

STS 01

Advances in Materials, Structures and Manufacturing for Aeronautics Applications

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Session Abstract

Keywords: *Lightweight materials, composite structures, multifunctional materials and structures for weight saving, reduced manufacturing cost*

According to the Strategic Research and Innovation Agenda of the *Advisory Council for Aviation Research & Innovation in Europe (ACARE)*, new technologies, materials, manufacturing processes and system concepts are vital for the European aviation sector.

Environmental protection is, and will continue to be, a key driver for aviation. The environmental goals in Flightpath 2050 recognise the need for aviation to accelerate its effort nuisance and air quality for the benefit of all citizens and to allow sustainable traffic growth.

For future airliners, the airframes, including cabin interiors, must contribute benefit from increased innovation in lightweight materials, including composites. Their use will require new approaches to design and manufacturing, with multifunctional materials and structures for weight-saving, reduced manufacturing cost and increased production rate. Design for end-to-end performance improvement must be achieved with multidisciplinary approaches such as multi-criteria optimisation and digital model based engineering.

In this session, a numerical simulation methodology of Additive Manufacturing process for open lattice cellular materials will be presented, followed by derivation of cellular material mechanical behaviour.

Advanced materials as nano-crystalline metals will be addressed, which have attracted considerable attention over the past two decades due to their increased tensile strength properties.

The following papers will be presented in this STS 01:

Numerical Modelling and Mechanical Behaviour of Cellular Materials Produced by Additive Manufacturing Process

George Lampeas, Harry Psihoyos and Spiros Pantelakis, Univ. of Patras, Patras, Greece

Modelling of Porosity Effect on the Mechanical Behavior of Nano-crystalline Materials

Panagiotis Bazios, Konstantinos Tserpes, Spiros Pantelakis, Univ. of Patras, Patras, Greece