

Numerical analysis of laser preheating for laser assisted micro milling of Inconel 718

ABSTRACT

Micro milling of super alloy materials such as nickel based alloys such as Inconel 718 is challenging due to the excellent of its mechanical properties. Therefore, new techniques have been suggested to enhance the machinability of nickel based alloys by pre-heating the workpiece's surface to reduce its strength and ductility. The prediction of fluctuated temperature distribution generated by pulsed wave laser in laser assisted micro milling (LAMM) is crucial. The selection of processing parameter by minimize the effect on the processing characteristic is decisive to ensure the machining quality is high. Determining the effect of heat generated in underneath surface is important to make sure that the cutting tools are able to cut the material with maximum depth of cut and minimum defects in terms of tool wear and tool life. In this study the simulation was carried by using Ansys APDL. In order to confirm the actual and distribution irradiation of temperature from simulation, an experimental was done to validate the results. The experiment was conducted by using Nd:YAG laser with wavelength 1064 nm.

Keyword: Laser assisted micro milling; Finite element analysis; Nd:YAG laser