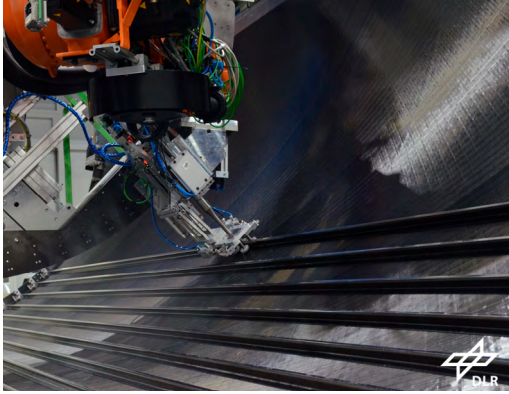
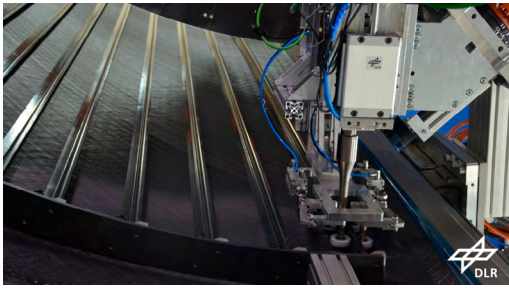
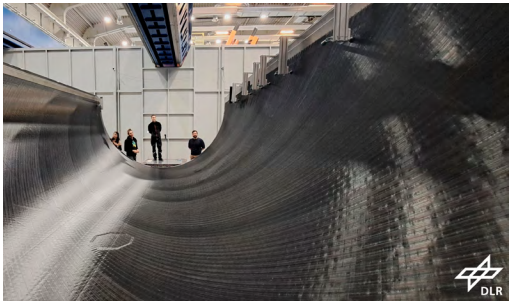
MULTIFUNCTIONAL FUSELAGE DEMONSTRATOR (MFFD)







RESEARCH INSTITUTE

DLR Institute of Structures and Design, Augsburg

PROJECT

MFFD

PROJECT DURATION

2019–2023

DIMENSIONS

8 m × 4 m

MATERIAL

CF/LMPAEK

OBJECTIVES

- Reduction of the fuselage weight
- Reduction of recurring costs
- Research on sustainable and high-rate manufacturing processes

The DLR Institute of Structures and Design in Augsburg, has completed the production of a full-scale upper fuselage half test shell for the Clean Sky 2 "Multifunctional Fuselage Demonstrator" (MFFD). Together with the partners Airbus, Premium AEROTEC and Aernnova, DLR delivered the demonstrator upper shell for the 8m long MFFD mid-2023.

The production technologies for thermoplastic composites, such as the in-situ tape laying, ultrasonic welding of the stringers, resistance welding of the frames, cleats and frame couplings, which are required for the production of the MFFD upper shell, were first successfully validated using a test shell.

The in-situ consolidation without using a vacuum bag assembly and autoclave treatment enables a reduction in panel production time of up to 40% (compared to the thermoset production route). Gap-free placement was ensured using an in-house developed tape placement sensor.

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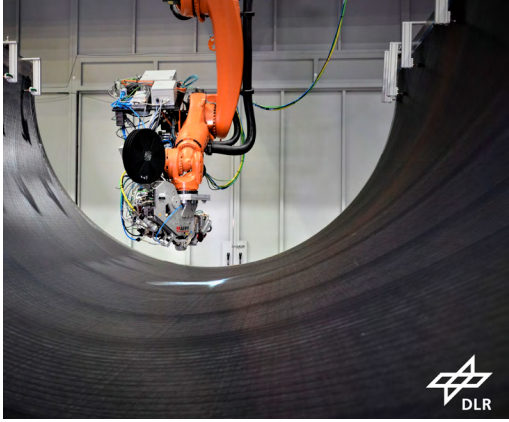

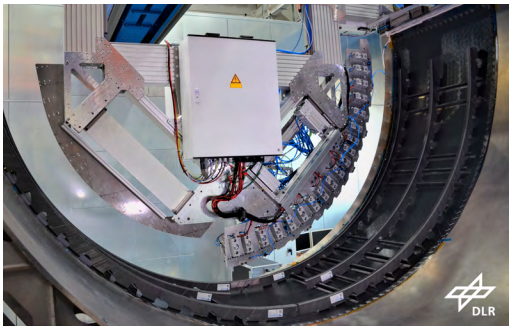

A new lightning strike protection (Cetex TC1225 LSP) film supplied by Toray Industries (Nijverdal, Netherlands) was used as first ply for the skin layup, streamlining fuselage production through function integration.

Continuous ultrasonic welding was used to weld the stringers onto the in-situ consolidated thermoplastic aircraft skin – a world first.

The frames were then integrated using resistance welding. DLR developed a welding bridge that rests on top of the placement tool for this purpose. Resistance welding has the potential to integrate entire frames within 5 minutes.

Acknowledgement
This project has received funding from the Clean Aviation Joint Undertaking (CAJU) under grant agreement CS2-LPA-GAM-2020-2023-01. The JU receives support from the European Union's Horizon 2020 research and innovation programme.

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More information:
Center for Lightweight-Production-Technology - MFFD – Production Technology for the Thermoplastic Fuselage of Tomorrow

YouTube video
Revolution in Aviation: Production of the Multifunctional Fuselage Demonstrator