Articles

Cost analysis of alternative automated technologies for composite parts production

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Received 15 Mar 2018, Accepted 25 Jul 2018, Published online: 18 Aug 2018

Download citation https://doi.org/10.1080/00207543.2018.1508903 Check for updates

Abstract

Composite material usage in aircraft has been rising since the 1990s, with significant increases in manufacturing productivity and repeatability due to automation in the production of aeronautic parts made of composite materials, becoming a strong driver for widespread adoption of composites in this industry. Automated Tape Layup (ATL) and Automated Fibre Placement (AFP) are two of the most important automated manufacturing technologies within aeronautics composites, although their cost implications and economic comparison have not been widely studied. This paper presents an economic evaluation of ATL and AFP technologies. Using process-based cost models, the manufacturing process of a horizontal stabiliser is modelled, determining for each technology the associated consumption and use of resources and their implications towards the part final cost. Results show that ATL is less expensive than AFP, due to lower material costs, although with less material efficiency and slower cycle time.

Keywords: automation, operational research, process modelling, process-based cost modelling (PBCM), composites