Technical University of Denmark

Popular science summary of the PhD thesis

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Title of the PhD thesis	Sensor Based Process Monitoring of a Large Scale Vacuum Casting Process
PhD school/Department	Department of Applied Mathematics and Computer Science (DTU Compute)

Science summary

* Please give a short popular summary in Danish or English (approximately half a page) suited for the publication of the title, main content, results and innovations of the PhD thesis also including prospective utilizations hereof. The summary should be written for the general public interested in science and technology:

The ever increasing demand for energy causes an increase in the demand for energy from renewable energy sources. A higher demand from renewables has caused a shift towards production of larger wind turbines and thereby longer wind turbine blades. The production of large scale wind turbine blades is a complex process, and the level of complexity and risk of casting defects increase with the size of the blades.

This thesis deals with the ability to look inside and monitor the process in a closed mould used for casting wind turbine blades at *Siemens Gamesa Renewable Energy*. In contrary to other manufacturers who cast half blades as an open process which can visually monitored, *Siemens Gamesa Renewable Energy* cast the blades in one piece, which excludes the posibility of mounting a camera and visually observing the process. Thus, this thesis discuss the possible solutions for implementing sensors in the blade moulds to monitor the casting process with the purpose of ensuring the quality of the cast blades through estimation and control of the vacuum assisted resin transfer moulding (VARTM) process.

The solution approaches for measurement and estimation of the casting process presented in this thesis are used for analyses of various case-studies suggested for real-time monitoring of the flow-front in a VARTM process. E.g. the analyses evaluate different approaches to using stochastic differential equation based flow-front progression models for estimation of the flow-front with different levels of uncertainty introduced to the system equations and measurements equations of a simulated flow-front progression.