Aerospace Technical Paper

Evaluation of Coated and Uncoated Inserts of the Cutting Tool for Improved Machinability of Inconel 825 Alloy

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Abstract

The limitations of commonly used materials such as steel in withstanding high temperatures led to exploring alternative alloys. For instance, Inconel 825 is a nickel-based alloy known for its exceptional corrosion resistance. Thus, the Inconel 825 is used in various applications, including aerospace, marine propulsion, and missiles. Though it has many advantages, machining this alloy at high temperatures could be challenging due to its inadequate heat conductivity, increased strain hardening propensity, and extreme dynamic shear strength. The resultant hardened chips generated during high-speed machining exhibit elevated temperatures, leading to tool wear and surface damage, extending into the subsurface. This work investigated the influence of varying process settings on the machinability of Inconel 825 metal, using both uncoated and coated tools. Optimal surface roughness (Ra) machining conditions were found by considering factors such as depth of cut, cutting speed, feed rate, and other parameters. The major objective of the present work was to enhance the machinability of Inconel 825 by considering the surface finish values. The results revealed that the favorable surface roughness (SR) values for machining Inconel 825 in an automated lathe were attained under lubricated coated conditions with a cutting speed of 100 m/min, feed rate of 0.06 mm/rev, and cutting depth of 0.7 mm.

Meta Tags

Topics

Coatings, colorants, and finishes Cutting Machining processes Automation Nickel alloys Materials properties Corrosion resistant alloys

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