

Parametric Analysis on Surface Roughness of Micro-channel by Fiber Laser Milling on Zirconia (ZrO₂)



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Abstract In the present days, the requirement of micro-machining has seen a rapid growth for the fabrication of precision machining of complex parts in automobile, shipbuilding, aerospace, electronics, medical industries, etc. Surface finish of these types of components is one of the most important criteria for fabricating better quality and to avoid failure caused by surface defects. The paper addresses the experimental investigation for the variation of surface roughness of micro-channel milling on flat zirconia (ZrO₂) ceramics by using a pulsed fiber laser system. In this work, considered parameters are laser power, pulse frequency, laser scan speed, and the number of scan while responses considered are surface roughness parameters, i.e., R_a and R_z . The experimental results show that aforesaid factors revealed huge influences on surface finish criteria on machined micro-channel on zirconia ceramics.

Keywords Fiber laser · Micro-channel milling · Zirconia · Surface roughness

1 Introduction

Nowadays, micro-machining of engineering materials has become very popular for the production of miniaturized components to fulfill the demands of various industries. Zirconia (ZrO₂) is one of the most promising ceramic materials for the replacement of other advanced hard-to-machine materials, due to its several advantages

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