FATIGUE LIFE ANALYSIS ON FPSO’S BOTTOM PLATE USING ELASTIC PLASTIC FRACTURE MECHANICS-BASED ON RELIABILITY METHODS

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Abstract
The occurrences of crack can cause the structure failure. Some Initial Crack at the Bottom Plate of FPSO will obviously decreases its reliability. This final project purpose is to analyzing the fatigue life of FPSO before and after the existence of crack at bottom plate and also to assessing the structure reliability due to effect of fraction on the bottom plate of FPSO. According to the Global analysis that was conducted by using POSEIDON software, it was obtained that the critical tension and fatigue life was 16 year at bottom shell (E-F) frame 87. The result of Fracture Mechanics analysis of base plate and longitudinal girder joint using ANSYS software was used for calculating the fatigue life with the effect of crack. The fatigue life that was obtained for initial crack depth 0.5 mm is 38 year, whereas for the next accretion depth crack which is 1 mm and 1.5 mm was 23 and 9 year. The Reliability analysis of the structure was conducted by MINITAB software with Monte Carlo simulation. The Failure Mode that was used is when the crack reach minimum allowable plate thickness that was issued by GL. A hundred thousand times (100,000) attempts has been conducted therefore the structure reliability value of bottom plate due to the effect of fraction fatigue can be calculated. The structure reliability with initial crack depth 0.5 mm was 0.815, whereas for the next accretion depth crack which is 1 mm and 1.5 mm the structure reliability was 0.679 and 0.539.

Keywords: FPSO, POSEIDON, EPFM, CTOD, Monte carlo, Reliability