

Brief write-up on S&T (Mines) completed projects

Project Title: Developing downstream applications of strip cast aluminium alloys.

File No: F. No. 14/35/2015-Met-IV dated 04/02/2016

Objective:

Develop processing parameters to develop microstructure/texture suitable for increasing the formability by optimizing the thermo-mechanical processing (continuous casting, cold rolling, annealing) and to improve the surface characteristics by anodizing.

Background:

The demand for aluminium alloys has been continuously increasing in automotive, appliance and food industries owing to their light weight and good corrosion resistance. For instance, the use of aluminium sheet material for typical automobile body parts could provide a mass reduction of up to 50 percent as compared to current steel construction. This could result in overall reduction of the vehicle and correspondingly fuel consumption. However, despite having high strength to weight ratio aluminium and its alloys are lagging far behind as compared to steel because of their poor formability at room temperature (approximately 2/3 of that of steel).

Improvement of formability is of special interest for the automotive, appliance and food industries, where weight reduction is compulsory and panels to be formed have intricate shapes. In this regard the above project was undertaken to develop microstructure/texture suitable for increasing the formability to improve the surface characteristics by anodizing for developing downstream application for strip cast aluminium alloys.

Outcome:

- The deformation and recrystallization behavior of strip-cast AA8011 alloy was studied and optimized. Based on microstructure and texture, a deformation-time-temperature combination was found out, where the formability of the sheet metal was maximum.
- The sheets supplied by NALCO were characterized for microstructure and texture. Optimum clamping force was found out for different thicknesses. Annealing at 450°C for 1h followed by microstructure/texture characterization, deep drawing tests and stretching tests revealed that the annealed sheets had higher formability due to increased grain size and softness of the material.
- Relationship between coating thickness and time was prepared for different thicknesses of sheets, which can be used to impart a specific thickness to the sheet metal.
- Successful lab scale trails were taken for preparing sample number plates.



- The findings shall be taken up with the industry for industrial applications.