

## EFFECT OF VARIATION OF SULPHUR AND PHOSPHOROUS ON THE MACHINING CHARACTERISTICS OF C45 CARBON STEEL

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### ABSTRACT

*The effects of increase in trace elements like sulphur and phosphorus in C45 medium carbon steel on the machining characteristics have been investigated. C45 steel is categorised as medium carbon steel having 0.40% to 0.50% of carbon and trace amounts of elements like Sulphur, Phosphorus, Nickel and Molybdenum in it. This particular steel is used to manufacture tools, shafts, nuts and bolts, connecting rods and rollers etc. In this work, comparison was made between two different samples of specific varying percentages of Sulphur and Phosphorus. The round bars were machined with different cutting speed (11.0m/min, 15.58m/min and 19.47m/min), varying feed rate (0.125mm/min, 0.175mm/min and 0.225mm/min) and depth of cut (0.5mm, 1mm and 1.5mm) using uncoated tungsten carbide tool inserts. Surface finish, tool flank wear, forces acting while cutting, material removal rate and temperature of tool tip were analysed and compared with two different samples of specific varying percentages of sulphur and phosphorus. Results showed that material with higher percentage of trace elements of sulphur and phosphorous has better machining properties and hence these traces within a minimum quantity give better results. In additional, tool and work sample were analysed using SEM & Energy Dispersive X-Ray Analysis for material behaviour and effect on its properties.*

**KEYWORDS:** Carbon Steel, Machining, Surface Roughness, Tool Wear & Temperature of Tool Tip