Modeling and Prediction of Welded Joints Lifetimes by GMAW Process Using Support Vector Regression

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Abstract: Accelerated life testing is a technique that is widely used to get timely reliability information on materials, components, and systems. The regression classic models related to accelerate testing have been developed during the last years. Commonly, these models are used to make inference and reliability analysis about systems due to its characteristics. However, support vector regression (SVR) is a powerful method for modelling complex welding engineering process. SVR offers the advantage of fast calibration and it is possible to make accurately predictions about fatigue of welded joints. The prediction rates for classic models are compared with SVR using different loss functions. This method achieves better overall performance than robust regression in measures such as R^2. Fatigue testing data of welded joints by Gas Metal Arc Welding (GMAW) process are used, the Huber loss function gave the best results. In order to predict lifetimes of welded joints and these could be used to establish the warranty time.

Keywords: GMAW, Fatigue, Accelerated Life Test, Reliability, Goodness of Fit Test, Support Vector Regression