ABSTRACT

Surface roughness is one of the important quality characteristics on the surface finish, so it is necessary to find the significant effect of the input variables on the surface finish. The machining variable is one of the variables that affect the surface roughness in the lathe machining process. Use of Design of Experiment (DOE), namely Full Factorial Method (FFM) to determine experimental scenarios to be carried out on machining conventional turning (CT) and Cutting Directional Vibration Assisted Turning (CDVAT) with a total of 108 experiments (27 CT experiments and 81 CDVAT experiments). The dependent variables are surface roughness, cutting temperature, and tool life. Comparison of the yield of the dependent variable between CT and CDVAT machining was noted. CDVAT machining produces a better impact on surface roughness by increasing the surface finish quality of the object by 36.9%, and lowering the cutting temperature by up to 33.15% compared to the results made by CT. Machining variable feed rate gives the greatest influence on the results of surface roughness with a percentage contribution of 77.08%. Meanwhile, the machining variables of spindle speed, depth of cut, and frequency do not have a significant effect on surface roughness. The regression model has a predictive accuracy rate of 77.23% with a mean error of 15%. The combination of machining variables resulting from the regression model that produces optimal machining roughness values using machining variables n = 2000 rpm, f = 0.05 mm/rev, ap = 0.25 mm, and F = 20 kHz with a Ra value of 0.3848 m . Tool life resulting from CDVAT machining is better than CT with a significant difference of 62%.

Keyword – ***Aluminium Alloy 6061-T6, Cutting Directional Vibration Assisted Turning, Conventional Turning, Tool Wear, Surface Roughness, Cutting Temperature, Full Factorial Method***