Application Note

Keeping Pressure Vessels Safe with the Sharck™ Probe

Pressure vessels are closed containers designed to hold fluids at pressures substantially different from the ambient pressure. These vessels are ubiquitous in refineries. Due to the critical nature of their function, pressure vessels must undergo regular and rigorous safety testing.

The Challenge

Refinery pressure vessels are subjected to the harshest conditions around. Their carbon steel welds are critical components and they are prone to several cracking mechanisms in their different zones (toe, cap, heat-affected zone).

Pressure vessel welds in this application are often controlled with wet magnetic particle testing (MT). This type of magnetic particle testing uses particles suspended in a water or oil solution. The particles can also be fluorescent to take advantage of the eye's sensitivity to color.

Wet MT is, obviously, messy, and requires surface preparation and post-inspection cleaning before being able to repaint or recoat the weld, which is time consuming. Other shortcomings of this inspection method are its inability to measure the depth of defects and its lack of archiving capabilities.

Any surface-breaking defects in pressure vessel carbon steel welds are target defects.

The Solution

This application required a solution that could address the shortcomings of wet MT, while, minimally, being as reliable.

The patent-pending ***Sharck*** probe was designed specifically for this type of application.

The probe's spring-loaded fingers are designed to adapt to the geometry of the weld crown, which enables scanning the cap, toe, and heat-affected zone in a single pass. The probe's built-in encoder also makes it possible to precisely position defects along welds.

Unlike wet MT, the innovative tangential ECA (TECA™) technology incorporated into the ***Sharck*** probe can size the length and depth of cracks. It can do this without surface preparation of any kind, as it is designed to monitor liftoff (as opposed to cancelling it out) and compensate for it.

The Challenge

Develop an improved solution to replace wet MT on pressure vessel carbon steel welds.

The Solution

The ***Sharck*** probe incorporating TECA technology to detect and size cracks.

The Benefits

Detecting and sizing the depth of previously undiscovered defects with little surface preparation and no chemical products.

The ***Sharck*** is also designed to scan at speeds up to 200 mm/s (8 in/s), record inspection data fully, and display it as intuitive 2D/3D C-scans thanks to the ***Ectane*** ® **2** and ***Magnifi*** ®. Performing the inspection with the new ***Reddy*** ™ (unavailable at the time) could have offered more portability and flexibility.

In the field, the ***Sharck*** probe performed admirably, detecting and measuring cracking in the cap and toe of abrasive-blasted welds 12.7 mm (½ in) thick. Cracks presence was confirmed with wet MT. The ***Sharck*** probe was able to detect and size these, but also to detect transverse cracks, as demonstrated here.

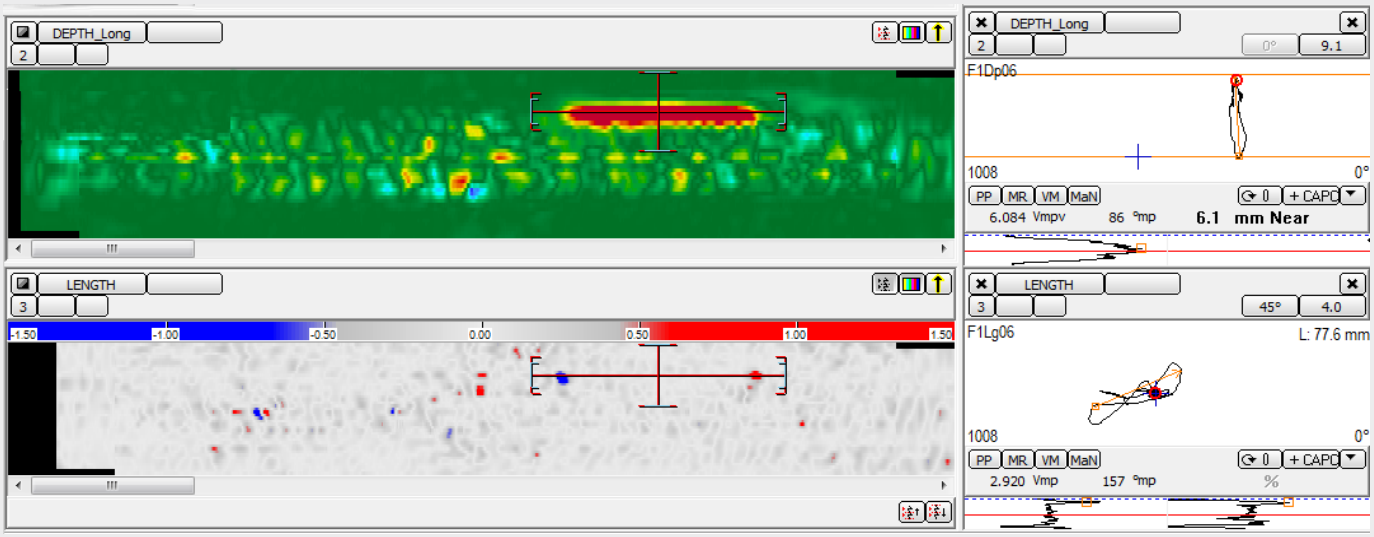
The Benefits

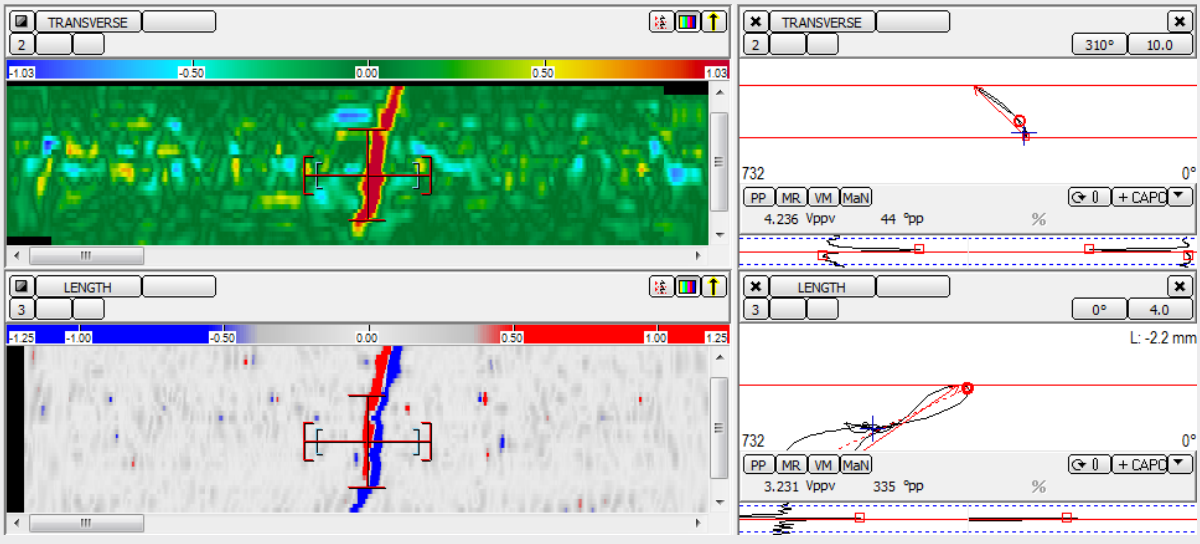
The benefits of this probe are obvious:

- Productivity gains — No need for surface preparation or post-inspection cleaning.
- Increased PoD — Detect previously undiscovered defects and size them.
- Better reliability — Single-pass scanning with intuitive C-scan imaging.
- Accountability — Full data archives to keep track of defect evolution.

Don't hesitate to talk to us about your own project specifications.

Longitudinal crack approx. 6 mm (¼ in) deep, 78 mm (3 in) long





Transverse crack

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