

A review on recent development of minimum quantity lubrication for sustainable machining

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ABSTRACT

Achieving sustainable machining is in demand nowadays and it is in line with the rise of global eco-awareness and rigorous regulations by the authorities to prevent from further damaging the environment and its constituents. One of the sustainable solutions extensively explored over the years is machining with minimum quantity lubrication system. Nevertheless, there is still room to improve this system as minimum quantity lubrication assisted machining poses some challenges. This paper provides a review of research articles involving the improvements made to enhance machining performance with minimum quantity lubrication system. To carry out the study, three search databases are used to compile all the minimum quantity lubrication advancements published over a span of 6 most recent years from 2014 to 2019. The machining performance are compiled for each category of advancements: minimum quantity lubrication with additives, minimum quantity lubrication with cooled air/gas as well as restructuring minimum quantity lubrication system and critically considers the experiment details such as workpiece material, machining process, cutting tool material, cooling/lubrication condition, cutting fluid and the output measurements, namely surface roughness, tool wear, cutting force and cutting temperature. Results obtained from the articles mostly show that the minimum quantity lubrication advancements outperform an independent minimum quantity lubrication system by generating better surface quality, providing lower tool wear and cutting force.

KEYWORDS

Sustainability; Minimum quantity lubrication; MQL system; Challenges; Advancements

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