

## Potentiodynamic Polarization Behavior of Surface Mechanical Attrition Treated AA7075

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**Abstract :** Aluminium alloy 7075 consist of different intermetallic precipitate particles  $MgZn_2$ ,  $CuAl_2$ , which result in heterogeneity of micro structure and influence the corrosion properties of the alloy. Artificial ageing was found to enhance the strength properties, but highly susceptible to stress-corrosion cracking. Various conventional surface modification techniques are developed for improving corrosion properties of aluminum alloys. This led to development of novel surface mechanical attrition treatment (SMAT) technique the so called ultrasonic shot peening which gives nano-grain structure at surface. In the present investigation the influence of surface mechanical attrition treatment on corrosion behavior of aluminum alloy 7075 was studied in 3.5wt% NaCl solution. Two different size of 1 mm and 3 mm steel balls are used as peening media and SMAT was carried out for different time intervals 5, 15 and 30 minutes. Surface nano-grains/nano-crystallization was observed after SMAT. The formation of nano-grain structure was observed for larger size balls with time of treatment and consequent increase in micro strain. As-SMATed sample with 1 mm balls exhibits better corrosion resistance as compared to that of un-SMATed sample. The enhancement in corrosion resistance may be due to formation of surface nano-grain structure which reduced the electron release rate. In contrast the samples treated with 3 mm balls showed very poor corrosion resistance. A decrease in corrosion resistance was observed with increase in the time of peening. The decrease in corrosion resistance in the shotpeened samples with larger diameter balls may due to increase in microstrain and defect density.

**Keywords :** aluminum alloy 7075, corrosion, SMAT, ultrasonic shot peening, surface nano-grains

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