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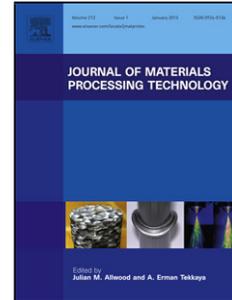
Welding quality monitoring of high frequency straight seam pipe based on image feature

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Abstract: Weld surface images were collected using a machine vision technique, and the geometry and texture features of the images were extracted by MATLAB software. Welding quality was determined by a weighted weld strength, elongation, impact energy and bending angle. A relationship between the welding quality and the image features was established. Experimental results indicate that the welding quality can be described quantitatively by such image features as the defect perimeter, invariant moment of IM_1, IM_7, IM_5, IM_4 and rectangular degree, and a BP neural network model can be used to monitor the welding quality online.

Keywords: welding quality; image feature; BP neural network model; online monitoring

1. Introduction

High frequency straight seam pipe is produced by bending a steel strip into a pipe billet, heating the two edges of the pipe billet to welding temperature under skin and proximity effects of high frequency current, and fusing and welding the edges with the action of pressure. It is gradually replacing seamless pipe in many application fields because of its low price and the development of production technology. Straight seam pipe has a weld line compared with a seamless one. Its performance depends largely on the welding quality. According to Jingxue (2011) and Zhiqiang et al.(2012), it is the most critical problem to ensure the welding quality during production of the welded pipe.