SYSTEM INTEGRATION FOR AUTOMATED PREPREG CARBON PLY FOIL REMOVAL, DRAPING, AND QUALITY INSPECTION

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ABSTRACT

Fibre composite materials are widely used in products that require a light but strong material such as aeroplanes, racecars, sports equipment, etc. One advantage of using prepreg carbon plies is the flexibility of it during production, allowing it to be used in products with complex geometries. An automated solution reduces manual labour cost as well as being a safer alternative due to the hazard of manually handling the resin used in prepreg carbon plies, such as epoxy. State-of-the-art automated draping solutions for prepreg carbon plies are limited to only the individual tasks of the draping process. Those tasks include foil removal, draping, and quality inspection, which are done in sequence. This results in a production flow that is inherently time consuming.

Three tools are required for: foil removal, draping, and quality inspection. The foil removal tool and the draping tool have previously been developed as a part of the FlexDraper research project (see Fig. 1). In this study, a scanning tool is used where machine learning software is developed for detecting defects in the drape. The three tools are combined into one multifunctional draping tool mounted to an industrial manipulator. The result is an automatic system capable of performing draping with prepreg carbon ply under industrial requirements. The contribution of this study is the development of software for integrating and calibrating the multifunctional draping tool and the manipulator to meet the requirements of an industrial setting.



Figure 1: Initial setup for the automated draping system.

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