LOCAL STRESS AND FATIGUE LIFE ANALYSIS OF BOLDER CONSTRUCTION ON FSO LADINDA DUE TO THE INFLUENCE OF SIDE BY SIDE OFFLOADING PROCESS

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ABSTRACT

FSO Ladinda is a conversion of the tanker which was built in 1974 and changed its functions as the FSO in 1984. Because of this FSO is a conversion from a tanker which previously not used for offloading and unloading process at the offshore. In this paper, local stress and fatigue life that occur in bolder construction because it is the mooring system equipment which receives the greatest burden when the side by side offloading process. So it can be known to determine whether the structure is still safe to operate. This case study begins with motion analysis of FSO and the tanker due to the wave load in free floating condition; then the maximum tension of hawser connecting Tanker to FSO will be known. In addition, it will be known the longitudinal strength of FSO to determine stress distribution on a bolder construction due to the motion of the global structure. Based of the maximum tension of hawser and stress distribution, local stress analysis of bolder construction on the FSO will be done. From the results of the local stress, the calculation will be known for the fatigue life analysis of bolder construction by using S-N curve method based of palmgren miner rules with estimate the cumulative fatigue damage using the method of deterministic. Based on the modeling, it is known that the dominant motion for FSO and the tanker is 4.543 deg/m and 4.798 deg/m in roll at light condition. Based on the simulation carried out to obtain the maximum tension, the maximum hawser tension obtained on the rope 5 with the configuration of spring line is 197.82 kN at heading 180° and the safety factor is 0.82. That safety factor was not requires by ABS, which is 1.82. While, the stress distribution on bolder construction due to the motion global structure is for the maximum stress of 24 MPa and deformation of 0.00141 mm. from the input of load, obtained the maximum stress on bolder construction of 115 MPa and the deformation of 0.201 m. This stress and deformation is less than the allowable maximum stress required by ABS, 225 MPa and 4 mm. based on the maximum stress, obtained the result of fatigue life in bolder construction is 61 year as long as the operation environmental load for about 100 years.

Keywords : local stress, fatigue life, side by side, offloading process