

ABSTRACT

The potential of the manufacturing industry based on industrial products in the form of marketed goods will be able to move the producer value chain to the final consumer. The implication is that there are more jobs and the economic impact created by the manufacturing industry. The challenges of the modern industry mainly focus on achieving high quality, in terms of work dimensions of accuracy, surface finish, high production rates, lifespan on cutting tools, and improving product performance with reduced impact on the surrounding environment. In recent years, the demand for surface quality and precision in machining products has greatly increased especially in the manufacturing industry. In modern times like today, the application of new technology in various sectors needed. Ultrasonic vibration is one of the newly developed technologies in various manufacturing such as ultrasonic welding, ultrasonic-assisted turning, ultrasonic-assisted drilling, ultrasonic-assisted milling, and is also used in the application of medical devices. In this study, the optimization process is carried out on the VAT machining parameters using the Taguchi method. Taguchi was chosen to find out which variables and combinations of variables had the most significant influence to produce optimal surface roughness data. Based on the surface roughness of the Taguchi method, orthogonal array produces a combination of L27 (3⁴). Furthermore, the results of the Taguchi S / N ratio analysis, a combination of spindle speed variables = 1350 rpm, depth of cut = 0.15 mm, feed rate = 0.17 mm / min and frequency = 18,000 Hz produce a minimum surface roughness value (Ra = 1,644 (μm)). Based on statistical tests obtained each parameter that contributed to the spindle speed of 0.94%, a feed rate of 93.71%, depth of cut of 0.46%, and a frequency of 0.40%.

Key words: Vibration Assisted Turning (VAT), Surface roughness, Taguchi