



DESCRIPTION:

The White Rose Field Development Subsea Production System (SPS), located approximately 350 km off the east coast of Newfoundland, will be developed using subsea wells tied back to a Floating/Production/Storage/Offloading (FPSO) Vessel. The subsea wells are connected to the FPSO via flexible risers. Each riser passes through an I-Tube, I-Tube Extension, Bend Stiffener Connector and Bend Stiffener. The Bend Stiffener Connectors are complex parts that must be checked for acceptable maximum hot-spot stresses and for desired minimum fatigue lives.

Martec Limited was contracted to review the four existing Bend Stiffener Connector (BSC) designs to ensure that they are structurally adequate. The BSCs were checked for static strength and fatigue life, using the finite element (FE) method to determine detailed stresses. The specialized FE program HyperMesh was used for pre and post-processing, and the general purpose FE program ANSYS was used to analyse the BSC models.

The bend stiffener assemblies are complex structures where loads are transferred from the Bend Stiffener to the BSC to the I-Tube Extension. The transfer of these loads from one component to the next is through a combination of interference fits and bolted connections, a challenging scenario to model using FE. The FE model developed by Martec included a section of the I-Tube Extension and a representation of the Bend Stiffener.

The analysis identified a problem high-stress area in one of the BSC designs. The design was modified and re-evaluated. Subsequently, all four BSC designs were found acceptable for static strength and fatigue considerations.
