-scale CFRP panels. The validation of the technology building blocks is performed using a cylindrical technology demonstrator under industrially relevant conditions. Furthermore, DLR addresses the functional integration of electrically conductive stiffening elements based on fiber-metal laminates to enable integrated grounding and lightning protection functions.

Fraunhofer IGCV Fraunhofer IFAM

Within the joint project »HEMERA«, the participating institutes Fraunhofer IGCV and Fraunhofer IFAM focus on applied research of high-rate preforming technologies and shape-adaptable tools / foil support cores for continuous and release-agent-free production of stringer preforms. These preforms are subsequently used for integrated skin manufacturing and co-cured with the outer shell. Furthermore, the application of inline-capable and AI-supported quality assurance concepts for CFRP lightweight structures will be investigated. The processes and technology bricks to be developed, will be validated on laboratory scale by production of increasingly complex test samples. In collaboration with the project partners scalability and transfer to industrial application will be assessed.

OSTSEESTAAL

In the LuFo project HEMERA, Ostseestaal develops key tooling technologies for high-rate manufacturing of single-curved, stringer-stiffened CFRP fuselage panels. Building on results from the NATUR project, Ostseestaal focuses on lightweight, energy-efficient Ni36 forming tools and on the optimisation of forming and production processes. The aim is to significantly reduce material usage, energy demand and processing times. The resulting tools form a critical component for future series production. While Airbus leads system integration and overall validation, Ostseestaal provides essential contributions to tool architecture, lightweight design and industrial manufacturability – forming a decisive cornerstone for scaling next-generation CFRP structure production.

FFT

Automation and tolerance management are indispensable for the integral construction of CFRP fuselage structures, which is the goal of HEMERA. FFT will develop a high-throughput

handling system for stringer preforms with this focus and implement it using a demonstrator setup at the DLR. In doing so, it will draw on expertise gained from various research projects on the processing of semi-finished textile products in the aviation industry. In addition, in-house technologies and products such as lightweight grippers, optical measuring systems, and AI-based tools for data evaluation will be adapted to the use case and integrated into the system in order to achieve the project's goals.

Broetje-Automation is developing automated manufacturing technologies for lightweight fuselage stringers made from pre-impregnated CFRP materials as part of the HEMERA project. The aim is to achieve efficient, high-volume production in which the stringers are manufactured continuously and already equipped with stabilizing core materials. This integration saves work steps and improves cost-effectiveness at high production rates.

In parallel, Broetje-Automation is also advancing high-rate production technologies for CFRP skins in the project. These enable the manufacture of complex geometries and ensure precise processing of the individual carbon fiber layers. The project involves comprehensive validation under production conditions in order to create a robust solution for series production in lightweight construction.

Broetje-Automation is thus laying the foundation for highly automated production technologies that will also enable the required rates of more than 70 aircraft per month.