Total Quality. Assured.

FACT SHEET

PULSED EDDY CURRENT

Assuring system integrity, longevity and product delivery

A unique non-intrusive wall thickness measurement technique that can be applied while equipment or asset is in operation and without the need of insulation removal minimizing the disruption of your production and operating schedules.

Pulse Eddy Current (PEC)

The pulsed eddy current (PEC) inspection technique has found a vast array of applicable uses in the years since its first application in the 1980's to find corrosion under insulation (CUI).

PEC was originally developed to locate CUI, and its unique characteristics have proven to be of great value in many industries including power, oil and gas, and chemical processing among others.

Applications

PEC has been found to be particularly successful during inspection of Heat Recovery Steam Generator (HSRG) finned tubes. Additional typical PEC applications include CUI in other forms of general area wall loss such as flow assisted corrosion (FAC) in power feedwater systems, large diameter underground piping where personnel can examine from within, storage sphere legs, storage tanks, process piping, offshore platform caissons and many more.

Benefits

One of the great benefits of this process is that it can often be performed online and through insulation which greatly reduces outage planning and insulation removal costs. The PEC inspection technique does not require any surface preparation. Readings can be acquired at a distance of approximately five inches from the surface, through any non-magnetic material such as insulation or fireproofing, or through features which do not support eddies such as the fins on HRSG tubes. The wall of any component being examined must be ferromagnetic carbon steel (stainless steels and aluminum are invisible to the PEC system).

The PEC system is most often used for the detection of general area wall loss in ferrous piping and shells. This method compares the relative difference between PEC signals to infer relative wall thickness, but it does not differentiate between internal and external wall loss. The PEC technique works by timing the diffusion of an eddy current pulse as it penetrates the pipe or shell wall. When the eddy current reaches the back wall of the pipe or shell, the signature of the signal suddenly changes. The time of arrival at the back wall is dependent on magnetic permeability, conductivity, and material thickness.

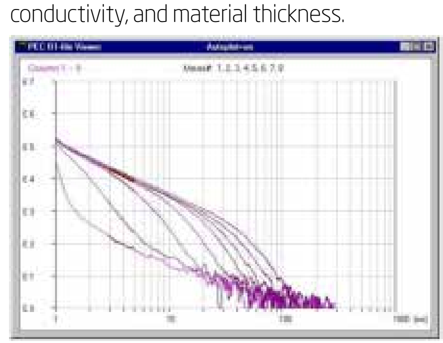

Figure 1: Example PEC signal falloff with decreasing wall thickness

PULSED EDDY CURRENT

PEC excels particularly well when it comes to inspecting feed-water heater shells, piping, tanks, HRSG finned tubes, and various other ferrous steel components susceptible to wall thinning damage mechanisms.

PEC System

The system can be used to measure pipe or shell thicknesses in the range of 0.125 inch to 2.5 inches. The combined wall and insulation thickness typically should not exceed 6 inches.

This system is designed to work in the temperature range of –150°F to 930°F. Accuracy may decrease with increasing temperature.

Components are gridded in a manner typical of Ultrasonic Thickness Testing (UTT), but with greater space between points (2 to 6 inches) to account for the area averaging of the PEC signal.

Interrogation area is dependent on the lagging standoff distance. Each PEC thickness measurement is calculated for a cylindrical volume where the diameter of the cylinder (footprint) increases with the distance to the pipe or shell outside surface.

For example, a pipe or shell with 3.0 inches of insulation and aluminum lagging would have a wall thickness measurement based on an average footprint diameter of 3.0 inches plus wall thickness.

A pipe or shell with 2.0 inches of insulation and aluminum lagging would have a thickness measurement based on an average footprint diameter of 2.0 inches plus wall thickness.

The equipment can also be used to report quantitative (as opposed to qualitative) pipe or shell thickness variations when a UTT measurement is taken at one or more grid point locations.

All other grid point thickness measurements are reported relative to the UTT measured grid point PEC signal.

One of the risks of using a qualitative approach is that, without quantifying any particular reading using UTT, it cannot be determined if any measurements are below Code minimum wall thickness or if uniform wall loss is taking place.

The use of a probe on a shell is shown in Figure 2. This figure illustrates the size and shape of one of the PEC probes. A typical screen display is shown in Figure 3.

Figure 2: Example of a probe used on a shell with a 1-inch thick insulation

Results are determined in various displays for the operator. The operator evaluates the results from all sections of the output screen to determine if the thickness measurement is valid, reasonable, and acceptable.

PEC excels particularly well when it comes to inspecting feed-water heater shells, piping, tanks and other ferrous steel components where the lack of need to prep surfaces or remove insulation can greatly reduce the cost and time of inspections.

PEC can be performed online as well as offline to help prepare and plan for upcoming outages. In the case of HRSG finned tubing, there may be simply no better option.

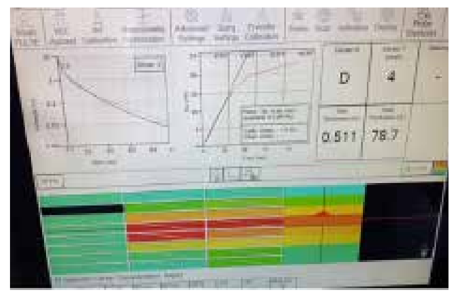

Figure 3: Example of a typical screen display

This can be a great advantage when compared with having to strip and inspect components of unknown condition during a busy outage.

The ease of screening a large number of components and knowing where the issues lie in advance of an outage can be a great advantage when compared with having to strip and inspect components of unknown condition during a busy outage. These benefits make the PEC inspection a favorite of many maintenance, safety, and reliability managers.

FOR MORE INFORMATION

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