Topic: The role of cutting fluids in machining

Synthesising information from different sources

The following excerpts contain information on the topic of the role of cutting fluids in machining. Read them carefully and:

- **Using information from all excerpts, write a paragraph of 140 words (not less than 110 and not more than 160) discussing the most important features of the role of cutting fluids n machining,**

You must:

- **Use information from all sources.**
- **Cite your sources appropriately.**
- **Paraphrase and summarise appropriately! You must not plagiarise!**

Extract 1

Major environmental hazards in machining operations are due to the use of cutting fluids. Direct exposure of the production worker to these fluids can lead to skin diseases and respiratory disorders and there is also an increased health risks. The cause is attributable to both the original constituents in the fluid and impurities which are introduced or generated during operation. Losses of cutting fluid from the manufacturing process occur through vaporization, loss with chips and work pieces as they leave the machine, loss with machine components such as manipulation and transport devices, as well as losses through vacuum and air pressure systems and through droplet formation and ensuing leakage.
[1] Franchetti, M. J. and Spivak, A., 2013, "Concepts, methods, and strategies for zero-waste in manufacturing," in *Green Manufacturing Processes and Systems*, Davim, J. P. Ed. Berlin Heidelberg: Springer-Verlag, pp. 73-103.

Extract 2

The main aim of all machining operations is to lower machining costs by improving quality and productivity. This aim can be achieved by machining at the highest cutting speed with long tool life, fewest part rejects (scrap) and minimum downtime. Cutting fluids affect the productivity of machining operations, tool life, quality of workpiece and prevent both the cutting tool and the machine from overheating. The proper application of cutting fluid enables higher cutting speeds and higher feed rates. However, a successful cutting fluid must not only improve the machining process performance, but also fulfil a number of health and environmental requirements, such as are non-toxicity, not being harmful to human health, not being fire hazardous, not producing potentially harmful cutting fluid mist when in use and cost less.
[2] Kuram, E. Ozcelik, B. and Demirbas, D., 2013, "Environmentally-friendly machining: Vegetable-based cutting fluids," in *Green Manufacturing Processes and Systems*, Davim, J. P. Ed. Berlin Heidelberg: Springer-Verlag, pp. 23-49.

Extract 3

One of the challenges of dry machining is the concern about increased wear rates in the absence of a cutting fluid, and researchers continue to explore techniques to attenuate these elevated wear rates, one of which is improved cutting tool materials. Certainly, depending on the tolerances associated with the desired output of the machining process, different processes are more suitable for reduction or elimination of cutting fluid. Because of its accessible cutting zone, turning operations have the potential to be performed dry. Sawing and milling also provide excellent opportunities to eliminate cutting fluid use because their interrupted nature ensures short breaking chips, good chip clearance, and cooling of the cutting edges (57). However, hole-making processes like drilling and tapping are often hard to accomplish without some fluid lubricant, since chip removal is a key to process efficiency.
[3] Adler, D. P., Hii, W. W.-S. , Michalek, D. J. and Sutherland, J. W., 2006, "Examining the role of cutting fluids in machining and efforts to address associated environmental/health concerns," *Machining Science and Technology*, **10**, pp. 23–58.