



**INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS**

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Programme of Study : Ph.D.

Thesis Title: SUSTAINABLE HARD MACHINING USING MECHANICAL MICRO-TEXTURED CUTTING TOOLS WITH MINIMUM QUANTITY NANO-GREEN CUTTING FLUIDS

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SHORT ABSTRACT

The present work is primarily focused on sustainable machining using different sustainable techniques. In the thesis work, various micro-textured cutting tools are fabricated; eco-friendly green cutting fluid is synthesized as well as nano-cutting fluids are prepared. Also, a minimum quantity lubrication experimental setup is design and developed. Further, the tribological and machining performance of the above mentioned sustainable machining techniques are compared with conventionally used techniques. Moreover, comparison of biodegradation, thermal, rheological, anti-corrosion and storage stability properties of three different cutting fluids have been carried out. Also, the mathematical modelling of the effect of tool-chip contact length on its coefficient of friction as well as stress distribution analysis is part of the thesis work. Further, four individual sustainable machining technique are combined for improving overall hard machining performance in terms of cutting force, feed force, tool-chip interface coefficient of friction, tool-chip contact length, workpiece surface roughness and tool wear.