

### Optimization of Acoustic features of Composites Materials for Aeronautics

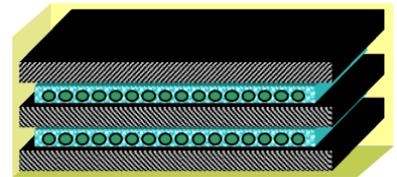
#### Soci IMAST coinvolti:

- **Alenia Aeronautica S.p.A.**
- **CIRA** – Italian Aerospace Research Center
- **University of Naples "Federico II"** – Department of Material and Production Engineering (**DIMP**) and Department of Aeronautical Design (**DPA**)
- **CNR** - Institute for Composite and Biomedical Materials (**IMCB**)

In civil aviation the use of composite materials applied to parts of the primary structure of fuselage makes significant weight reductions with the same structural performance. However, these materials are rather poor under the point of view of the acoustic characteristics, because particularly permeable to the noise in passengers cabin, with a consequent strong decrease of comfort level. The aim of the project was to develop innovative composite materials with improved acoustic feature in comparison with the traditional composites.

The most important techniques identified in this project were:

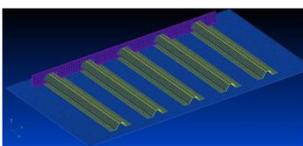
1. insertion of a damping layer inside the various layers of which the composite material is made-up;
2. addition of fibers of damping material inside the individual layers of the composite;
3. addition of nanomaterials at level of matrix and/or fibre.



Moreover, innovative cabin acoustic treatments were investigated. Acoustic treatments were performed through polymeric materials of different natures, including active noise control techniques, in order to optimise their performance as acoustic and/or vibration energy absorber or damper.

#### Achievements

The most important results were obtained with the damping layer configuration. In particular, a panel was realized with improved capacity to absorb and dissipate vibro-acoustic energy compared to current systems (-3dB), with a reduction of noise heard by passengers. The panel have good structural properties and a 60% of weight reduction with a reduction of fuel consumption and pollutants.



Furthermore, it was acquired multidisciplinary expertise (materials, modeling and design, testing vibro acoustics) and a almost unique database is in the international scientific community

