funded by cornet

DeMaCo
Design for Manufacture of Composites

project overview

background:

Composite materials offer **unique opportunities in part and product design**. Their high specific strength and stiffness, high chemical resistance and other distinctive properties make them the materials of choice for an ever increasing range of applications. This creates unique opportunities and possibilities:
carbon fibre is now widely available for industrial use, newly developed resin systems are tough and yet straightforward to process, closed mould processing techniques become more robust and automated production solutions are increasingly available.

Nevertheless, there is still a **threshold for small and medium enterprises (SMEs) to implement these composite solutions**, as the design and economical production of such products is considered being much more difficult than of traditional metallic products. **The aim of the project "DeMaCo" is to develop "Design for Manufacture of Composites" guidelines which support SMEs during the development of composite products.**

VARI process – Source: Sirris Leuven Composites Application Lab

aim of the project:

Cost and manufacturability are largely affected by the product geometry and the choice of the primary and secondary manufacturing processes. The selection of raw materials (resins and fibre types, preform types) and the performance specification such as geometrical tolerances or aesthetic demands play a major role, too. The **developed guidelines and tools should lead designers towards the right mix of product geometry, materials and production processes** including considerations for preforming processes and finishing operations.

In particular, designers and production managers should be able to:

- Select the most **suitable production process steps**
- Understand the **relationship between the material choices and the process parameters**
- Select **appropriate tooling solutions**
- Select the right **finishing operations**
- Estimate the **cost and the cycle time** of the production

approach:

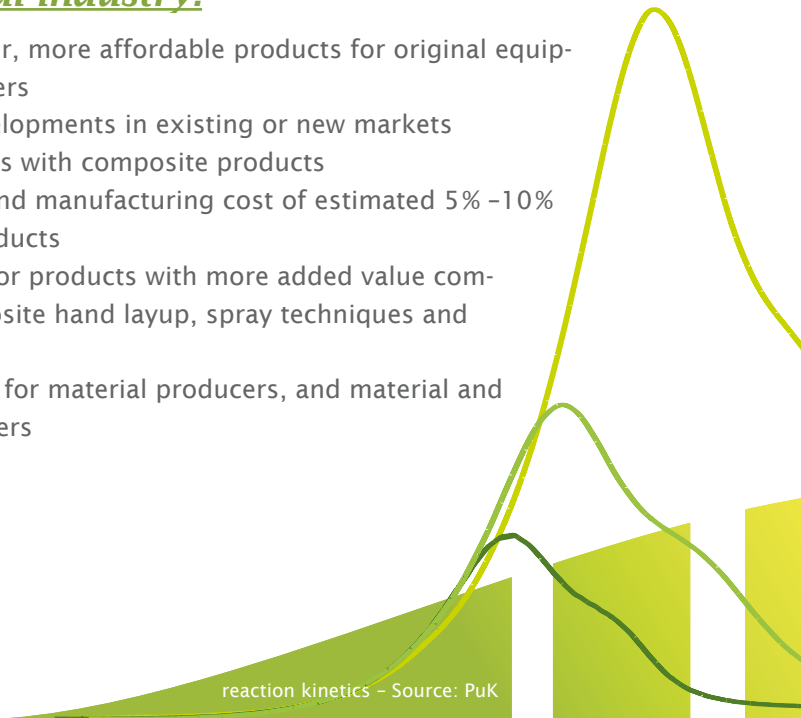
The study of the design process is enhanced by laboratory experiments and the development of three demonstrators. The **liquid composite moulding (LCM)** family of processes (i.e. RTM, RTM-Light and VARI) was selected. For SMEs, these processes offer a **wide range of design possibilities, from small to mid-series production, with the opportunity for automation**.

Incorporated in the technical work packages are three practical case studies that will be worked out from the specification list to a finished prototype.

This work strongly interact with the **development of a simple-to-use cost model**. The aim is to pro- vide designers and production managers with a tool to estimate the effects of design choices on the component cost. The methodologies and results of the technical work packages are then **condensed into a decision tool** which includes **guidelines and practical information** for the design of composite products.

impact on local industry:

- Redesigned, better, more affordable products for original equipment manufacturers
- New product developments in existing or new markets
- New OEM start-ups with composite products
- Lowered design and manufacturing cost of estimated 5% –10% for the target products
- Growing market for products with more added value compared with composite hand layup, spray techniques and metallic products
- Secondary effects for material producers, and material and equipment suppliers



reaction kinetics – Source: PuK

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