

Development of High Strength Filler Consumables by Means of Calculations and Microstructural Characterization

Authors : S. Holly, R. Schnitzer, P. Haslberger, D. Zügner

Abstract : The development of new filler consumables necessitates a high effort regarding samples and experiments to achieve the required mechanical properties and chemistry. In the scope of the development of a metal-cored wire with the target tensile strength of 1150 MPa and acceptable impact toughness, thermodynamic and kinetic calculations via MatCalc were used to reduce the experimental work and the resources required. Micro alloying elements were used to reach the high strength as an alternative approach compared to the conventional solid solution hardening. In order to understand the influence of different micro alloying elements in more detail, the influence of different elements on the precipitation behavior in the weld metal was evaluated. Investigations of the microstructure were made via atom probe and EBSD to understand the effect of micro alloying elements. The calculated results are in accordance with the results obtained by experiments and can be explained by the microstructural investigations. On the example of aluminium, the approach is exemplified and clarifies the efficient way of development.

Keywords : alloy development, high strength steel, MatCalc, metal-cored wire

Conference Title : ICSRD 2020 : International Conference on Scientific Research and Development

Conference Location : Chicago, United States

Conference Dates : December 12-13, 2020