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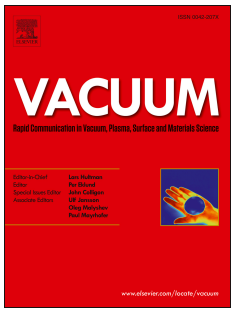

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Analysis of Cracks in the Electron Beam Welded Joint of K465 Nickel-Base Superalloy

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Abstract: The weldability of K465 nickel-based superalloy by electron beam weld (EBW) was studied, and the microstructural evolution and cracking characteristics were also investigated. The microstructure of fusion zone (FZ) were mainly γ dendrite, Chinese-script MC carbides, the interdendritic γ/γ′ eutectic and fine γ′ particles precipitated from dendritic and interdendritic region. The solidification cracking of FZ and intergranular liquation cracking in heat affected zone (HAZ) were observed in the joint. Solidification cracking was caused by the residual liquid metal originated from segregation of Ti, Nb and Al elements in interdendrite region at the last stage of solidification. And the HAZ liquation cracking was associated with the constitutional liquation of γ′, MC carbides, and melting of Cr-rich boride. With the increased heat input, the susceptibility of solidification cracking and liquation cracking presented different variation. And this variation of cracking susceptibility was discussed in this paper.

Keywords: K465 alloy; Weldability; Electron Beam Welding; Solidification cracking; Liquation cracking

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