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# International Conference on Recent Trends in Mechanical Engineering

# (ICRTME -2025)


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# International Conference on Recent Trends in Mechanical Engineering

# (ICRTME -2025)

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# Performance Evaluation of Cryogenic LN2 Coolant on Surface finish and Chip morphology in Machining 7075 Aluminium alloy

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## ABSTRACT

This paper presents experimental investigations on surface finish and chip morphology during the machining of a 7075 aluminium alloy bar, comparing the use of Cryogenic Liquid Nitrogen (LN2) against a conventional coolant in turning operations. The analysis of chip thickness, form, and morphology, alongside surface roughness measurements, revealed that employing cryogenic coolant significantly improved the process outcomes. Specifically, the thickness of the metal chips was reduced by 6 to 20%, and the surface finish was enhanced by 15 to 23% under cryogenic machining conditions compared to those using a conventional coolant.

**Keywords**: 7075 aluminium alloy; LN2 cooling; chip thickness; surface roughness

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