SPA3. Prediction And Measurement Of Ferrite Content In Stainless Steel Weldments

Robert Lee Hall, North Harris College

Introduction

It has been generally known for a number of years that small amounts of ferrite have been helpful in reducing cracking tendencies in austenitic stainless steel weld deposits. This poster will demonstrate the control of ferrite content by means of prediction and measurement. Through this control of ferrite, the weldability, corrosion resistance, and mechanical properties will be enhanced.

Technical Approach & Results

The prediction of ferrite content will be demonstrated through four well known constitution diagrams. These diagrams are similar to one another in that they all utilize a list of nickel equivalents (Austenite formers) on the vertical scale, and chrome equivalents (Ferrite formers) on the horizontal scale. They differ from one another in the number and type of elements considered, the individual weight given to those elements, and their applicability to a particular alloy.

Two common devices used in the measurement of ferrite content in weld deposits will be illustrated. These instruments are the Magne Gage and the Severn Gage, and both rely on the measured attraction of a magnetic source of known strength to the material in question.

The term “Ferrite Number” will be explained, along with the approximate relationship of FN (ferrite number) to percent ferrite. It will also illustrate the maximum, minimum, and desired levels of ferrite.

Conclusions

The composition diagrams may be used to predict ferrite content and have the advantage of “up-front” (primary) control over deposit metallurgy. Care should be taken to use the diagram most appropriate to the alloy in question.

Measurement techniques allow for retroactive control over ferrite content, and therefore are considered to be a secondary check on predictive methods.

The ideal range of ferrite content is shown to be from 4FN to 12 FN (approximately 4 to 11 percent ferrite).