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Analysis of defects on machined surfaces of aluminum alloy (Al 7075) using imaging and topographical techniques (2022) *International Journal of Metrology and Quality Engineering*, 13, art. no. 12, .

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Department of Manufacturing and Materials Engineering, International Islamic University Malaysia, Kuala Lumpur, 53100, Malaysia

Abstract

Aluminum alloys 7075 (Al 7075) are widely used for various industrial components in which machining operations are often conducted during their manufacturing process. However, the machining operations could introduce defects on the machined surfaces of the components which will be carried over and may lead to either issues in the subsequent fabrication process or failure during the products' service life. This study investigates the machined surface's defects of Al 7075 underwent drilling operations using imaging and topographical techniques which include optical microscope, scanning electron microscope and 3D surface profiler. Surface roughness was analysed with respect to the surface defects to investigate the correlation between the roughness parameters and topographical features of the machined surfaces. The defects found on the machined surfaces of Al 7075 are microcrack, adhesion, feed mark and burr. Surface roughness was found to be highly influenced by topographical features particularly feed mark. Thus, in addition to measuring the roughness, inspection through imaging and 3D topographic techniques is important for analyzing the surface characteristic in order to determine the defects, hence deducing the detailed surface features and deformation caused by the drilling operations. © A.N. Dahnel et al., published by EDP Sciences, 2022.

Author Keywords

Aluminum alloy; Defect; Machining; Roughness; Topography

Index Keywords

Aluminum alloys, Infill drilling, Machining, Machining centers, Scanning electron microscopy, Surface defects, Topography; Aluminum alloy 7075, Drilling operation, Fabrication process, Industrial components, Machined surface, Machining operations, Manufacturing process, Optical microscopes, Product service life, Topographical features; Surface roughness

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S Miami, F FL

Correspondence Address

Dahnel A.N.; Department of Manufacturing and Materials Engineering, Malaysia; email: aishahnajiah@iiium.edu.my

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