MARY KAY O'CONNOR PROCESS SAFETY CENTER
TEXAS A&M ENGINEERING EXPERIMENT STATION

20th Annual International Symposium
October 24-26, 2017 • College Station, Texas

Demonstrating the effectiveness of non-metallic riser flange covers for diverting leaks and jet fires using computational fluid dynamics

Dr M.P.Straw*, Dr E.Kay*, Dr S.J. Rees*, P.Watson, A.Graham*****

**Norton Straw Consultants Ltd, Derby, UK; **Advanced Insulation Systems Ltd, Gloucester, UK; ***Siemens PLM Inc., London, UK*

Abstract

The current oil and gas industry market conditions put greater emphasis of finding cost-effective design solutions while maintaining the same emphasis on process safety. Riser flange covers potentially provide a weight-saving alternative to fire walls between FPSO riser balconies and process modules, but that saving can only be realised if non-metallic materials are employed. Flanges represent the most probable leak point, and the covers are designed to entirely surround the flange and divert any leaks outboard and away from the process equipment. Therefore, any flange cover system has to be capable of resisting and diverting the flow from the largest credible leak.

This work demonstrates the application of Computational Fluid Dynamics (CFD) coupled with Finite Element Analysis (FEA) to demonstrate the response of a syntactic phenolic foam and glass reinforced laminate system which combine to provide passive fire protection and thermal insulation. The work outlines a combined analytical approach to demonstrate the effectiveness of this weight-saving system for a high-flow rate gas riser.

This paper describes the design of the flange cover and the materials used, the failure case against it was to protect and how that case was simulated, the fluid dynamics of the gas leak within the cover, and the stresses generated within the cover structure.

Keywords

Jet fire, FPSO, riser, flange, CFD