GE
Inspection Technologies

Oxide Scale Measurement

A hard oxide coating will gradually build up on the inside of power generation boiler tubes caused from a reaction between the water and carbon steel when heated to very high temperatures. The thicker the oxide layer, the less efficient the boiler becomes and additional heat build up will promote creep in the tube metal – resulting in a loss in remaining life with a long term overheat failure.

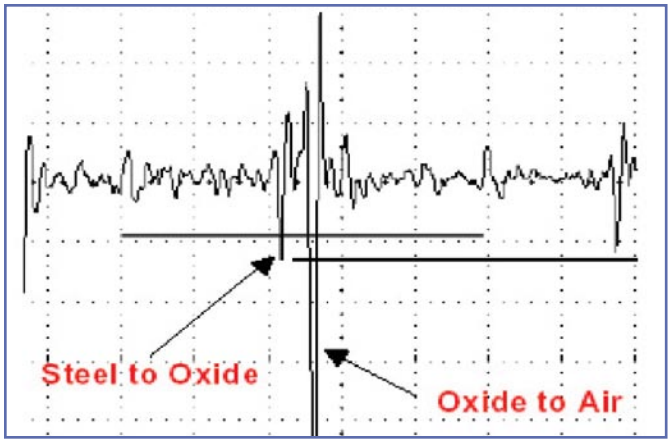
Ultrasonic thickness measurement provides data used in predicting remaining tube service life to result in less unscheduled shutdowns due to boiler tube failure and required repairs.

Depending on the application GE Inspection Technologies is able to offer customized Oxide Scale Measurement solutions using our DMS2, CL400 thickness gauges or USN60/58L flaw detectors with a special shear wave probe or the A2DFR / CLF4 with a special delay.

The object of the test is to measure the steel wall thickness of the tube and the layer thickness of the Oxide Scale on the ID wall of the tube. The thickness of the oxide layer is calculated by measuring the time difference between the signals reflected from the steel/scale interface and the tube ID surface.

The echo from the tube to oxide is much smaller than the echo from the oxide to air/liquid interface. Thus the difficulty is separating these two echoes from each other and making the measurement between the two (see figure). The example above shows the steel to oxide interface echo at about 1/3 the amplitude of the oxide to air interface echo.

Using a highly damped "Alpha" type straight beam Shear Wave probe is the key to obtaining thin oxide layer measurements. The shear waves have _ the velocity of L-waves which doubles the time resolution and enables the system to measure thinner layers than with conventional L-wave probes. Special Parameter Setups allow optimized setting of the instrument for the application resulting in a Minimum Measurement Capability of 0.005" (130 microns)!



imagination at work

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