ABSTRACT

Bovine horn is a natural material with the unique characteristic, its material mostly used for creative industry product. In order to increasing the use of bovine horn as a work-piece material in industry, the study of manufacturing process especially machining process is needed. Decreasing power consumption to minimizing the environmental effects without ignoring the surface quality in machining process is a challenge nowadays. This study aims to describe the optimum condition of bovine horns milling process variables, depth of cut (d), feed-rate (f), and spindle speed (s), to gain maximum surface quality and minimum power consumption. The optimal combination of machining process variables obtain by using response of 27 Taguchi orthogonal array L_{27} (3^3) in this experiment. Based on Taguchi S/N ratio by selecting d = 1 mm, f = 72 mm/min, and s = 860 rpm, the bovine horn finished goods showed minimum surface roughness (R_a= 0,614μm), although at the setting of d = 1 mm, f =155 mm/min, and s =360 rpm, the machining process consumed the minimum power (P= 0.858 kW). In order to attain the optimal point of these two condition Grey rational analysis (GRA) was applied. The result of this analysis are d = 1 mm, f = 72 mm/min, and s = 860 rpm as the milling variables to produce the minimum surface roughness (R_a= 0.858μm) with small power consumption (P=0.991 kW). In conclusion, to produce the bovine horns product with maximum surface quality and good power consumption by decreasing feed-rate and depth of cut of milling process is a reasonable approach.

Keywords*: Bovine horns; Surface roughness; Taguchi; Power consumption; Grey Relational Analysis.*