

Immersion Inspection of Well Casing

Application Notes

Background: Oil and gas production requires significant investment in pumping infrastructure to ensure reliable and high yield results. The pumping system is exposed to water and high pressure, which can cause the pipes to corrode from within. In order to ensure the integrity of oil well casings, it is necessary to inspect them regularly for corrosion. Excessively corroded pipe wall is a liability, as dangerous and costly blowouts can delay production.

By using Ultrasonic NDT methods, well operators are able to monitor the integrity of pipe walls by checking the wall thickness. Due to the nature of oil wells, exterior access to pipe wall is not feasible. The solution is to lower an ultrasonic probe down the well shaft, and use the pressurized pumping water as a coupling medium. It is possible to achieve full wall inspection coverage without depressurizing or removing pipe sections by using an immersion type probe in conjunction with a PIG.



Equipment:



[RAPTOR Flaw Detector](#)

Key features

- Spike or Square tunable wave pulser
- 0.5 MHz - 30 MHz receiver
- 25Ω - 375Ω (8 damping levels)
- 10Hz - 5000Hz PRF for high-speed scanning
- Sun readable full VGA display 640 x 480
- 8 hours of battery autonomy
- DAC/TGC incl. JIS, ASME, ASME-3 compliance
- Shear mode for flat or curved surfaces (CSC)
- AWS calculations as per D1.1/1.5 code
- Imaging view: B/C-scan, spreadsheet, 3D, histogram
- SplitScan view: Display A-Trace and B- or C-scan
- 2GB built-in and 2GB external/removable storage
- Windows based RAPWIN software for post-processing
- Quick and direct access to submenus with F1-8 keys
- Rugged aluminum case with rubber end caps

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Technical Outline/Procedure: Enel Green Power, based in Nevada, inspects oil well pipe and casing integrity using a custom UT solution. EGP incorporates a NDT SYSTEMS TG-410 thickness gage and an IBMF054 immersion probe with an immersable rig. The rig consists of a housing with a constant force leaf-spring and two stand-off flanges, which keep the housing centered in the well bore. Inside the housing is a water coupling system, and a holder for the IBMF immersion probe, oriented at 90 degrees to the travel direction. The entire rig is lowered into the well casing, and sealed within to allow for pressurization. Once the rig is secured inside the casing, it is slowly lowered and rotated, with thickness data points gathered along the way.



The TG-410 is set up for immersion testing by gating out the water path, and measuring the sound wave travel time from the water-pipe interface echo to the pipe backwall echo. Nominal thickness values for the pipe wall are close to 0.5", and displayed thicknesses significantly less are marked as potential flaws. For depths of 60' the TG-410 works very well, and the signal to noise ratio from interface to backwall is well defined.



EGP recently needed to inspect wells at greater depths than previous inspections. For greater depths, more capability is required, as the increase in cable length decreases the signal to noise ratio. The RAPTOR Flaw Detector was chosen as an alternative to the TG-410 for a few specific reasons. Firstly, the RAPTOR is able to deliver pulses of greater voltage, which in turn allows successful resolution of greater wall thicknesses at greater depths. The RAPTOR's larger, full color screen also allows the operator to more easily read the displayed thickness, and therefore more accurately characterize the condition of the pipe wall.

After a demonstrating the capability of the RAPTOR Flaw Detector over a cable length of 120', the EGP decided to upgrade from their TG-410.

Please contact NDT SYSTEMS for information on similar applications and solutions.