

## ABSTRACT

*Bovine horn is a natural material that has unique characteristics. The uniqueness of this characteristics of this bovine horn can be used for various things, one of the uses is manufacturing products made by the creative industries sector. The application of machining process in industrial sector for acknowledging the bovine horn material is the aim of this study. In addition, minimizing energy consumption carried out to improve environmental stability as well as improving the surface quality in machining process is a challenge that obtained in this study. Variabels optimization for selecting the optimal variabels from depth of cut (d), feed rate (f), and spindle speed based on the output from energy consumption and minimum surface roughness of the machining process of cutting bovine horns. The experiment data was processed using taguchi a combination of grey relational analysis with orthogonal array L27 ( $3^3$ ). Based on the signal to noise taguchi ratio, the analysis of smaller is better characteristics used to produce optimal variabels obtained from energy consumption data and surface roughness. If the optimal variabel is obtained then carried out to the ANOVA test to find out the most dominant variabel. Finally, the optimal machining variabel combination is obtained based on gray relational analysis, namely the depth of cut is 1,5 mm (level 2), feed rate is 0,13 mm / rev (level 1), Spindle speed is 855 rpm (level 1) with energy consumption value of 1,165 kW and the surface roughness value of 1,570  $\mu\text{m}$  with the factors that have the most dominant influence are the feed rate and spindle speed. By reducing the combination of the variabels it produced the optimal energy consumption and surface roughness.*

**Keywords:** *Bovine horn; energy consumption; surface roughness; taguchi; grey relational analysis.*