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Digitisation of Manual Composite Layup Task Knowledge using Gaming Technology

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Abstract

Increased market demand for composite products and shortage of expert laminators is compelling the composite industry to explore ways to acquire layup skills from experts and transfer them to novices and eventually to machines. There is a lack of holistic methods in literature for capturing composite layup skills especially involving complex moulds. This research aims to develop an informatics-based method, enabled by consumer-grade gaming technology and machine learning, to capture and digitise manufacturing task knowledge from skill-intensive hand layup. The digitisation is underpinned by the proposed human-workpiece interaction theory and implemented to automatically extract and decode key knowledge constituents such as layup strategies, ply manipulation techniques, motion mechanics and problem-solving during hand layup, collectively categorised as layup skills. The significance of this research is its potential to facilitate cost-effective transfer of skills from experts to novices, real-time automated supervision of hand layup and automation of layup tasks in the future.

Keywords

Composite hand layup; manufacturing informatics; digitisation of task knowledge; human skill capture.

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