

***THE EFFECT OF TOOL RAKE ANGLE VARIATION ON
CUTTING FORCE AND CUTTING TEMPERATURE IN
THE TURNING PROCESS OF MEDIUM
CARBON STEEL (S45C)***

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ABSTRACT

The turning process is one of the most widely used machining processes in the manufacturing industry to produce cylindrical components with good dimensional accuracy and surface quality. During the turning process, the interaction between the cutting tool and the workpiece generates cutting forces and cutting temperatures, which significantly affect tool life, machining quality, and process efficiency. One of the important factors influencing cutting force and cutting temperature is the tool rake angle. This study aims to analyze the effect of tool rake angle variation on cutting force and cutting temperature in the turning process of medium carbon steel (S45C). The research was conducted experimentally using a conventional lathe machine and a High Speed Steel (HSS) cutting tool. The rake angle variations used in this study were 0°, 12°, and 22°, while other machining parameters were kept constant. Cutting temperature was measured using an infrared thermometer, whereas cutting force was determined based on machining parameters. The experimental data were analyzed using descriptive statistical methods to identify trends in the effect of rake angle variation on cutting.

Keywords: *Turning, tool rake angle, cutting force, cutting temperature, medium carbon steel (S45C).*