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Single Pass Drilling Methodology Through Composite/Titanium/Aluminum Stack-Up

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Abstract: The purpose of this project is to conduct research to investigate the opportunity for single pass drilling through a combination of material stack-ups. Each part is assembled, from entry to exit, using carbon graphite, titanium, aluminum, and carbon graphite material. It was determined that 85% of the defects were related to delamination from drilling/machining. Planned methodology for this experiment is to measure the effects of delamination using tooling such asreamer bits, twist drill bits (single/double fluted), and subland drills. Drill geometry and tool characteristics will consist of optimal combinations of step angle, point angle, feed-rate, and spindle speed. Tooling parameters used for the study were: Spindle speeds (330, 465, 660, 1000 RPM), feed-rates (.002, .001 in/rev). Delamination model for push-out at exit is used to indicate the thrust force at the graphite exit point. The desired results will be achieved by indicating the thrust force at exit.

Keywords: Manufacturing, Material Stack-Up, Delamination