inholland composites

Project description (First-time-right)

Design new methods for production of direct moulds for composite parts (NEDcam)

Internship for WTB, LT 3rd/4th year

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Background

Manufacturing of composites can involve a lot of manual labour, which makes it more expensive and less consistent. In order to decrease the manual labour automation production technologies for composites require further development. Inholland Composites started a RAAK-MKB research project in September 2014 , *Robocompo,* together with 10 SMEs with the aim to automate the vacuum infusion process. The project was a great success and the result can be seen in the Composite Labs in the form of a robot with several end-effectors.

One of the conclusions of the project was that almost the whole process can be automated, but the biggest challenge is controlling the infusion process itself. This subject resulted in a new RAAK-MKB project named: *First-time-right injections for the production of one-off or small series of composite products.* For this project the focus will be on improving the quality of the infusion in such a way that complex and one-off products can be infused in one try, instead of several tries that can be required. The plans to achieve this is using smart-moulds (with sensors and heating) to control the resin flow, vision systems to increase the quality of the build-up and advanced simulation models linked with real-time data and new disruptive concepts.

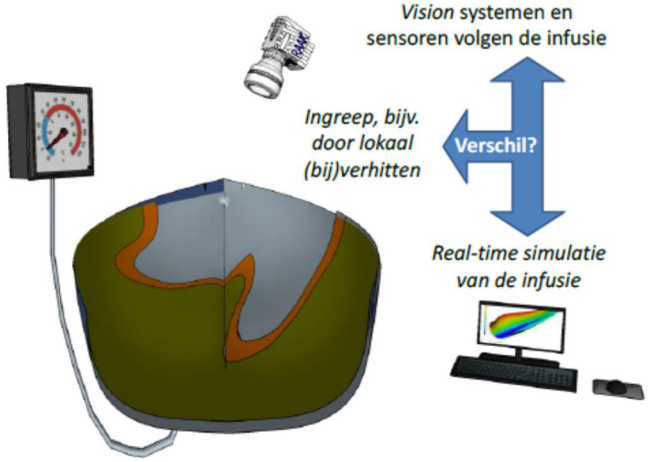
Project description

NEDcam is using styrofoam blocks and an epoxy-paste to make the moulds for composite parts (vacuum assisted resin transform moulding (VARTM)), but this requires multiple steps. First the rough shape is built out of styrofoam blocks, then this is milled to the correct dimensions. After this the epoxy-paste is applied to the styrofoam blocks and a final, more detailed, milling step is performed. NEDcam wants to improve this process by optimizing the production steps. This can result in a material study about a mould material that can be milled in one step. This material can be more expensive but has to reduce the production time. Also other techniques of mould production can and should be examined.

This project is all about process engineering, optimizing and efficiency. **(WTB, LT 3rd/4th year**).

Scope of work

During all projects at the First-Time-Right-projects it is intended for the student to gain practical experience with composites. So, even if you're working on a 'theoretical' business-case, you will have to get your hands dirty in the lab. Thus, during design you will learn about manufacturing methods and materials. We are striving to create physical demonstrators in the design projects. Furthermore, a typical scope of work consists of these elements:



- Project plan, research questions, research method
- Literature study, research on tool design, etc.
- Functional analysis and concept study
- Gain expertise in composites
- Detailed design
- Demonstrator for manufacturing samples
- Testing of the mould
- Analysis of test results
- Communication and interaction with stakeholders, companies and experts
- Technical report

Company information

Inholland Composites, located at Inholland in Delft and Alkmaar, is a very well equipped, high-tech laboratory in the field of composite materials and structures. The focus is on fibre reinforced plastics which provide durable and lightweight solutions in a wide range of applications. Inholland Composites needs students from various technical departments and it's our mission to put theory into practice and provide students with up-to-date education which connects to today's business.