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# Wear analysis of titanium carbonitride in machining high strength steel (KRUPP 6582) using used palm oil as cutting fluid

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**Abstract**

Palm oil is organic and completely harmless to human and the environment. It is a greener alternative to synthetic oil. Moreover, it has good lubrication properties due to its polar nature. Used cooking oil is usually discarded into the drain and contribute to the clogging in the drain and water pollution.

Otherwise, it is ended up in the landfill in a plastic container or plastic bag. Reusing cooking oil is part of circular economy and does to some extent reduce the burden onto the environment. Clean unused palm oil and used palm oil are used as cutting fluid in the machining of high strength steel (KRUPP 6582) using Titanium Carbonitride (TiCN) coated tool in turning process. Analyses on the tool wear, tool life, cutting forces, material removal rate (MRR) and cost are performed. Three different cutting speeds are employed: 194, 245 and 305 m/min with depth-of-cut (0.2 mm) and feed rate (0.1 mm/rev). Used palm oil has shown significant decrease in wear rate by 5.9, 8.8 and 9.5% when machining at 194, 245 and 305 m/min respectively. Using used palm oil has shown increment in tool life and total volume

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