

DMC-O-08**Fatigue Assessment of an Offshore Piping System by
Finite Element Analysis**

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The maintenance of systems in offshore sites is relatively costly, especially in case of unplanned breakdown maintenance. Therefore, offshore facilities should be designed to have minimal maintenance. For any structure subjected to repeated loading, prediction of fatigue life is necessary for designing the structure to last for a specified design life. This work studied the fatigue assessment of an offshore piping system located in the Bongkot South natural gas field in the Gulf of Thailand. This piping system is located in the gas pre-treatment system and exposed to cyclic thermal stress loading due to the flow cycle of hot gas inside the pipe. The hot gas with the temperature of 260°C flows through the pipe for 40 minutes and then the flow is halted for 120 minutes before the next cycle starts. The fatigue life evaluation started by performing finite element analysis (FEA) for the heat transfer due to the hot gas flow in the pipe. The hot gas transfers the heat to the piping system's structure. The temperature distribution in the piping system's structure was obtained by transient heat transfer FEA. After that, the resultant temperature distribution was used as thermal loading to calculate the stress distribution in piping components by FEA. In this work, we compared several methods of fatigue life estimation including the twice-yield method suggested in ASME BPVC (Boiler and Pressure Vessel Code) Section VIII Division 2. The results show that the fatigue life predicted by one of the methods is in agreement with the observation in the real situation.