

Challenges and Opportunities for Airbus towards Digitalization of Composite Materials

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Application of advanced composite materials to aircraft primary structures is continuously growing, and projects like Airbus A350XWB in the field of commercial aircraft are new references of how far composite technology can be implemented. The validation of those composite parts and qualification of materials is mainly realized by tests. Those tests have an important impact on the cost and the lead time of development project. It is then necessary to develop a numerical alternative to predict the strength and the composite material behavior to decrease the global amount of tests. This numerical alternative would also impulse implementation of innovative technologies with low maturity in future aircrafts development while reducing the time to market. Efficiency for managing evolution of qualified composite materials, competitiveness with multiple sources are as well significant benefits expected from materials digitalization.

To support this target, Airbus is building important bricks to achieve an end-to-end view, with focus on following enablers:

- Simulation of materials behavior, with necessary inputs from material suppliers
- Prediction of materials failure strength by simulation at meso or micro scale
- Simulation of manufacturing flaws and their effect on mechanical strength
- Link between manufacturing process and materials behavior
- Investigation on scale effect: from coupon to structural application
- Management of uncertainties to assess reliability of simulation

Those enablers will be developed to achieve qualification of composite materials with a minimum of physical testing. The presentation will expose the challenges and opportunities for Airbus to develop those bricks towards alleviation of physical testing with an equivalent level of reliability.