

Solution Heat Treatment and Cold Die Quenching in Forming AA 6xxx Sheet Components: Feasibility Study

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Keywords: aluminium, heat treatment, quench-forming

Abstract. To overcome the major problems in forming aluminium sheet components, such as springback, low formability and microstructure variation a novel process is proposed in this paper. That is combined Solution Heat Treatment (SHT) hot stamping followed by cold die quenching. To determine the feasibility of such process a series of thermal-mechanical tests have been designed and carried out on aluminium alloy AA6082. Three aspects of the forming process are investigated and represented in the paper. The first is to investigate the effects of SHT proportions on the mechanical properties of the material. The second is the effects of quenching rates on the mechanical properties after SHT. The third is the effect of predeformation after the SHT and the quenching rate on the mechanical properties of the formed parts. Summaries are given for each aspect of the study. These tests are to investigate the effects of Solution Heat Treatment time proportion. Variables are also introduced during the cold die quenching, including clearance between the testpiece and dies as well as the applied load. Finally the relationship between quench rate and predeformation is investigated.