TUBE INSPECTION USING ACOUSTIC PULSE REFLECTOMETRY: APPLICATION TO A TUBULAR AIR HEATER

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Abstract
Acoustic Pulse Reflectometry (APR) is an Internal Diameter (ID) tool for tube inspection, offering several advantages over conventional methods, among them very short inspection times and high sensitivity to through holes. It has recently been applied to a wide range of tube diameters, from 3/4" heat exchanger tubes to boiler tubes 3" in diameter and above. In this paper we present the physical principles behind APR and the innovations enabling its implementation in a portable and robust tool. This is followed by a description of a field test on a Tubular Air Heater (TAH). TAHs are typically difficult to inspect, often containing internal sleeves and other constrictions, which make it impossible to use invasive techniques such as Remote Field probes. Usually they are inspected visually, using flashlights, which enable inspection of the first few feet only. To provide a more comprehensive inspection, APR was used recently to examine one such TAH. 901 tubes were inspected, 14' in length and 2" in diameter, in the space of only four hours. 32 leaks were found and quantified, some of them clearly beyond the reach of what could be found by visual inspection.