LOCALIZED CORROSION IN A HEAT EXCHANGER CHANNEL

A Local Thin Area (LTA) was found during an online ultrasonic examination (UT). The LTA was in the heat exchanger channel shell near an inlet nozzle (a major structural discontinuity). An aggressive corrosion rate [greater than 500 mils/year (12.7 mm/year)] was observed, as was the failure of the internal coating. The facility planned to replace the channel within one year.

A Part 5, Level 3 FFS assessment of the damage was performed in accordance with API 579-1/ASME FFS-1. A grid of thickness data was provided by inspectors and transferred to a spreadsheet that was color coded to show the areas of highest damage (in red). Note the black area is nozzle hole in the shell.

THE PROBLEM

In this case study, the thickness measurement data was transformed onto a finite element model for analysis, as shown. Based on the calculated stress, the FFS assessments indicated the vessel was acceptable for continued operation based on the assumptions made for the future corrosion allowance (FCA).

RECOMMENDATIONS

• Apply a new internal, two-component coating system to the heat exchanger channel
• Perform online ultrasonic thickness monitoring on a monthly basis to confirm the effectiveness of the coating and the assumed FCA
• Replace the damaged component (channel shell) with a stainless steel clad, carbon steel shell

BENEFITS TO THE CLIENT

• Avoided a costly delay in the shutdown
• Demonstrated the component (channel shell) could be operated safely for one year without replacement