

# Application Report

**BRANCH** : Power Plants, Boiler Industry, RLA service providing organizations

**TEST TASK** : Oxide scale thickness measurement in boiler tubes

**SOLUTION** : High frequency ultrasonic testing

Our customer for this application is a Government organization in the power industry and they offer RLA (Remaining Life Assessment) services to various power plants all over India. The task in this application is to detect and measure the thinnest possible scale layers.

Due to formation of oxide scales on the inner tube walls, the heat transfer rate and the boiler efficiency gets affected, and in a worst case scenario, it may lead to overheating of the boiler tube and eventually, its rupture ! The boiler tubes are generally of low alloy steel grade material, thickness ranging from 5 – 10 mm and diameter from 50 – 60 mm. The solution described is capable of measuring oxide scale thickness down to 200 microns (depending upon the sound velocity characteristics in the oxidized layer).



DPR 300



Waveform Analysis

The equipment used in this application is portable, stand alone high frequency Pulsar Receiver unit, Model DPR 300 from our principal company **M/s JSR Ultrasonics, USA**. The waveforms can be seen and analyzed on a portable digital oscilloscope.

Highly recommended is the use of very high frequency (upto 50 MHz) contact probes. At such a high frequency, good resolution is achieved and the measurement then made on thin scales are quite precise. The probe element size should be as small as possible (for eg. 3 mm size) and it can have a permanent fused silica line in its front. The system is being used with long cable lengths of 15 meters so as to facilitate working at high elevations on the boiler structure.

In the A-Scan, a small interface echo (tube material/oxide scale) which occurs in the front of a high backwall signal from the inside wall of the tube is identified and the corresponding time of flight measurement analysis gives the oxide scale thickness measurement.

---

**Suitable Equipment:**

- Pulser Receiver DPR 300
  - High frequency contact ultrasonic probes
  - Accessories like probe cable, couplant etc
-