

Effect of Be, Zr, and Heat Treatment on Mechanical Behavior of Cast Al-Mg-Zn-Cu Alloys (7075)

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Abstract : The present study was undertaken to investigate the effect of aging parameters (time and temperature) on the mechanical properties of Be-and/or Zr- treated Al-Mg-Zn (7075) alloys. Ultimate tensile strength, 0.5% offset yield strength and % elongation measurements were carried out on specimens prepared from cast and heat treated 7075 alloys containing Be and/or Zr. Different aging treatment were carried out for the as solution treated (SHT) specimens. The specimens were aged at different conditions; Natural and artificial aging was carried out at room temperature, 120C, 150C, 180C and 220C for different periods of time. Duplex aging was performed for SHT conditions (pre-aged at different time and temperature followed by high temperature aging). Ultimate tensile strength, yield strength and % elongation data results as a function of different aging parameters are analysed. A statistical design of experiments (DOE) approach using fractional factorial design is applied to acquire an understanding of the effects of these variables and their interactions on the mechanical properties of Be- and/or Zr- treated 7075 alloys. Mathematical models are developed to relate the alloy mechanical properties with the different aging parameters.

Keywords : casting aging treatment, mechanical properties, Al-Mg-Zn alloys, Be- and/or Zr-treatment, experimental correlation

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