

# **Microstructure, tensile and stress corrosion cracking studies on precipitation hardened AA7xxx (Al-12Zn-3Mg-2.5Cu) alloy**

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## **Abstract**

In the present investigation, squeeze casting process was used to produce Al-12Zn-3Mg-2.5Cu alloy. Squeeze cast Al-12Zn-3Mg-2.5Cu alloy reveals distribution of both soluble and insoluble intermetallic compounds in the  $\alpha$ -aluminium matrix. In order to improve the mechanical properties and condition the microstructural features, precipitation hardening (solutionizing and ageing) treatment was carried out by keeping temperature and time as variable. Ageing treatment was carried out at two different temperatures viz. 120°C and 160°C with varying time interval. Detailed microscopic analysis was done using optical and electron microscopy (SEM and TEM) to understand the phase and structural evolution during ageing. Tensile and hardness studies were carried out on the aged alloys. Stress corrosion cracking studies was conducted as per standard using proof rings. There is a greater increment in strength and hardness at different precipitation conditions. Evolution of coherent / semi-coherent precipitates and their morphology were studied using transmission electron microscope. There are precipitate free zones near the grain boundaries and around insoluble intermetallic compounds. The aged alloy exhibits good stress corrosion resistance than other conditions.

**Keywords:** Al-12Zn-3Mg-2.5Cu alloys, Squeeze casting, Precipitation hardening, Coherent precipitate, Precipitate free zone, and Stress corrosion cracking.