IOP Conference Series: Materials Science and Engineering
Volume 290, Issue 1, 30 January 2018, Article number 012068
International Conference on Advances in Manufacturing and Materials Engineering 2017, ICAMME 2017; International Islamic University Malaysia (IIUM), Gombak CampusKuala Lumpur; Malaysia; 8 August 2017 through 9 August 2017; Code 134404

The optimization study on the tool wear of carbide cutting tool during milling Carbon Fibre Reinforced (CFRP) using Response Surface Methodology (RSM) (Conference Paper) (Open Access)

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Abstract

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Carbon Fibre Reinforced Plastic (CFRP) composite has become one of famous materials in industry, such as automotive, aeronautics, aerospace and aircraft. CFRP is attractive due to its properties, which promising better strength and high specification of mechanical properties other than its high resistance to corrosion. Other than being abrasive material due to the carbon nature, CFRP is an anisotropic material, which the knowledge of machining metal and steel cannot be applied during machining CFRP. The improper technique and parameters used to machine CFRP may result in high tool wear. This paper is to study the tool wear of 8 mm diameter carbide cutting tool during milling CFRP. To predict the suitable cutting parameters within range of 3500-6220 (rev/min), 200-245 (mm/min), and 0.4-1.8 (mm) for cutting speed, speed, feed rate and depth of cut respectively, which produce optimized result (less tool wear), Response Surface Methodology (RSM) has been used. Based on the developed mathematical model, feed rate was identified as the primary significant item that influenced tool wear. The optimized cutting parameters are cutting speed, feed and depth of cut of 3500 rev/min, 200 mm/min and 0.5 mm, respectively, with tool wear of 0.0267 mm. It is also can be observed that as the cutting speed and feed rate increased the tool wear is increasing.

Indexed keywords

Engineering controlled terms: Aircraft materials | Carbide cutting tools | Carbides | Carbon fiber reinforced plastics | Carbon fibers | Cutting | Fiber reinforced materials | Fiber reinforced plastics | Fighter aircraft | Manufacture | Milling (machining) | Reinforcement | Surface properties | Turning | Wear of materials

Compendex keywords: Abrasive materials | Anisotropic material | Carbon fibre reinforced plastic composites (CFRP) | Cutting parameters | Fibre reinforced | High resistance | Optimization studies | Response surface methodology

Engineering main heading: Cutting tools

ISSN: 17578981
Source Type: Conference Proceeding
Original language: English
DOI: 10.1088/1757-899X/290/1/012068
Document Type: Conference Paper
Sponsors:
Publisher: Institute of Physics Publishing

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