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PERFORMANCE EVALUATION OF ELECTRICAL DISCHARGE MACHINING PROCESS BY USING BIO-DIELECTRIC CALOPHYLLUM INOPHYLLUM (POLANGA) OIL

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ABSTRACT

The electrical discharge machining (EDM) has a great potential of machining hard materials with great accuracy and hence, used to generate complex geometries. The material is removed by the high- frequency electric discharge established between the tool and the conductive workpiece placed in a dielectric environment. However, the use of conventional hydrocarbon-based dielectrics like kerosene produces aerosole missions along with other pollutants which have a negativeimpactontheenvironment. This leads to the use of more environment-friendly dielectrics like vegetable oils. Thesebio-dielectrics have higher break down voltage and hence are more efficient than conventional oils. In the present work, polangaoil has been used as the bio-dielectric for the machining of P20steel by the EDM processwith a tool made up of pure copper. As the pure polanga oil has a high viscosity, it has been chemically processed to make it suitable to be used as a dielectric fluid. The prepared dielectric was then characterized to assess its properties like viscosity, thermal conductivity, specific heat etc. Theprocess parameters *viz.* sparking current, pulse on time, and pulse off time have been used to investigate the EDM process. The material removal rate (MRR) and surface roughness (SR) have been considered to evaluate theEDMprocess.Theexperimentswere conductedusing bio-dielectricpolangaoil aswell as the conventional dielectric fluid i.e. kerosene. It has been observed that the MRR is improved by 0.08 to 0.77 times when machined with polanga oil as the dielectric. However, no significant improvement is observed in the surface finish when polanga oil is used as adielectric.

Keywords: EDM, Polanga Oil, Bio-dielectric, MRR, Surface Roughness, P20 Steel

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