ABSTRACT

Considerations for enhancing mechanical capability and corrosion resistance of precision elements encourage the use of aluminum, magnesium, titanium and even ceramic alloys which are difficult to process in machining. The process of machining materials with hard and brittle properties needs to be done in ductile mode by minimizing the depth of cut. Then the application of ultrasonic vibrations in machining process especially turning called Vibration Assisted Turning (VAT) appears as an alternative. VAT has been proven to be able to produce low surface roughness (Ra) and result in lower cutting temperatures compared to conventional machining. To improve quality and reduce tool waste by minimizing surface roughness (Ra) and cutting temperature all at once requires an optimization process. In this study the optimization process was carried out on the Longitudinal VAT machining parameters using Response Surface Methodology (RSM). Optimal variables are spindle speed 645 rpm, feed rate 0,17 mm / rev, frequency 19,856 KHz, and depth of cut 0,114 mm. The optimal variable is predicted to cause a cutting temperature of 72.5 ° C and machining surface roughness of 2.053 µm.

Key words: Longitudinal Vibration Assisted Turning (VAT), Surface roughness, Cutting temperature, Response Surface Methodology (RSM)