

4.2.17. COMPENSATING FOR VARIATIONS IN MATERIAL PROPERTIES IN REMOTE FIELD TESTING OF HEAT EXCHANGER AND BOILER TUBES

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Abstract. Material compensation technique has been developed for RFT inspection. It is useful whenever difference in material property and/or wall thickness exists between calibration sample and actual tubes or pipes. A new "Material Compensation" software program can help operators of RFT equipment to adjust their wall-loss predictions in the presence of magnetic permeability changes and/or wall thickness variations. The new software is described and several case studies would be presented.

Introduction. It is well known that the properties of carbon steel tubes change with such things as applied stresses, (which affects the magnetic permeability of the tube), tubes that have become bent in service, (such as bent boiler tubes), tubes that have been bent during manufacturing (such as return bends) and tubes that have been bent during handling (such as the outer rows of exchanger tubes removed for cleaning every shut-down) can give signals that can be mistaken for wall loss. Quite often, it is difficult to find calibration sample that is identical to actual tubes/pipes in both material properties and geometry (thickness in particular). Material property variation could be due to manufacturing process or the use of different tube types while tube geometry variations could be due to manufacturing tolerance or availability of calibration tubes. On the other hand, tubes in a bundle may originate from different manufacturers or in extreme cases such as when tubes are mixed with different types and grades when heater exchangers were manufactured. Difference in either material properties or tube wall thickness requires material compensation before defects can be quantified. It is a better solution to use material compensation technique than to prepare all types of calibration tubes to calibration all possible tube types that may exist in a tube bundle. This paper shows the feasibility of using material compensation to take into account material and wall thickness difference between cal tube and actual tube in the process of RFT data analysis.