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HOT MACHINING IN END MILLING OF AISI D2 HARDENED STEEL

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Abstract

A study was performed to investigate the performance of coated carbide inserts in end milling of AISI D2 hardened steel (60-62 HRC), under room temperature and workpiece preheated conditions. The effects of cutting conditions on tool wear morphology and machined surface finish were also investigated. Tests on end milling were conducted on a vertical machining Centre (VMC) to ascertain the relative advantages and drawbacks of applying workpiece preheating in the process of machining using induction heating. Preheating of the work material with higher heating temperatures (250-450 0C) gives significant improvement in terms of maximum tool wear. Average uniform wear at the flank surface is found to be lower in the case of preheated machining of 335 0C and 450 0C temperature. Abrasive wear, notch wear and diffusion wear are found to be a very prominent mechanism of tool wear. It has been observed that preheated machining of the material leads to surface roughness values well below 0.4 µm, such that the operations of grinding as well as polishing can be avoided at the higher cutting speeds.

KEYWORDS: Hot machining, Hardened steels, Tool wear and Surface roughness

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