

THERMO-MECHANICAL ANALYSIS FOR SKIRT OF PRESSURE VESSEL USING FEA APPROACH

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ABSTRACT

In oil, gas and petrochemical industries, in pressure vessels, excessive temperature gradient near the junction of skirt to head in hot operating cases, can cause unpredicted high thermal stresses. Then fracture of the vessel may occur as a result of cyclic operation. Providing an air pocket (hot box) in crotch space is an economical, applicable and easy mounting method in order to reduce the intensity of thermal stresses, due to which, radiation due to temperature difference between the wall of pocket, will absorb heat near the hot wall and release it near the cold wall then the skirt wall conducts heat to the earth as a fin. This conjugated heat transfer removes the temperature gradient boundary and converts its step form to approximately ramp form. This paper demonstrated the profit of hot box over vessel without hot box according to Simulation. It has been seen that radiation has important effect on heat transfer in this triangular cavity and thereby heat conduction in the vertical wall (skirt) is the most important parameter to keep convection in steady state condition.

FEA is a proven cost saving tool and can reduce design cycle time therefore it can be used as accurate tool to investigate stresses in skirt support. The analysis is accomplished in accordance with ASME B & PV code, section VIII, division 2. This provides sound basis for classification of calculated stress intensities.

KEYWORDS: Air Pocket, Pressure Vessels, Support Skirt, Thermo-Mechanical FEA