

## FEA ANALYSIS OF A MANWAY CONNECTION IN A PRESSURE VESSEL

**PURPOSE:** Evaluate the thermal and structural deformations and stresses in a manway connection under internal pressure

A detailed axisymmetric FEA model for a manway connection was developed for analysis. Non-linear temperature dependent material properties were used for analysis. The model was first analyzed to obtain a steady-state thermal solution, followed by a non-linear structural analysis with bolt pre-tension, internal pressure and temperature distribution load cases. From the analysis results, it was evident that the difference in the coefficient of expansion between the weld overlay (lining) and the body of the flange and cover is significant in magnitude at elevated temperatures. The application of internal pressure had a minor effect on the stresses as compared to the temperature distribution. Although the stresses are predominantly in compression, their magnitudes seem to indicate that compressive yielding is a significant possibility. Under cyclical loads, this can cause sufficient compressive micro-cracking in the weld overlay, as well as interlaminar fractures between the weld overlay and the body of the vessel.

