MAPICC 3D

Project title: One-shot Manufacturing on Large Scale of 3D up Graded Panels and Stiffeners for Lightweight Thermoplastic Textile Composite Structures (Collaborative Project, 2011-2015)
Acronym: MAPICC 3D
Project description: One of the priorities in transport but also others industries (building and energy) is to develop lightweight complex structures with high mechanic and quality performances, in order replace the metallic heavy pieces. In fact, the demand of energy efficient environment friendly vehicles for transport industries is increasing. Such vehicles are expected to be lightweight for less energy consumption as well as for minimum CO2 emission, high performance, reliability, recyclability, cost effective production, safety and comfort. An important issue is to reduce the material types, to enhance recycling, but without scarifying the notion of performance at affordable cost. The needs concerning composites structure is increasing; however there is still major breakthrough limit acting against their development, which are the following:

- high cost production;
- long and labor-intensive production;
- quality issues;
- lack of versatile and flexible process;
- tailored properties difficult to achieve with current technologies;
- low qualified skillness.

Moreover the lack of modeling tools to virtually prototype products, to evaluate the manufacturability and performances properties, prevents the synchronization of SMEs and OEMs for manufacturing of high volumes of customized lightweight complex composite products. The new concept of MAPICC3D for 3D high volume production of composite lightweight are based on:

- the development of a new technology, steering the placement of fibres in 3 directions X, Y and Z, able to produce complex 3D performs : stiffeners and panels. These two types of part are generic and cover the major need of structural components requested by transport industries but also for other industries (energy, building);
- the adaptation of up-graded thermoplastic hybrid yarns, which can act both as matrix and reinforcing phase, and which can also host a functional material component. This material will be specifically adapted to the new technologies and avoid the polluting step of impregnation by a liquid resin;
- the development of modeling tools to design, characterize and predict the behavior of 3D perform so the automatic process manufacturing of selected complex lightweight composite structures.

Homepage: http://mapicc3d.ensait.fr/