

## 초대형 컨테이너선의 해치 코밍 용접부의 내부 균열에 대한 파괴역학적 연구

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### A Study on Embedded Crack at the Hatch Coaming FCA Butt Weldment in an Ultra Large Containership on the Basis of Fracture Mechanics

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#### Abstract

The purpose of this study is to prevent the unstable fracture at the FCA butt weldment of hatch coaming deck in the ultra large containership during service life. In order to do it, the behavior of the embedded crack at the weldment under design loading conditions was evaluated in accordance with BS7910. Here, the level of primary stress induced by ship motion was evaluated by the design code of classification society and FEA. The level of residual stress as secondary stress was calculated in consideration of the restraint degree of weldment and welding heat input by using the predictive equation proposed by authors in the previous study. The fatigue crack growth rate at the weldment was evaluated using CT specimen in accordance with ASTM E647. According to the results, although the allowable defect for embedded crack specified in the classification society exists at the weldment, the occurrence possibility of unstable fracture at the weldment could not be negligible, regardless of CTOD value given in this study. So, in this study, the effect of initial defect size, welding heat input, restraint degree and CTOD on the fracture mechanical characteristics of embedded crack at the weldment was evaluated by the comprehensive fracture assessment. Based on the results, the design criteria including allowable defect, residual stress level and CTOD value was established to prevent the unstable fracture at the FCA butt weldment of hatch coaming deck in an ultra large containership during service life of 20years.

**Key Words** : Containership, Hatch coaming, Embedded Crack, CTOD, Brittle fracture, Fatigue cack growth