



Magnetic Biased Eddy Current Technique



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Magnetic Biased Eddy Current technique is one of the non destruction inspection techniques for heat exchanger and boiler tubes of ferromagnetic material.

The Magnetic Biased Eddy Current technique is a combination of applied Direct Current (DC) field lines and Eddy Current field lines. Both coil systems are combined in a single probe.

The electromagnetic coil for DC field induction is adjustable for the magnetic field strength suitable to the material and wall thickness. The Eddy Current coils based between the electromagnetic systems can be applied with the Eddy Current frequency required for the inspection.

The basis of the technique is the principle that in the case of defect, the magnetic field lines are running higher compressed in the remaining tube wall, which causes a permeability change in the tube wall and consequently changes the induced Eddy Current field in the tube wall. This is shown in Diagram 1.

The Eddy Current signal then displays the defect severity in amplitude. The difference in the Eddy Current field line changes as well as the change changing the DC field lines shows the differentiation between external to internal defects.

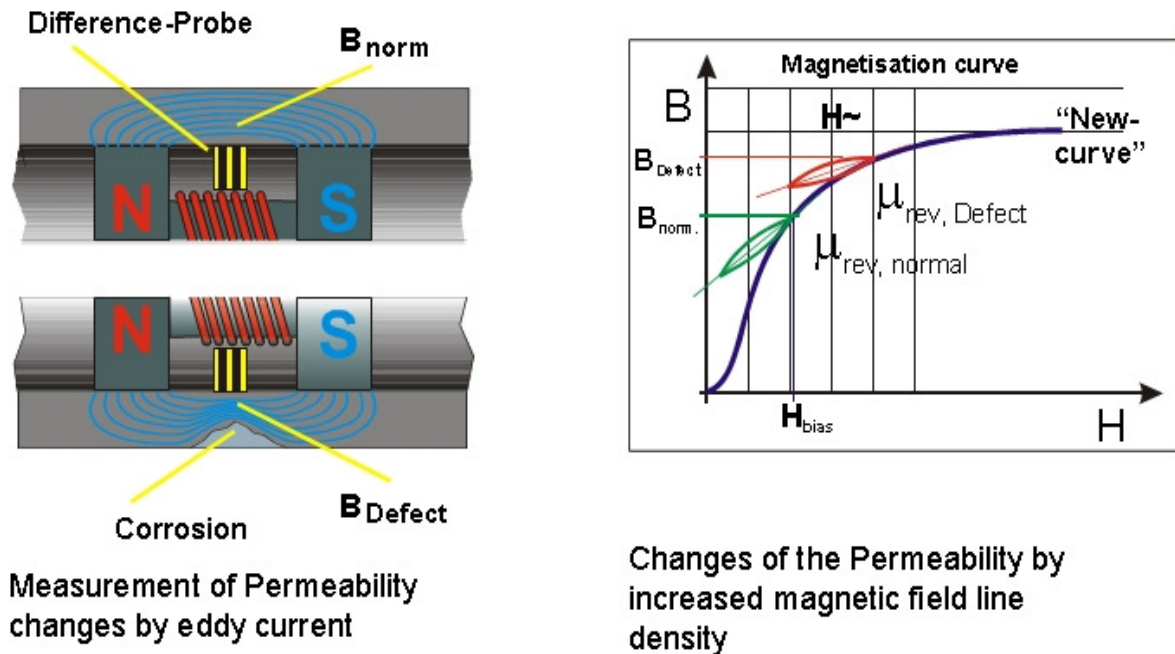


Diagram 1: Principle of the Magnetic Biased Eddy Current Technique

This technique is a fast technique as relatively high frequencies can be used. The possibility to analyse signal phase and signal amplitude makes it capable to differentiate defects from other occurrences.

The signal amplitude is also able to detect and analyse the defect volume. Diagram 2 shows the signal analysis of the Magnetic Biased Eddy Current Technique.

As the technique is not a direct Eddy Current based technique, the use of the absolute mode is limited. With the use of only the differential channel, it is very sensitive in the detection of localised defects. Even the smallest pits can cause the compression of the described field lines which in turn gives good response to the Eddy Current signal analysis.

Therefore, the Magnetic Biased Eddy Current technique is described as a very sensitive technique in detecting localised defects but less sensitive in detecting gradual defects such as erosion.

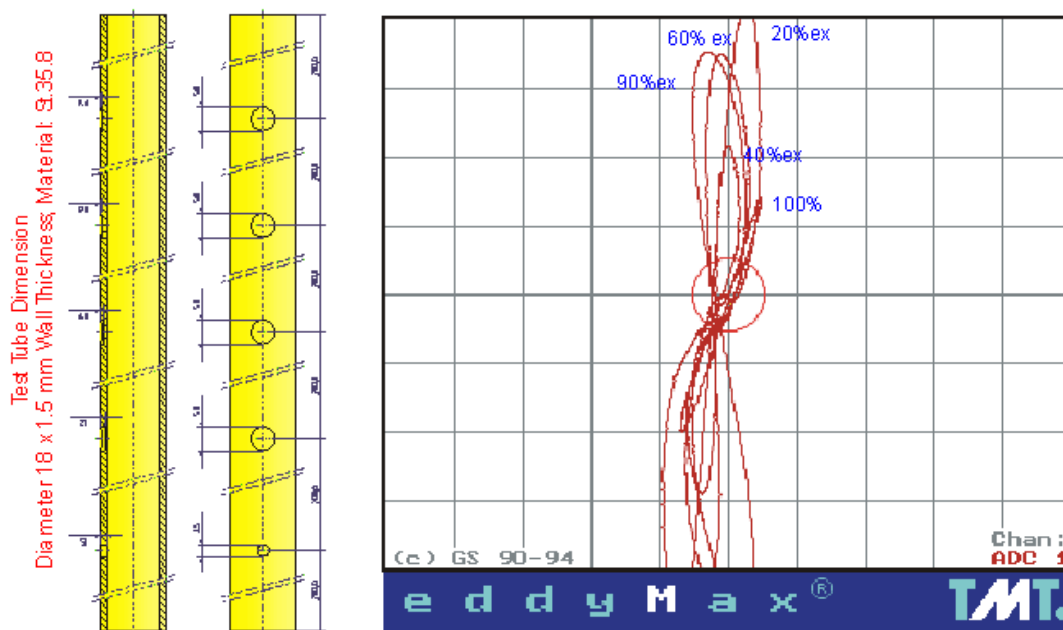


Diagram 2: Signal analysis of the Magnetic Biased Eddy Current Technique