


Abstract

On the Influence of Lead in the Hot Workability of Brass Alloys [†]

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Abstract: The increasing concern in the mitigation of lead exposure to the human body has given rise to international regulations that limit its content in raw materials. For the particular case of brass alloys, lead-free chemical compositions have been developed as more ecologically appropriate solutions. The absence of lead is generally unfavorable when it comes to the well-known fabrication ease of brass alloys. Such a fact, allied with the novelty and thus lack of data regarding these alloys, brings to focus the need for material characterization. In this study, the hot workability of two brass alloys, with 3% (CW617N) and without lead content (CW510L), is investigated. Compression tests at high temperatures and variable strain rates were performed, allowing for flow stress identification in similar-to-manufacturing conditions. The higher mechanical strength of the lead-free brass results in significantly larger press loads, hindering one-step forging operations. These have been numerically modeled and simulated for different operative conditions, thus aiding in the definition of industrial process parameters, namely in what concerns billet size and die-filling defect minimization.

Keywords: hot forging; brass alloys; numerical simulation



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