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Determination of the Interfacial Heat Transfer Coefficient for a Hot Aluminium Stamping Process

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Abstract

The interfacial heat transfer coefficient (IHTC) is an important thermophysical parameter in hot stamping processes and must be identified not only to retain the full mechanical strength of formed components, but also to optimise the production rate. In this work, a novel experimental facility was developed and applied to measure the temperature evolutions of the specimens and tools in stamping processes. Simulated temperature evolutions obtained using the FE software PAM-STAMP were then fit to this data. The IHTC values between AA7075 and three different tool materials were characterized at different contact pressures under both dry and lubricated conditions. In addition, a mechanism based IHTC model was developed and validated as a function of contact pressure, tool material and lubricant thickness to predict the IHTC values under different conditions.

Keywords: Interfacial heat transfer coefficient (IHTC); hot aluminum stamping; AA7075; IHTC test facility

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