# A comprehensive review on the application of nanofluids in the machining process

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**ABSTRACT**
Industrial evolution and practical application of unusual methods for upgrading production procedures necessitate extensive studies in respective fields, particularly in the machining perspective. Higher yields and incomes are main factors for most of the manufacturers. Indeed, the substantial aim in manufacturing process is to optimize time of production, energy, cost, and resources while improving the function. Nowadays, exploitation of nanotechnology has gained great interest due to promising advantages toward higher yield in different processes. Hence, nanotechnology is considered in machining operations as nanofluid and coated cutting tools with nanoparticles. This review work attempts to represent a comprehensive review of the open literature describing recent advancements in machining application by using nanofluids. Basically, nanofluids could be beneficial in most of the cryogenic systems, heat transfer, and lubrication applications. Current study summarizes substantial aspects of utilizing novel nanofluids as coolant/lubricant with special focus on their impact on cutting parameters in various machining processes consisting of grinding, turning, milling, and drilling. Application of nanofluid enhances lubricant properties which leads to a high wettability and enables the lubrication process of the cutting zone much better while resulting in minimized frictional force. Therefore, cutting force could be reduced due to the reduction in frictional force. Nanofluid enable the production of the lowest surface roughness due to the inclusion of nanoparticles which boosts up the heat transfer rate and consequently improves the properties of the tool's rake face. Nanofluid prolongs the tool life due to the oil mist and the number of nanoparticles formed on flank face. The formed oil mist and nanoparticles in the cutting zone make possibility to create a film of barrier which eventually decreases the cutting force and tool wear. The application of nanofluids reduces tool wear by removing the heat from the primary shearing zone at faster rate and preventing the work piece hardening. Thus, the cutting tool can sustain longer the hardness of the work piece and prevent the tool wear issues.

**KEYWORDS**
Machining process; Nanofluid; Surface roughness; Tool life; Cutting force

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