



ADVANCING THERMOPLASTIC COMPOSITE TECHNOLOGIES

The ThermoPlastic composites Research Center (www.tprc.nl) is an open research center for fiber reinforced thermoplastic composites. TPRC performs research in co-operation with national and international partners, such as Fokker, TenCate and Boeing, on the processing and performance of thermoplastic composites. TPRC would like to reinforce its research team with an intern or graduation student on the topic of:

INDUCTION WELDING OF THERMOPLASTIC COMPOSITE COMPONENTS

Project description

Thermoplastic composite (TPC) parts are increasingly used in the aerospace industry because of their superior stiffness to weight ratio and rapid manufacturability. A highly automatable method to assemble these manufactured parts is done by the induction welding (IW) technique. This technique is based on induction of eddy currents in the separate composite parts. These eddy currents generate sufficient heat to melt the thermoplastic matrix material after which a controlled cooling and properly applied pressure the two TPC components will be joined.

An essential tool to obtain full control of this joining technique is the capability to accurately predict – based on IW parameters - the temperatures at the weld interface on beforehand.

The aim of this assignment is to create a validated Finite Element (FE) model of the induction heating set-up, available at TPRC. Validation of the FE model needs to be performed 1) based on analytical methods and 2) by means of actual performed experiments with the induction heating set-up. The results of this research will contribute to the optimization of production processes at the industrial partners of the TPRC.

Tasks

This assignment focusses on the creation of a validated coupled electro-magnetic/thermal FE model in which an actual induction heating experiment is simulated. The work includes:

- Performing a literature review on analytical methods to compute eddy currents in a simplified work piece
- Applying an analytical model of a simplified induction heating situation
- Creating a validated FE model of a simplified induction heating problem by means of an analytical approach to solve the same induction heating problem
- Discussion of the results in a written scientific report

Practical information

The project is to be performed within a time frame of 7-9 months. You will have a desk at TPRC and receive a monthly trainee remuneration of 250 Euro. Please contact Sebastiaan Wijskamp (sebastiaan.wijskamp@tprc.nl or 088-8773804) for additional information.