

Hybrid Seating Structure

Clean Sky 2 (CS2) is a Joint Technology Initiative (JTI) between both public and private parties, which includes multiple companies, universities and public laboratories, as well as the European Commission. This JTI sets out to develop innovative technologies aiming at significant reductions in fuel consumption as well as pollutant and noise emissions of civil aircrafts.

Within CS2, Fraunhofer ICT and its partners are developing an innovative, composite-based seating concept for civil aircraft, incorporating multi-material design, a high level of functional integration, and novel material systems and processes.

This approach enables production of a lightweight part with a positive environmental impact due to its lower mass compared to the state of the art. The application of polyurethane-based resins in both structural components and foam cushions further facilitates recycling of the seating structure, which is a significant step towards a circular economy. By combining multiple processes during seat production, an improved weight-specific part perfor-

mance at reasonable material and process costs is achieved. The seat base consists of a sheet molding compound (SMC) and wet compression molding (WCM) part, combining the advantages of the respective materials in a shell-like structure.

The outer shell consists of carbon-fiber-reinforced SMC. The compression molding process of SMC enables the production of complex geometries, including ribs, which is applied to achieve increased part stiffness. The inner shell is a WCM component, manufactured with a continuous carbon fiber reinforcement structure. Non-crimp fabric layers are stacked according to the load-based ply book. The fabric stack is draped and simultaneously impregnated by the reactive PUR system.

The final demonstrator is a hybrid seating structure, which does not surpass a maximum weight of 10 kg, is easy to dismantle and has a high recyclability (at least 90 % of the seat weight). In order to achieve high recyclability, both production processes use PUR as their respective matrix material.



*SMC (below) and WCM (above) component of the seat structure
Photo: Fraunhofer ICT.*

Project consortium: