# AN EXPERIMENTAL INVESTIGATION OF TiCN TOOL LIFE AND TOOL WEAR IN TURNING OF TITANIUM

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'In the name of Allah, the Most Gracious, the Most Merciful'

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## ABSTRACT

Coated cutting tools have been successfully used in the turning of Titanium alloys. Since the demand of titanium is extremely high, many studies in machining, especially turning had been conducted. In this work, the tool life and tool wear of the coated cutting tool inserts using titanium carbon nitride (TiCN) is investigated in turning of titanium alloy under dry cutting condition. The study is focused on the machining parameters which are feed rate (*f*), cutting speed (*N*) and the depth of cut (*d*). Turning experiments were conducted at rotational cutting speeds of 125, 140 and 185 rev/min on the workpiece of Ti-6Al-4V using TiCN cutting tool inserts. The depth of cut and feed rate were remained constant at 0.2 mm and 0.15 mm/rev, respectively. The cutting tools undergo 30 times turning process in a length of 200 mm per cycle at three different cutting speeds. The tool life was calculated using Taylor's equation and surface roughness of the workpiece was measured using portable Surface Roughness. The wear mechanism was examined using Scanning Electron Microscope (SEM). The tool life is decreased dramatically while the tool wear and surface roughness of the workpiece increased as the rotational cutting speeds increased. The increasing of the average roughness illustrates the low quality of the surface finish. The wear mechanism acting on the tools were found to be flank wear and crater wear. It was found that diffusion of carbon between the cutting tool and workpiece material occurred during the machining.

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