Progressive Tool Flank Wear and Surface Roughness When Turning AISI 1017 Mild Steel Using Reduced Thickness Inserts in Finishing Cutting Conditions

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Abstract. Tool wear is a major aspect in metal cutting, especially during steel machining. This studies the capability of 1 mm thick uncoated tungsten carbide insert during the turning of AISI 1017 mild steel. The reduction of insert thickness will lead to a more economical and efficient use of material and energy during fabrication, operation, and disposal of the cutting insert. Axial machining trials have been performed using the finishing cutting conditions. Tool flank wear and workpiece surface roughness were analysed using an optical microscope and contact perthometer device, respectively. The data of flank wear and surface roughness achieved were used to analyse the capability of replacing 4 mm thick cutting inserts with 1 mm thick cutting inserts. The results showed that the flank wear and the surface roughness of conventional inserts performed better as compared to the 1 mm thick insert with a significant difference of 5.74 % and 1.57 %. Thus, the experimental study shows that the 1 mm thick insert performed as good as a conventional cutting insert in terms of tool life and surface roughness quality.