

## **The role of direct chilling, retrogression and reaging treatment on mechanical properties of high strength aluminum alloy**

### **Abstract**

The effect of retrogression and reaging heat treatment on microstructure evolution and mechanical properties of 7075 Al alloy in direct chilling casting process was investigated. The subsequent heat treatment process comprised pre-aging at 120°C for 24 h, retrogression at 180°C for 30 min, and then reaging at 120°C for 24 h. By this three-step process, the mechanical properties of the chilled casted samples were substantially improved. The samples retain their high strength at T6 level. They gave yield strength up to 290 MPa, ultimate tensile strength of 386 MPa and elongation of 5.9%. The average value of multiple Vickers hardness tests results were in the range of 210 Hv. The direct chilling process followed by retrogression and reaging heat treatment yielded casts of fine and uniform microstructure as opposed to the microstructure of samples casted by the conventional process.

**Keywords** — Aluminum alloys 7XXX, direct chill casting, mechanical properties, microstructure, re-aging, retrogression