

PROCESSING OPTIMIZATION FOR AUTOMATED DRY FIBER PLACEMENT AND MECHANICAL PROPERTIES OF DRY FIBER REINFORCED COMPOSITES

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Keywords: Automated dry fiber placement, Liquid composite molding, Mechanical property

With the continuous expansion of the application of advanced composite materials in aviation and aerospace, the tradition autoclave technique used in the manufacture of composite components meets difficulties in future expansion due to its large equipment investment and high energy consumption. In this paper, a low-cost and high-precision composite components manufacturing technology- Automated Dry Fiber Placement (ADFP), combined with Liquid Composite Molding (LCM), was used to manufacture composite laminates. The process parameters of ADFP was optimized by the adjustment of fiber placement head speed and the power of laser heating device. As the quality stability of preform made by ADFP was conformed, laminates was fabricated by LCM process. Then, the mechanical properties of the ADFP&LCM laminates were systematically tested and compared with autoclave technique. It was found that the compression strength after impact (CAI) of ADFP&LCM laminates with a thermoplastic toughening phase is 40% higher than autoclave laminates, and the toughening mechanism was detected.

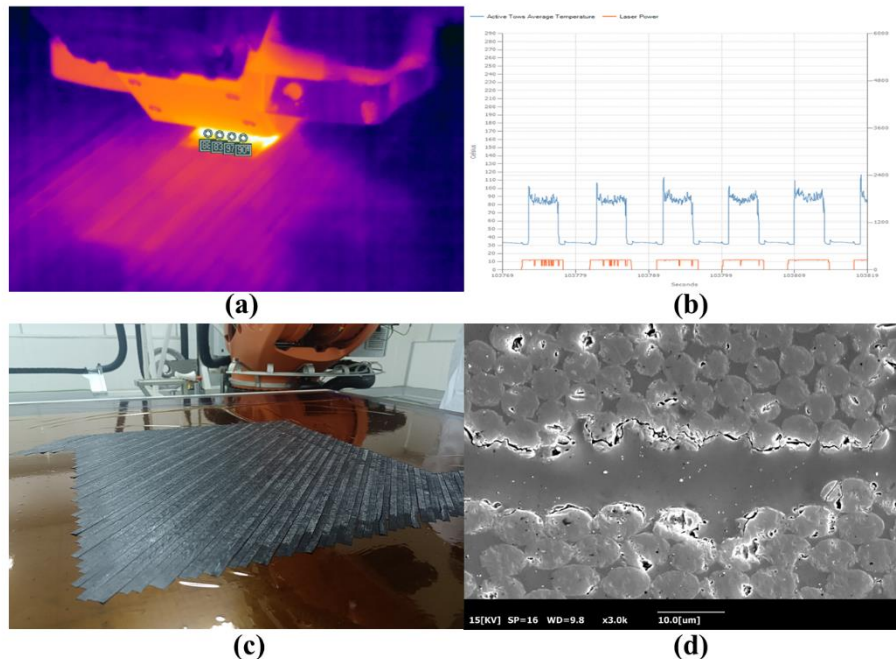


Figure 1: (a) Laser heated on the surface of dry fiber; (b) Temperature variations during dry fiber placement; (c) Automatic placed dry fiber preform; (d) Typical interlaminar zone containing thermoplastic phase.