EVALUATION OF NEEM SEED OIL AS A CUTTING FLUID IN ORTHOGONAL MACHINING OF ALUMINUM MANGANESE ALLOY (AL-MN) IN TURNING OPERATION

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ABSTRACT

Neem seed oil was investigated in order to determine its suitability as a cutting fluid. So, the neem seed oil was used as a cutting fluid to machine aluminum manganese alloy 3003 in a centre lathe machine under the following machining (turning) conditions: Spindle Speed (V) was 250, 355 and 500 rpm respectively; depth of cut (d) was 0.5mm, 1.0mm and 1.5mm respectively; the feed rate (f) was 1.05mm/rev, 1.52mm/rev and 2.10mm/rev respectively. Carbide tool insert grade SNMG 120408-QM H13A was used. The results of the neem seed oil in terms of the surface rough, tool wear were compared with that of the soluble oil and 'dry' machining. Based on the obtained results, the neem oil reduced the surface roughness by 39% and 22% when compared to soluble oil and dry machining respectively. The soluble oil reduced the flank tool wear by 24% compared to dry turning. In fact the lowest surface roughness was obtained when the V = 500 rpm, f = 1.05 rev/mm and d = 0.5mm in comparison with soluble oil and dry machining. It has been established from the results that the neem seed oil gave the lowest flank wear at spindle speed of 250rpm, feed rate of 1.05mm/rev and depth of cut of 0.5mm as compared to dry and soluble oil machining. The neem seed oil reduced the flank wear by about 72% and 56% as compared to dry turning and soluble oil cutting respectively, while the soluble oil reduced the flank wear by 36% as compared to dry turning. Therefore, the neem seed oil is not only suitable for cutting fluid, but it is more effective as a cutting fluid than the soluble oil as a cutting fluid.

Keywords: Neem Seed oil, Soluble oil, aluminum manganese alloy, surface roughness, flank wear.