Structure and Mechanical Properties of Mg-Based Alloys for Elevated Temperature Applications

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Magnesium alloys are progressive light-weight materials with a great potential in automotive and aerospace applications in which they enable significant weight and fuel savings. However, the main drawback of the most widely used AZ type magnesium alloys (Mg-Al-Zn) is a very poor thermal stability. The AZ alloys cannot be applied in components exposed to temperatures exceeding 120°C, because of a rapid drop of mechanical characteristics at above this temperature. There are two approaches to improve the thermal stability of Mg alloys. The first one consists in alloying with rare earth metals and the second one involves simoultaneous additives of aluminium and alkaline earth metals (Ca, Sr). In the present study, microstructures, mechanical properties and thermal stability are characterized for advanced commercial Mg alloys, WE43 (MgY4Nd2RE1Zr) and AJ62 (MgAl6Sr2) developed for elevated temperature applications. It is semonstrated that thermal stability of both kinds of alloys significantly exceeds that of the commercial casting AZ91 (MgAl9Zn1) alloy.

Keywords: Magnesium, Mechanical Properties, Thermal Stability

Acknowledgement

Authors would like to thank the Czech Science Foundation (project no. P108/12/G043) for the financial support of this research.

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Paper number: M201491