

## **Experimental investigation of formability of Al/Mg/Al strips fabricated via cold roll bonding process**

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**Abstract:** Cold roll bonding (CRB) process is a method for production of multi-layered sheets with same and dissimilar

materials that, in the past decade has been attracted the attention of many researchers. In the present study, formability of Al/Mg/Al composite which was fabricated by the CRB process was investigated using the Nakazima test and forming limit diagram (FLD). Also, mechanical properties were studied by carried out uniaxial tensile test and microhardness test. Tensile fracture surfaces were demonstrated by scanning electron microscope (SEM) to define the fracture mode. The Al/Mg/Al composite was fabricated using a rolling machine, and a thickness reduction of %70 was applied at room temperature and without lubricant. It was observed that a good bonding between the Al/Mg layers fabricated via CRB process. The strength and microhardness increased, and elongation and formability decreased compared to the original strip due to strain hardening and cold work. The Al/Mg/Al composite prepared via CRB process was annealed to reduce the work hardening and create the stronger bonding between Al and Mg layers. Annealing and cooling were done in the furnace at 300°C for 60 min and in the air at ambient temperature, respectively. Finally, the value of microhardness of Al and Mg layers reached to 98.8HV and 91.6HV, respectively. The strength value was about 1.73 and 1.84 times higher than that of the primary aluminum and magnesium sheets, respectively. Also, results of SEM demonstrated that dimples shallower and smaller than the initial sample.

**Keywords:** CRB, Al/Mg/Al, FLD, SEM, mechanical properties