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Performance of Non-toxic, Corrosion Resistant, and Lubricious Metalworking Fluids under Machining

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Abstract : Vegetable oil-based environmentally friendly metalworking fluids (MWFs) are formulated. The tribological performance, cytotoxicity, and corrosion resistance of the formulated fluids (FFs) are evaluated and benchmarked with commercial mineral oil-based MWFs (CF). Results show that FFs exhibited better machining characteristics (roughness, cutting forces, and surface morphology) during machining than CF. MTT assay and Live dead cell assay confirm the cytocompatibility nature of the FFs relative to the toxic CF. Electrochemical analysis shows that FFs and CF exhibited comparable corrosion current density.

Keywords : corrosion inhibitors, cytotoxicity, machining, MTT assay, Taguchi method, vegetable oil
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