

OPTIMIZATION OF CUTTING SPEED AND DEPTH OF CUT TO INCREASE THE EFFICIENCY OF THE THREAD MANUFACTURING PROCESS ON CNC LATHE MACHINE

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ABSTRACT

The demands of the efficiency of the production process in the industry indirectly have implications for the world of education, especially schools that prepare graduates to work in industry. The world of education is also encouraged to provide efficient manufacturing learning. Students who are prepared to enter the world of work must be familiarized with real experience implementing their knowledge to improve machining efficiency.

This study aims to: (1) measure wear and determine the type of wear of the MMT16ERA60-S type carbide tool from several variations of depth and cutting speed for turning threads made of S45C carbon steel, (2) measure the average value of the surface arithmetic roughness of threads made of S45C carbon steel in several ways. variations in depth and cutting speed, (3) measuring the turning time of threads made of S45C carbon steel from several variations of depth and cutting speed, (4) analyzing the most optimal cutting speed and depth of cut in producing low tool wear, low surface arithmetic roughness values minimum, and the fastest time to turn S45C carbon steel threads with MMT16ERA60-S type carbide chisels.

The research used experimental method. The tool used for making CNC programs is MasterCAM X7 software. The tool for turning threads was the Feeler brand Fanuc Series Oi Mate-TD CNC Lathe, Mitsubishi M70 control with operation according to Fanuc standards. Threading process used carbide tool with the Mitsubishi brand type MMT16ERAG60-EDP:262182. The material used was S45C carbon steel with a size of 38.1 mm x 125 mm. The research instruments included: 0.05 mm accuracy vernier caliper, 600x - 1000x digital microscope, and a surface roughness comparison tool. Data analysis was carried out by comparing the cutting results of 15 cutting treatments which included thread roughness, type of wear, dimensions of wear and machining time.

The results showed that the process of turning threads made of S45C carbon steel with a carbide chisel type MMT16ERA60-S in order to produce the lowest tool wear, the lowest average value of surface arithmetic roughness, and the fastest time, it is necessary to use a cutting speed of 141.3 m/min and depth of cut is 0.5 mm.

Kata Kunci: *turning, CNC, thread, optimization, machining, carbide, S45C.*