Sensor based process and quality control for dry fiber layups on blades for wind turbines

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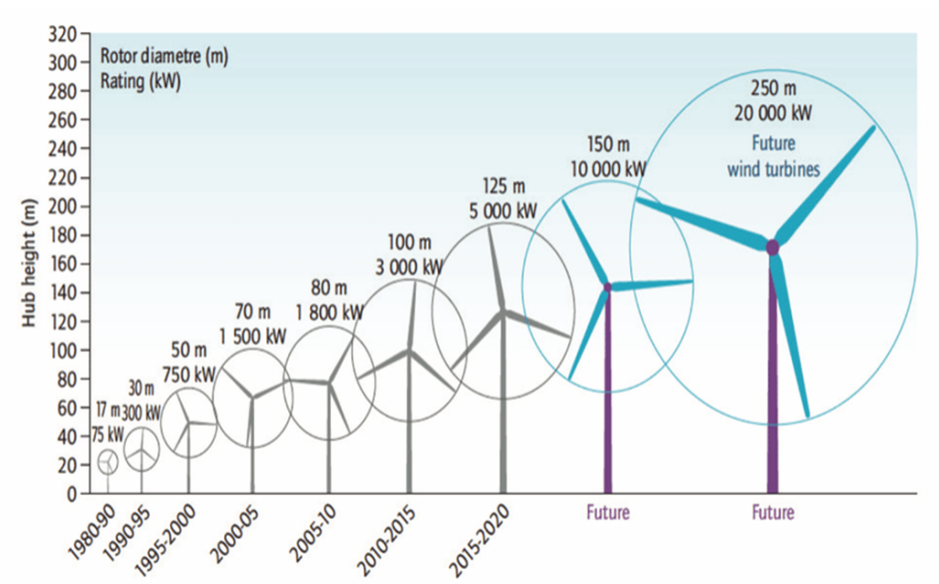
Background

The manufacturing of wind blades is a manual, labour-intensive process requiring workers to lift and place the fabric materials into the blade moulds. This process is associated with safety risks among the workers, especially as blade are becoming increasingly larger because the weight of the fabric increases and workers need to reach in unsafe positions during the placement process. In addition, the manual lay-up is a costly, time consuming process responsible for up to 50% of the time that the mould is in use.



For these reasons, there has been an increased interest in developing a solution for carrying out the layup process automatically. The process must ensure that fabrics are placed consistently because errors such as wrinkles in the material may ultimately impact the rigidity and geometrical stability of the blade. Therefore, it is important to have the capability to detect potential errors.

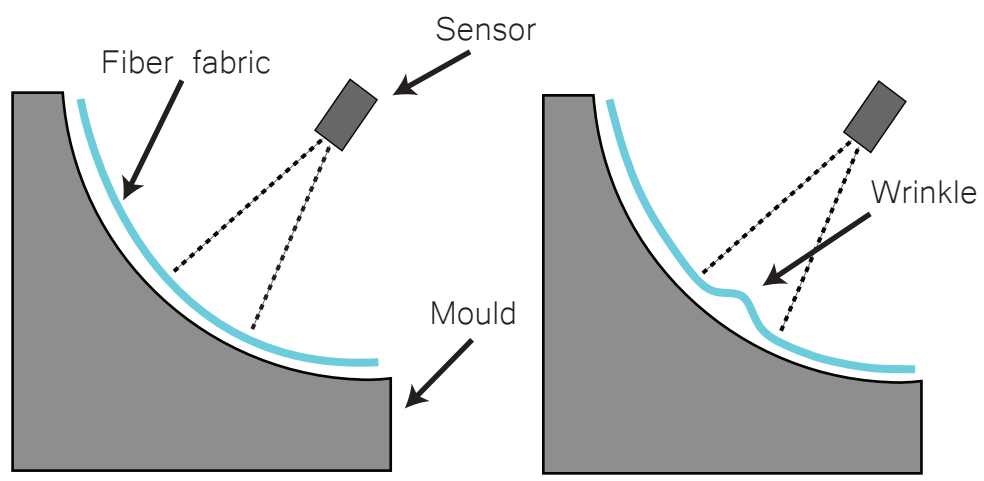
Objectives

This project aims to develop and incorporate inspection methods for wind turbine production to enable an accurate and consistent manufacturing.

The inspection system will leverage advances from AI and computer vision. It will provide valuable knowledge to the field of composite manufacturing to explore the potential of such methods in preforming layups. In addition, the process provides a case for the development of data processing algorithms and validating their application in an industrial context.

Methodology

The research will be facilitated by the development of model-based simulation of the layup process as well as lab-scale experiments emulating the layup.



The simulation and experiments will be used to generate the data necessary to build predictive models for detecting defects or anomalies in the layup. These models will serve as the basis for providing online guidance of the process as well as post process quality control.

Collaboration

The PhD project is related to the project ALMA, which is a collaboration between SDU, DTU, Airbourne and Siemens Gamesa. The project is funded by the EUDP.