A STUDY OF THE THERMAL EFFECT OF DRILLING GLASS FIBER-REINFORCED POLYMER COMPOSITES

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Composite laminates are the exceptional quality materials for many applications, including aerospace and aircraft structural components. Composites offer advantages like enhanced fatigue, corrosion resistance, and increased specific strengths and stiffness over conventional materials like steel and aluminium. However, their low heat conductivity limits their application due to machining complexity. Overheating during cutting can damage the drilled hole's surface polish and dimensional accuracy, making it crucial to control cutting settings and use the right conditions. Goal of this study is to assess how well cutting fluid based on vegetable oil performs when machining the Glass fiber composite. To provide the ideal machining environment, machining responses are also compared to dry and wet cutting circumstances. The Taguchi Orthogonal Array (L9) was utilized in the experiment, which was initiated in a dry atmosphere. Thus, for the experiment, nine holes were used. The L9 orthogonal array has three levels and three parameters. The mean values of the temperatures obtained from this L9 array test were the lowest with the existing cutting fluid (Aquatex 3180). The highest mean temperature value is 46.25°C with dry condition. Here the drill bit diameter was 12mm and the speed of the drill machine was 500 rpm. The lowest mean temperature value is 27.40°C with Cutting Fluid (Aquatex 3180). Here the drill bit diameter was 12mm and the speed of the drill machine was 700 rpm. So, the cutting fluid Aquatex 3180 (Existing Cutting Fluid) is superior, according to experimental research. Additionally, the features of these vegetable oil-based fluids can be improved by utilizing surfactants, nanoparticles, or other additives to improve the qualities of coconut oil, making them more comparable to the cutting fluid already used in the market.

Keywords*:* *Cutting fluid, Glass-fiber, Taguchi Orthogonal array, Thermal effect, Vegetable oil-based fluids*