

The effect of air in the machining of aluminium alloy

Abstract

Aluminium 2014A workpieces subjected to various heat treatment conditions have been machined at low speeds (up to 0.1 m/s) with conventional high speed steel (HSS) tools under controlled atmospheres. It was found that precipitation heat treating the alloy could result in (i) the formation of chips with greater ability to curl away from the rake face, leading to a reduction in the frictional force and a change in the friction condition at the chip-tool interface, and (ii) an increase in the adhesion between the cutting tool and the chip; in such circumstances, air became increasingly important in reducing the adhesion at the chip-tool interface. The results obtained in the machining of this alloy in pure oxygen suggest that oxygen in air plays an important role in reducing the adhesion at the chip-tool interface. These results are in contrast to previous findings where, in machining of non-ferrous materials, air was found to increase the gross adhesion and cutting forces.