ABSTRACT

Precision components are needed in producing a product in the aerospace and automotive. Precision components is fabricated with a micro machining process. Micro turning is part of micro machining with the characteristic size of the tool nose radius being larger than the depth of cut. In micro turning, a phenomenon occurs where the resulting chip is not cut perfectly so that it builds up on the workpiece. This phenomenon is called the ploughing phenomenon which reduces the quality of the surface. EVAT is used as an alternative solution to reduce the phenomenon and improve the quality of the resulting surface. This study focuses on the effect of machining parameters on EVAT on micro turning with $h_s < h < h_{min}$. The machining parameters used as input variables are feed rate, spindle speed, and frequency. Determination of the combination of parameters used in this study was designed using the design of experiment (DOE) using the full factorial method. The material used in this experiment is Aluminum Alloy 6061. The results of this experiment produce an average surface roughness (R_a) to determine the quality of machining. Surface quality on changing the feed rate, spindle speed, and frequency parameters cannot minimize the surface roughness results of the cutting results. The results of the EVAT performed increased the surface roughness results. It is important to determine the combined feed rate because these parameters affect the appearance of ploughing on the surface roughness. The implementation of EVAT on micro turning with an indication of the ploughing phenomenon produces a large surface roughness because the value of the depth of cut in vibration cutting is smaller than in cutting without vibration.

Keywords: Micro turning, surface roughness, ploughing, EVAT, MUCT.