

https://dspace.org/

Optimization of the machining of Ti-6A1-4V under MQL and flood cooling conditions

Eckowitz, Jordan

2014-02-17
http://hdl.handle.net10539/13793

Downloaded from a DSpace repository. https://dspace.org/

Abstract

This research investigation focused on the quantitative comparison of Ti-6Al-4V with respect to two cutting fluid delivery systems: Flood Coolant and Minimum Quantity Lubrication (MQL). The analysis was based around the effect of three general machining process parameters (axial depth of cut, cutting speed and feed) with regard to surface integrity factors/descriptors (such as residual stress) and machining responses (such as workpiece temperature). The investigations were undertaken both experimentally and computationally. The results illustrate that in order to enhance the surface quality of milled Ti-6Al-4V, when using Flood Coolant & MQL, one should minimize the feed rate. The conclusions drawn from the other two analysed process parameters are what differentiate Flood Coolant & MQL. In order to enhance the surface quality of MQL machined components one needs to maximize the axial depth of cut and minimize the cutting speed. This outcome results in a machining setup that has a higher material removal rate than the optimum Flood Coolant solution and with an enhanced surface quality and tool life. Therefore, the results indicate that MQL, which is an economical and environmentally-friendly cutting fluid solution, is a system that is better suited to milling Ti-6Al-4V than Flood Coolant.