PENGARUH VARIASI SUDUT POTONG UTAMA (*KR)* TERHADAP AUS SISI (*VB*) ALAT POTONG PADAPEMOTONGAN PADUAN ALUMUNIUM 6061 MENGGUNAKAN PAHAT KARBIDA BERLAPIS TITANIUM ALUMINIUM NITRIDA (TIALN)

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ABSTRACT

Metal cutting is a vital process in the manufacturing industry, where Titanium Aluminium Nitride (TiAlN)-coated carbide tools are widely used due to their resistance to heat and wear. One key variable affecting tool performance is the main cutting angle (Kr), which directly influences cutting forces, pressure distribution, and the rate of flank wear (Vb). This study aims to analyze the effect of varying main cutting angles on tool flank wear in the turning process of Aluminium 6061 alloy, identify the wear mechanisms involved, and determine the optimal cutting parameters to minimize tool damage. The research was conducted experimentally using main cutting angles of 50°, 60°, 70°, and 80° at two spindle speeds, 1600 rpm and 1120 rpm. The turning process was carried out on a conventional lathe using (TiAlN)-coated carbide tools (GC1005 type), with a cutting depth of 1.5 mm and a feed rate of 0.2 mm/rev. Flank wear was measured visually using a USB Digital Microscope, and the data were analyzed to compare wear levels for each variation. The results show that the main cutting angle significantly affects the rate of flank wear. The 50° cutting angle at 1600 rpm produced the lowest wear, with an average value of 0.05 mm, while the 80° cutting angle resulted in the highest wear. The dominant wear mechanism observed was flank wear caused by repeated friction between the tool flank and the workpiece surface, accompanied by signs of abrasive wear. The optimal cutting condition to minimize wear was found at a 50° cutting angle, 1.5 mm depth of cut, 0.2 mm/rev feed rate, and 1600 rpm spindle speed.

Keywords: Main cutting angle, flank wear (Vb), carbide tool (TiAlN), Aluminium 6061, turning process.