



Puffin HP/ HT Pipe-in-Pipe Study

OIL

Shell Exploration & Production (Shell Expro)

Shell Expro were investigating the development of a number of high pressure-high temperature (HP/HT) fields in the North Sea. One such field was the Puffin field which had a wellhead temperature of 150 deg C and a shut-in pressure of 10,500 psi.

Export of HP/HT fluids places severe requirements on the design and construction of the pipeline system. Pipe-in-pipe insulation systems can provide attractive solutions, particularly where the fluid temperature is to be maintained at an elevated level, requiring high levels of insulation.

Andrew Palmer & Associates were contracted by Shell to perform an evaluation of proprietary and generic pipe-in-pipe insulation systems for HP/HT service, using the Puffin export line as a case study.

The proprietary pipe-in-pipe insulation systems considered were Interpipe, Snamprogetti, DIPS and British Steel Hydrotherm, while generic systems were those installed by reel-lay and Controlled Depth Tow Method bundle.

Conceptual configurations of each system were developed with input from proprietary system designers. Conceptual design of each system was then undertaken, including sleeve pipe sizing, thermal analysis, lateral buckling and expansion analysis, stability analysis, impact assessment and bulkhead/ spacer design. The fabrication and installation issues of each system were critically reviewed.

The study also considered the operational, repair and abandonment implications for each system. Preliminary cost estimates for each system for the Puffin development were prepared.

