

SPC7. Diffusible Hydrogen Reduction in Steel Weldments

*Justin Chandler, Center for Welding, Joining, and Coatings Research -
Colorado School of Mines*

Introduction

The presence of diffusible hydrogen in steel weldments can be reduced through the addition of fluorides in the flux. In this research, the two methods have been combined and their activity in the arc is studied through use of a spectrometer. Correlations between arc activity during FCAW deposition and diffusible hydrogen in the steel weldment were used to determine the optimal flux composition for a FCAW consumable to be used in high strength steel welding.

Technical Approach & Results

Compared with GTAW arcs, the spectroscopic investigation of an FCAW is far more complicated because of the presence of molten metal droplets, metal vapor, and molten flux in the arc. These were observed and related to arc emission characteristics. Initial analysis also used GMAW to compare the effect of fluoride addition under various shielding gases.

Conclusions

Spectroscopic analysis of FCAW processes during deposition was utilized to correlate hydrogen activity in the arc to diffusible hydrogen levels in steel weldments. Spectroscopic data was collected for various FCAW consumables with flux additions of fluoride to determine the optimal flux composition for reduction of diffusible hydrogen. The optimal flux composition was then incorporated into a FCAW consumable for use in high strength steel welding.