Thermoplastic Prepreg and Welding Technologies Developments at IRT Saint-Exupéry

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The use of thermoplastic composites for primary structures is a topic of great interest for aerospace industry. High performance thermoplastic polymers, such as PAEK, show interesting properties such as high toughness, recyclability, unlimited storage, weldability. Commercial PAEK-carbon prepreg from several suppliers are now available. However, their use is still restricted due to a lack of know-how.

In this context, IRT Saint-Exupéry helps the stakeholders such as materials supply chain and OEM by studying innovative technologies such as thermoplastic impregnation, sizing and induction welding. The objectives are to answer how to optimize robust thermoplastic prepreg as a function of manufacturing routes and how to simplify the assembly of thermoplastic parts.

These activities are performed on evolutive preindustrial equipments that have been designed specifically to bring comprehension and support the technologies maturity evaluation. The thermoplastic impregnation pilot is used to elaborate high performance prepreg materials from the formulation of impregnation solutions to the control of key process parameters. Thanks to line modularity and rapid iterative cycles, various material typologies are addressed and adapted to meet the needs of industry targets regarding miscellaneous manufacturing routes. For welding, a pilot comprising a robot-mounted induction effector was developed and is used to study optimal welding conditions.