



Heat Exchanger Tube Failure

THE PROJECT

The Institute was requested to carry out an investigation into a recurring problem with water leaks on a heat exchanger associated with the steel production process route. The request was to identify the root cause of the problem and to suggest remedial action.

The heat exchanger was designed for an operational life of 15 months, but due to increasing numbers of leaks it was taken out of service after 12 months. Reduced lifespan of the heat exchangers was noted on successive occasions. Water leaks led to downtime for weld repairs and excessive water leakage at this location was a safety concern.

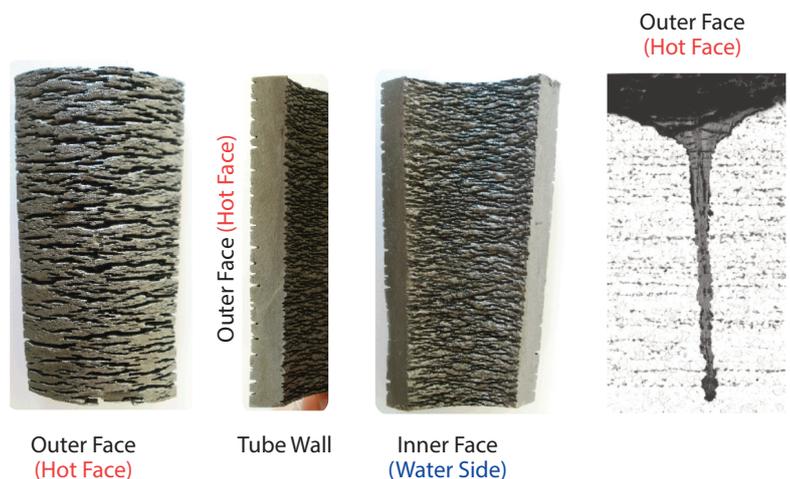
On-site inspections were carried out followed by sampling. From optical and electron microscopy analysis it was found that the whole of the heat exchanger tube work was suffering from severe cracking.

THE OUTCOME

It was determined that the leaks were occurring by corrosion fatigue cracking. The mechanism was symptomatic of the plant operating method and necessitated a redesign to give future viability to the operations. This was done and in the three years of operation water leaks have not been a problem.



Section of heat exchanger with multiple weld repairs on some tubes



Sample of tube with surface cracks plus cross sectional microstructure