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"Wrought Al – cast Al compound casting based on zincate treatment for aluminum wrought alloy inserts"

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ABSTRACT

The surface properties of solid inserts are critical to the development of a reaction zone in compound castings. In contrast to prior works (based on Al99.5) the goal of this paper is to apply the zincate treatment to different aluminum wrought alloys. This enables the possibility to create compound structures with enhanced mechanical properties. During zincate treatment the aluminum oxide layers are dissolved and a thin layer of zinc (< 500 nm) prevents reoxidation. Coating parameters are optimized especially for compound castings: maximum coverage of the surface and high coating adhesion implemented by double zincate treatment. The pretreated inserts are embedded in an aluminum component by high pressure die casting. A sound metallic bonding between both aluminum alloys develops due to diffusion and reaction zones. Mechanical tests confirm a sound metallic bonding. Depending on the integrated wrought alloy enhanced mechanical properties of the compound structure can be achieved. Microprobe and fracture analysis provide detailed information about the