Critical Erosion/ Corrosion Piping Wall Thicknesses Under Static and Fatigue Stress Conditions According to ASME Guidelines

By
Christian Robert Comeau

Larry Mitchell, Chairman

The purpose of this project was to show the updated procedures and to make additions to the computer program called Tmin designed by E. I. DuPont De Nemours and Company. This program is used as a screening tool for determining the largest of the minimum pipe-wall thicknesses in a piping system.

This project involved several additions that will be released in the next version of the Tmin computer program. The first major additions to be implemented are four alternating Stress-to-Number of cycles curves: Aluminum 1100, Aluminum 3003-0, Aluminum 6061-T6, and Nickel 200. In addition, procedures of the ASME for fatigue curve analysis and implementation of fatigue data were investigated. These four stress-to-number of cycles (S-N) fatigue curves were added to Tmin's internal Microsoft Access® database. Next, a 2-D vertical piping span configuration was incorporated. Finally, DuPont required a Microsoft Word® document output of the pipe-wall thickness data including the piping span model information. Other user-friendly additions were included.

Since this computer program was to be American Society of Mechanical Engineers (ASME) compliant, a study of the ASME Pressure Vessel and Piping standards and codes was made to determine how pipe-wall thickness calculations were to be processed. The 2-D vertical piping span calculation procedures were investigated. Once the 2-D vertical piping span analysis was complete, the largest pipe-wall thickness value calculated were passed to a Microsoft Word® document. The last implementation is the inclusion of help files. Help file button additions in all input boxes allowed for the user to know exactly what was needed before a data entry was made.