

Manufacturing Innovation

Automated Fibre Placement (AFP)

Preparation for the eco-statement



OBJECTIVES

The application of robot-based Automated-Fibre-Placement results in a material-efficient (near net shape and load-path optimized), automated lay-up of complex geometries. The main target is the demonstration of an automated manufacturing chain for complex sandwich structures like the rotorcraft side shell.

Source: Airbus

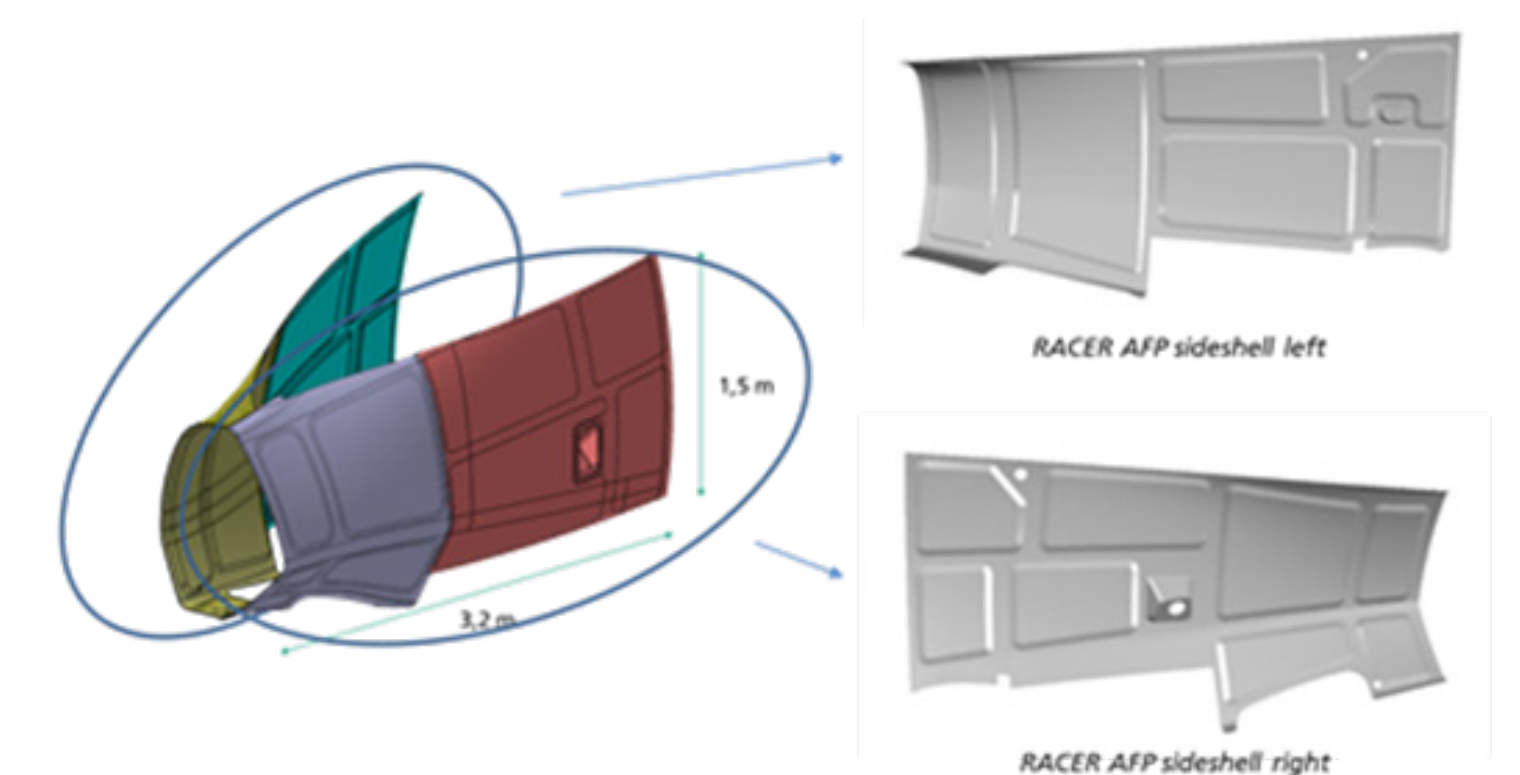


TECHNICAL DESCRIPTION

Robot based AFP can usually laid up 8 to 32 tows. Hereby each tow is fed and cut separately resulting in a near net-shape stack with cutoffs below 5%. Processable tow width varies from 1/2 sto 2 inches. The fixation of the tows depends on the material system, for thermoset based prepreg tows usually an IR lamp is used.

Main process steps are:

- Material preparation (defrosting of prepreg, trimming and forming of sandwich structure)
- Plant equipping with material and preparing of lay-up tools
- Automated lay-up of the inner layers (after the first layer vacuum is applied for compaction)
- Positioning of the sandwich
- Automated lay-up of the outer layers (after the first layer vacuum is applied for compaction)
- Curing of the part in an autoclave
- Demolding, milling and quality inspection



TECHNICAL AND ECOLOGICAL IMPROVEMENT/INNOVATION

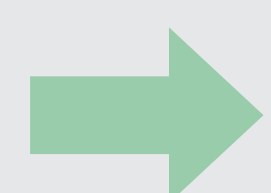
- Increased process robustness and reproducibility
- Expectation of 10% reduction of manufacturing costs compared to a manual lay-up, due to lower scrape rates, less workforce and higher productivity
- Expectation of 20% improvement in the environmental footprint along the manufacturing process based on the achieved material waste reductionhe environmental footprint

PREPARATION FOR THE ECO-STATEMENT

- LCI Technology Description of the technology
- Definition of the system boundaries
- Data collection sheets for each process of the technology
- Preparation of the modelling in the LCA software of the steps and database

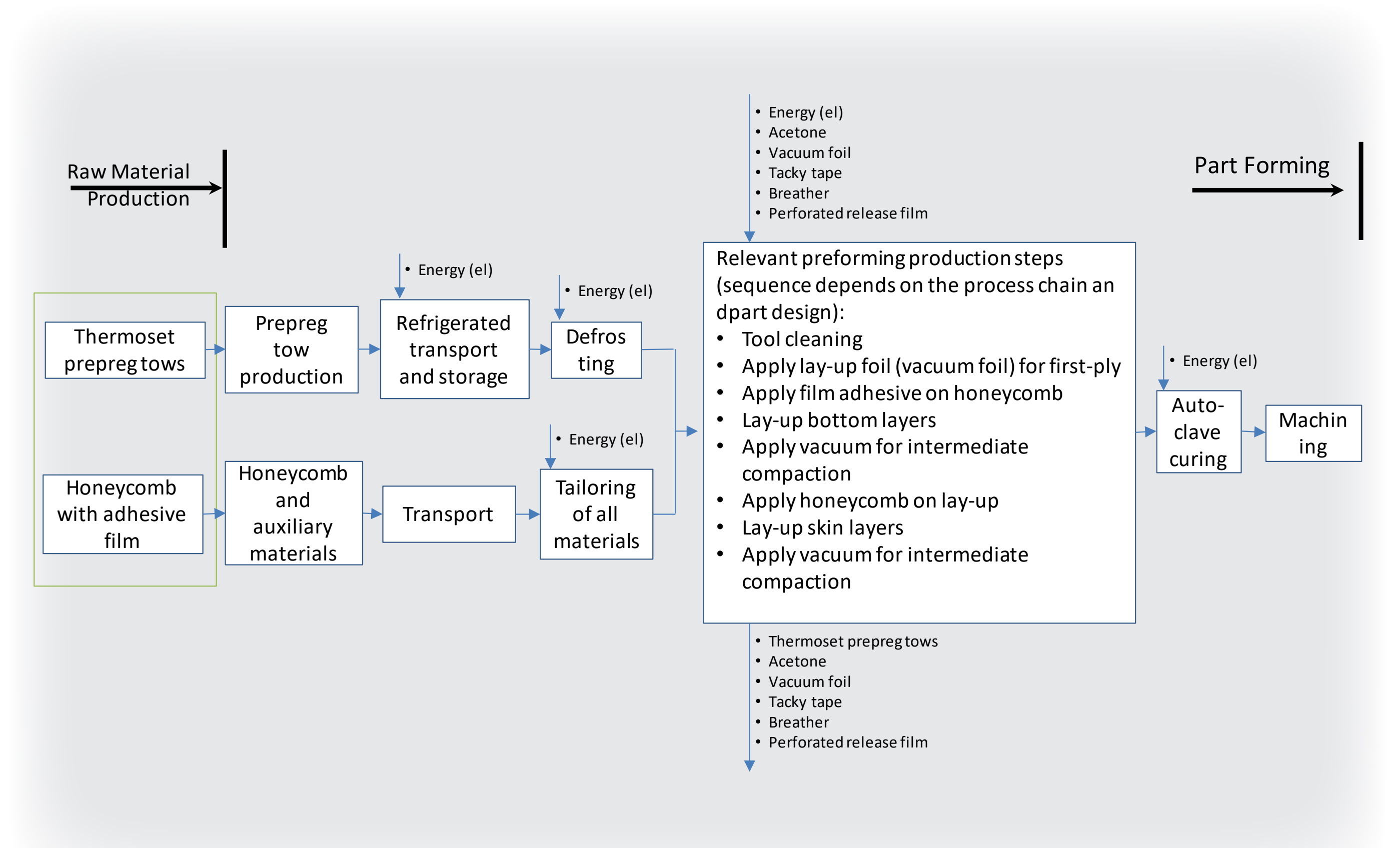
System boundary:

Raw material production



Part manufacturing

LCI Technology Description:



ACKNOWLEDGEMENTS

These research activities receive supporting funding from the Clean Sky 2 Joint Undertaking under the European Union's Horizon 2020 research and innovation programme under grant agreement No. 807091 and 807083. This publication reflects only the author's views and the European Union is not liable for any use that may be made of the information contained therein.



CONTACTS

Thomas Zenker, Fraunhofer IGC, thomas.zenker@igcv.fraunhofer.de
Ana Salles, Fraunhofer ICT, ana.salles@ict.fraunhofer.de
Peter Brantsch, Fraunhofer ICT, peter.brantsch@ict.fraunhofer.de

