

Bachelorthesis

Topic: Precipitation process in Al-Mg-Si-Mn casting alloys as the origin of its high mechanical properties

Start: asap

Description: Higher mechanical properties are required for the Al alloys due to its wide application in the highly technological fields (automotive, marine, aerospace, chemical and other industries).

Particular interest in heat treatable Al-Mg-Si aluminum alloys is due to the ability to modify solid solution and thereby improve mechanical properties. The hardening effects arise as a result of interacting dislocations with the precipitates, which act as obstacles to the dislocation motion.

Generally, transition elements (such as Sc, Cr, Zr), in Al alloys form precipitates or crystallize as intermetallic compounds because of their poor solubility in aluminum. Therefore small addition of transition elements has large influence on the properties of Al alloys. In contrast to the listed elements, Zn has a high solubility in aluminum. Also, together with Mg, zinc is able to form hardening nanoscale precipitates (Zn_2Mg) in aluminum matrix.

However, simultaneous modifications of chemical composition and heat-treatment and their effect on the mechanical properties of Al-Mg-Si alloys have not yet been investigated.

The main task of the paper is to elucidate influence of Cr, Sc and their combination on the mechanical properties and structure of Al-Mg-Si-Mn alloys.

This investigation is performed through an examination of microstructural properties, including chemical composition at the micro-scale, as well as measurements of mechanical properties.

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