عنوان مقاله:

Effect of Residual Stress on Failure of Tube-to-tubesheet Weld in Heat Exchangers

محل انتشار:

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خلاصه مقاله:

In a shell and tube heat exchanger, the failure of tube-to-tubesheet welds results in high-pressure water jet which erodes the refractory in front of the tubesheet. Finite element method was employed to simulate the welding process and post weld heat treatment (PWHT) to find the factors affecting the failure in tube-to-tubesheet weldments. Residual stresses in two different geometries of tube-to-tubesheet weldment were calculated through uncoupled thermal-structural analysis. The results showed that the values of residual stresses are higher in heat exchanger of site 1 than site 2 due to more weld passes and geometry of connection. Also, the maximum stress in site 1 occurs at the shellside face of tubesheet while it is on the weld toe in site 2. High tensile residual stresses, especially in Site 1, reduce the tubesheet life. Therefore, performing an efficient PWHT is vital. The PWHT simulation indicated that the process designed is effective for both sites by reducing the residual stress significantly. In addition, the effect of stress concentration was examined on both sites. Moreover, the stress concentration factor in site 1 is as twice as in site 2 .and it is the main reason for more failures in site 1

کلمات کلیدی:

Residual Stress, Post Weld Heat Treatment, heat exchanger, Stress Concentration Factor