**ABSTRACT:**

The recent industries are more concise about clean, green and sustainable machining process for better quality and productivity. Although the role of cutting fluids in grinding are crucial, but ecological and economic view, the consumption of cutting fluid should be minimum. The conventional cutting fluid is gradually replaced by new technology called nanofluid due to heat transfer and lubricating properties of nanoparticles. The effect of material hardness on grinding performance of EN31 material interms of surface roughness is determined for different cooling environments such as conventional flooded, MQL and Nanofluid MQL. The results show that the surface finish of hard material obtained is better in Nanofluid MQL at 0.30 vol.% concentration in comparison to conventional flooded, MQL and 0.15 vol.% . In present work modeling and optimization of process parameters of soft material is carried out using Jaya algorithm for better process performance. The process parameters such as table speed, depth of cut, dressing depth, coolant flow rate and nanofluid concentration are considered as input parameters for model development which is based on RSM (response surface methodology). The study demonstrates the validity of regression model by comparing the experimental test results with predicted values obtained from Jaya algorithm at optimal feasible values.

***Keywords*: C**ooling environments, Jaya algorithm, Modeling, Surface roughness