

1.12.12. APPLICATION OF GUIDED WAVES METHOD ON THE INSPECTION OF AIR-COOLERS AND BOILER TUBES – PRACTICAL EXPERIENCE

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Ultrasonic guided waves are excited using an internal transducer probe from a single position at or near one end of the tube. These propagate along the length of the tube, and are reflected from features such as defective areas. Since guided waves occupy the entire cross-section, 100% of the tube is inspected. The probe consists of an array of piezoelectric transducers, which are dry-coupled to the inside of the tube wall through a pneumatic system.

The guided wave method is applied to non-destructively screen tubes using technology known as T-scan. The main idea behind this inspection is that tubes, such as those found in heat-exchangers, boilers and air-coolings, can be screened for defects in a fast and cost-efficient way. Once the defective tubes, which may only constitute a small percentage of the total number being inspected, have been identified, they may be cleaned and precise defect sizing methods applied in a focussed and cost-effective manner.

This paper addresses two applications of T-scan in on-site conditions. In the first case about 250 boilers tubes from a paper&mill plant were inspected. In the second case about four hundred air cooling tubes from forty units were inspected in a refinery. The major part of the results was reliably classified in three levels of severity. However, in both cases, a certain amount of tubes provided a type of data that did not allow the interpretation for different reasons. The results are presented and the limitations are discussed in order to improve the technology.

The results indicate that T-scan provides an alternative approach to the inspection of air cooling and boiler tubes, although some further developments and improvements are required to overcome the limitations presented.