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Machining of Al6061/10%Al₂O₃ Composite using Abrasive Waterjet

S.Sakthi suba raja

Department of Mechanical Engineering, Einstein College of Engineering, Tirunelveli-627012, Tamilnadu, India

Abstract: Abrasive waterjet machining is a non-traditional machining process whose capabilities to compete with laser machining process has widened its industrial applications and drawn a good degree of research attention. The present work investigates the quality characteristics of surface machined by using an abrasive waterjet (AWJ). The work sample taken for study is Al6061/10%Al₂O₃ composite, whose machining is always associated with a degree of difficulty. Taguchi's L₉ array is used for experimentation and the cutting trials are performed by varying the AWJ cutting parameters like abrasive flow rate, water pressure and feed rate at three levels. Surface finish and kerf width are observed as the quality characteristics. A new approach of desirability based simulated annealing (DSA) is disclosed to predict the optimal cutting condition for Al6061/10%Al₂O₃ composite. The results are validated through confirmation experiment and the effect of water pressure is observed to be noteworthy in influencing the responses.

Keywords: Al6061/10%Al₂O₃; Composite; Abrasive waterjet; Desirability analysis; Simulated annealing; optimization.

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