



*Proceedings of Iran International Aluminium Conference (IIAC2018)  
April 24-25, 2018, Tehran, I.R. Iran*

## **Heat transfer experimental and numerical analysis on HAZ for outside corner joint welded of Aluminium 5083-H111sheet**

Arash Honaryar, Mehdi Iranmanesh\*

Faculty of Marine Technology, Amirkabir University of Technology, Hafez Avenue, Tehran, P.O. Box: 15875- 4413, Iran

**Abstract:** gsten arc welding induced heat affected zone (HAZ) for outside corner joint aluminium sheet with application in aluminium marine structures are presented. The outside corner joint of 5083 aluminium alloy sheet specimen with angle of 70 degrees joint was conducted using practical method under actual welding condition. A three-dimensional modelling based on Finite Element Method (FEM) is used to compute heat flux and temperature field. A mobile heat source was made according to experimental results. Size and distribution of heat source input, thermal properties dependent on temperature, and surface heat losses by convection were considered. The results of numerical simulation were verified using metallographic observations of fusion penetration criteria in the base metal, and show good agreement with experiments by applying Gaussian distribution to model mobile heat source. The width of HAZ was computed in two different speeds and results show that the width of HAZ is decreased by 12% when welding speed is increased by 33%. Also observation of weld pool cross section indicates importance of cleaning the joint zone before starting the welding process, because crack existing in the root of weld due to lack of cleaning was resulted.

**Keywords:** Aluminium 5083 sheet, Gas-tungsten arc welding, outside corner joint, heat affected zone, finite element analysis.