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Machining performance of carbide insert in turning aluminum alloy 7075-T651
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Abstract
Aluminium alloys are commonly used in the aerospace, automobile and electricity transmission industries due to its excellent strength to low weight ratio. The demand of high accuracy machining in the market today has made the optimizing of the machining parameters an important aspect of machining. Aluminium alloy Al7075-T651 is a ductile material. In continuous machining operation like turning, high amount of friction and heat is generated. This may cause the workpiece's material to adhere to the rake face of the cutting insert and lead to the built-up edge (BUE) formation. This BUE will detach and adhere to the chips in a way the surface roughness of the workpiece would be affected. This project is focusing on the machinability of aluminum alloy Al7075-T651 by measuring the performance of KW10 uncoated carbide cutting tool in terms of flank wear, surface roughness of the machined surface, wear mechanism and volume of material removed. The turning experiment was conducted in dry condition. The cutting speed range was 250 and 450 m/min whereas the feed rate range was 0.05 and 0.15 mm/rev. The depth of cut was kept constant at 1 mm. The results showed that the higher cutting speed and feed rate produced higher flank wear progression and higher surface roughness reading (Ra). The adhesive and abrasive wear can be seen through the SEM for all sets of parameters. It was identified that higher cutting parameters removed higher amounts of volume material with shorter tool life. © 2023 Author(s).

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