

PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON MECHANICAL AND INDUSTRIAL TECHNOLOGIES, VOLUME-1

BOOK OF ABSTRACT

EDITORS

Dr. Ashish Kumar Srivastava
Dr. Pramod Kumar
Prof. (Dr.) Mithilesh Kumar Jha
Prof. (Dr.) Sandeep Tiwari

**ICMIT
2025**

MAY 24-25, 2025



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MUZAFFARPUR INSTITUTE OF TECHNOLOGY, MUZAFFARPUR
DEPARTMENT OF SCIENCE, TECHNOLOGY AND TECHNICAL EDUCATION,
GOVERNMENT OF BIHAR, PATNA

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Impact of Process Variables on Roughness of Turned Surfaces using Biodegradable Cutting Fluids

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ABSTRACT

This research focuses on improving the surface finish during mild steel turning by optimizing cutting parameters, with a particular emphasis on the role of cutting fluids. The primary goal is to achieve better surface quality and enhance machining performance by determining the best combination of speed, feed, and depth of cut. An important aspect of the study was to evaluate how biodegradable cutting fluids affect the machining process. To measure performance, surface roughness was used as the key indicator. All experimental trials were performed on a center lathe under varying machining conditions. Various cutting fluids, including sunflower, coconut, and soyabean oils, were tested to determine their effectiveness in enhancing the surface finish. Statistical methods, including Response Surface Methodology (RSM), were utilized to refine the parameters and establish the relationship between machining conditions and surface roughness. The findings indicated that cutting speed and feed had a significant impact on surface quality. Additionally, biodegradable cutting fluids demonstrated a notable influence on the surface roughness of mild steel. The best cutting fluid and ideal cutting parameters have been identified in the study. A surface roughness value of 0.2858 microns was found to be minimum with soybean oil as the cutting fluid. The associated cutting speed was 25m/min. The corresponding feed-rate and cut-depth were 0.10mm/rev and 0.7879mm respectively.

Keywords: Biodegradable Cutting Fluids, Turning Operations, Surface Roughness, Surface Finish Optimization, Response Surface Methodology (RSM)