
Development of Design and Manufacturing Guidelines to Produce Fibre Reinforced Plastics (FRP) Boats Using Vacuum Assisted Resin Transfer Moulding (VARTM) Technique

M.T.T. Ranjan^a, U.I.K Galappaththi^a, S. Baduge^a and W.K. Wimal Siri^b

^a*Department of Mechanical and Manufacturing Engineering, Faculty of Engineering, University of Ruhuna, Sri Lanka*

^b*Department of Mechanical Engineering, Faculty of Engineering, Sri Lanka Institute of Information Technology (SLIIT), Sri Lanka*

Corresponding author: galappaththi@mme.ruh.ac.lk

The main objective of this paper was to form “design and manufacturing guidelines” for composite laminate structure of boats, which are produced by using Vacuum Assisted Resin Transfer Moulding (VARTM) technique. Four categories of design guidelines were formed to improve the laminate structures, thermal response of laminates, holes and cut-outs and bonded joints. Six guidelines related to the designing of laminate structures were developed to improve the mechanical properties, quality, and stability of the boats. It was highly focused on the thermal response of the laminates, and four guidelines were presented to avoid defect formations which result in extreme temperature fluctuations. Holes and cut-outs were identified as unavoidable features of the boat manufacturing, and five guidelines were defined to overcome significant structural damages and compressive strength reductions. Joining several structural components were required to finish boat as a marketable product. Consequently, it was identified and categorised twelve essential guidelines to develop bonded joints of boat structures. The existing research literature and analyzed observation in the manufacturing of three boat prototype structures were used to develop manufacturing guidelines specifically for VARTM technique integrated boat building.

Keywords: Composite boats, Designing guidelines, Fibre reinforced plastics boats, Manufacturing guidelines, Vacuum assiste resin transfer moulding,