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Experimental Study of Different Bio Based Cutting Fluid using Multiple Machining Characteristics during Turning Operation

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Abstract*: *Cutting fluids are extremely important in the machining industry. In order to increase tool life and product quality in machines, cutting fluids are typically utilised to decrease friction. Mineral oil is utilised as cutting fluid in manufacturing. However, its use has detrimental impacts on human health, even in the workplace. These negative impacts are evident when turning. There has been research done to replace mineral oils with bio oils. Bio oils are simply readily available, vegetable-based oils, many of which are also edible. To comprehend the machining process of three distinct metals—MS, EN08, and STAINLESS STEEL—against three various bio-oils—SUNFLOWER, SOYA-BEAN, and COCONUT as lubricants, parametric studies using experimental techniques are conducted. It is clear from the plotted graphs that utilising soybean oil as CF2 results in a higher reduction in surface roughness than using coconut oil as CF3, sunflower oil, or both as CF1. Additionally, using sunflower oil as CF1 results in a bigger drop in cutting temperature than using soybean oil as CF2, while coconut oil as CF3 results in a greater reduction than all three metals together. The results showed that bio-oils had superior outcomes than mineral oils and have the qualities of a good cutting fluid. These bio-oils are more biodegradable and sustainable. Thus,they are said to as eco-friendly. By adding additives and nano particles, bio-oil may be furthermodified to have better lubricating characteristics.

Keywords: Cutting Fluids (CF), Cutting Temperature, Machining, Surface Roughness, Tool Life,Turning.