Improving ECT Reliability:
Why ECT Technicians make false calls

by
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Summary
Signal phase from metallic deposits in tubes is in the same range as the defects. They can therefore be easily misinterpreted as defects.

Case Study
ECT signals are produced by changes in conductivity and permiability in the tubes. Defects in tubes increase the resistance to the flow of eddy currents and hence show up as ECT signals. These signals are interpreted using the ASME depth curve to determine their depth. The ASME depth curve is based on the phase of the ECT signal. Signals with a phase angle in the 0 to 40 degrees represent ID defects while signals with a phase angle of greater than 40 degrees represent a OD defects. The signal from the hole is set to 40 degrees.

The above process works well in tubes that are free of metallic deposits. However, it is not uncommon to run into situations where metallic deposits are encountered during tube inspections. Some examples of metallic deposits are:

- Iron particles on the ID of tubes
- Copper deposits on the ID of tubes
- Copper deposits on the OD of tubes (see Fig. 1)

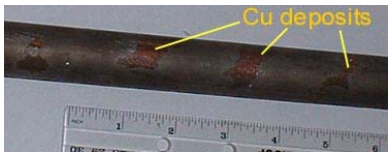

Figure 1. Copper deposits on the OD surface of Inconel Tube

Signal phase from these metallic deposits is in the same range as the defects. They can therefore be easily misinterpreted as defects.

For example, iron particles on the stainless steel tubes will produce a signal with a phase angle of about 20 degrees which is the same phase angle as a 50% ID defect.

Copper deposits on the ID of stainless tubes produce a signal with a phase of 10 to 16 degrees. This is representative of a 25 to 40% deep ID defects. Figure 2 shows the signal from a deposit with a phase angle of 12.8 degrees. This would represent a 32 percent deep ID defect as per the ASME depth curve. The actual source of the signal is copper deposit.

As noted above, deposit signals can be easily misinterpreted as defects and lead to unnecessary tube plugging or replacements. It is therefore important that ECT technicians recognize these signals and correctly interpret them as deposits or “no defect”.

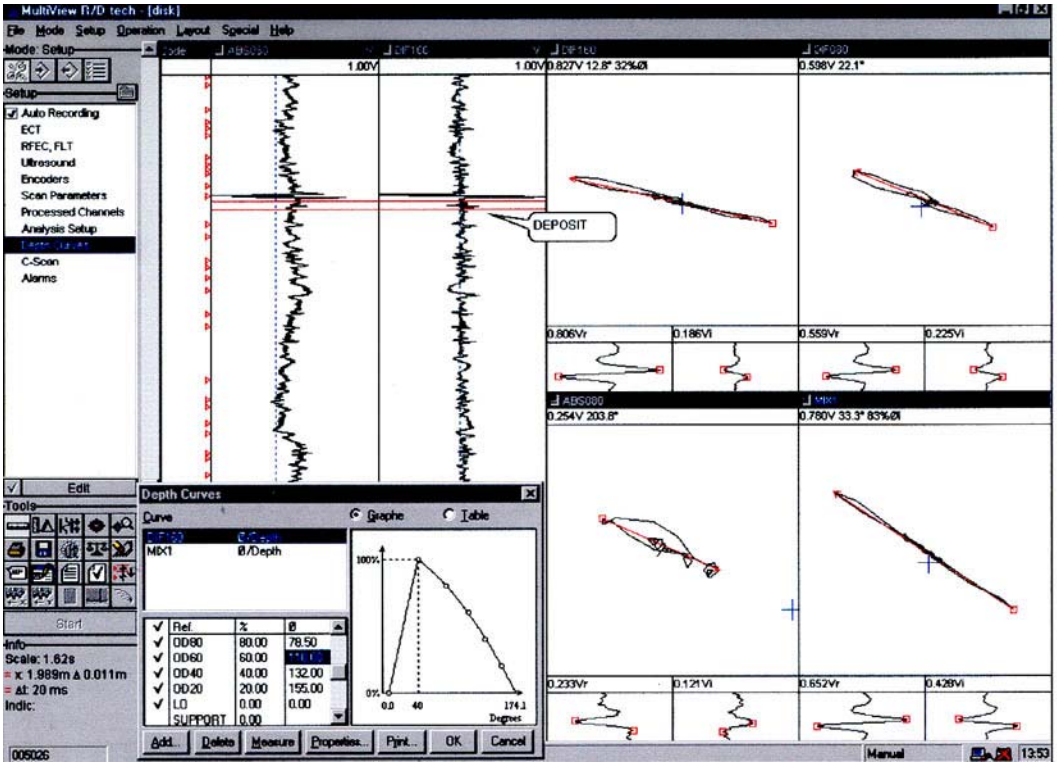

Figure 2. The above signal has a phase angle of 12.8 degrees. As per ASME depth curve, this would represent a 32 Percent ID defect. However, the signal is from metallic deposit.

NDE Associates, Inc has gained considerable experience in discriminating between defects and metallic deposits. We use a combination of signal phase, amplitude, frequency response and other signal parameters to determine the source of the signal. Our technicians are trained and have the expertise to recognize these signal features and make a correct call. NDE Associates, Inc. maintains an extensive data base of signals that includes deposits and defects. These signals are acquired from previous ECT inspections. Technicians are regularly tested for their ability to resolve defects from non-defects signals.

NDE Associates, Inc’s goal has always been to provide NDT inspections with the highest reliability. Detecting all defects and making no false calls achieves the highest inspection reliability. This is an indication that we provide critical data, input and analysis to ensure that tubes are not taken out of service unnecessarily. NDE Associates is devoted to providing solutions not just reports. We focus on training, certification, and continuing education of our personnel. We are constantly improving our techniques and processes ensuring the latest technology and equipment to provide our customers with solutions.