Evolution of mechanical behavior of aluminum alloy al 7075 during maturation time

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Abstrak

The Aluminum 7075 (Al 7075) alloy is a precipitation hardening material instead of a strain hardening material. These mechanical properties are of a particular microstructure obtained by thermo-mechanical treatments. Among other things, this is a complicated microstructure which is responsible for the mechanical performance. The evolution of the mechanical properties of aluminum alloys is dependent on aging time parameters after heat treatment. In this study, the material has undergone a tempering heat treatment followed by a series of tensile tests. The experimental data (tensile curves in three directions during maturation time) is used to describe the evolution of the mechanical characteristics in terms of loading directions and maturation time, denoted respectively as: ? and t. The tensile curves are the source of data to begin the problem of identifying the behavior law of studied material using Barlat’s model and Hollomon’s isotropic hardening law. Thus, from the identified parameters (anisotropy coefficients and hardening coefficients), the evolution of the Lankford coefficient, deformation rate and load surfaces during the maturation time for three load directions (0°: rolling direction, 45° and 90°) are described. This study allows optimizing the response of the aluminum alloy to plastic strains, resulting from forming processes measured against the best time during maturation and the best load direction.