

The effect of application of the plaster as a mould material on the microstructure and properties of AlSi9 aluminium alloy

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Abstract:

The study involved examination of the effect of mould material on the microstructure and mechanical properties of AlSi9 aluminium alloy castings. The castings were fabricated in: plaster-based moulds, dehydrated plaster-based moulds and steel mould. The structure of castings from plaster mould not subjected to dehydration process was characterized by significant porosity. This results indicated that as-cast plaster mould is not suitable for casting of AlSi9. Dehydrating of the mould led to significant reduction in the number of pores in the casting, small porosity was observed only locally in middle region of casting. No pores were observed in the structure of steel mould castings. Microstructure of dehydrated plaster mould castings and steel mould castings was analysed in a Scanning Electron Microscope. Both types of examined castings were characterized by typical microstructure containing a eutectic (α -Al and Si) with dendrites of α -Al and multicomponent phases locally distributed in the matrix. Mould material affected the size of microstructural constituents of observed specimens. Castings fabricated in steel mould showed considerable refinement of the eutectic and dendrites of α -Al in comparison with dehydrated plaster castings. Castings from dehydrated plaster mould had lower strength and smaller elongation than steel mould castings.

Key words:

Aluminium alloy, casting, mold, microstructure, mechanical properties, plaster