Advanced Eddy Current Array Tools for Stress Corrosion Cracking Direct Assessment on Pipelines

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Magnetic Particle Inspection (MPI) has been the main reference for Stress Corrosion Cracking (SCC) detection in pipeline integrity for years. Although this technique is relatively economical and easy to deploy – thanks to a large pool of certified technicians – it remains time-consuming and highly user dependent. Some of the factors impacting results during SCC Direct Assessment (SCCDA) include the total surface area requiring examination, hard-to-reach positions underneath pipes during inspection, improper surface preparation due to poor sandblast or contrast, condensation on pipes, and operator fatigue. Recent trials have proved that Eddy Current Array (ECA) technology compares favorably against MPI on many aspects in the field, and that ECA has the potential to become the new standard for SCCDA on pipelines. Offering an impressive speed, combined with a particularly high Probability of Detection (PoD), ECA could transform the work of technicians in ditches and above all, offer greater control over the human factor. Besides detection, ECA has also proved its reliability for SCC characterization on real SCC colonies in both lab and field environments. Comparisons with metallography cuts, grinding measurements and X-Ray Computed Tomography (XCT) data have greatly contributed to optimized depth sizing algorithms for this new solution, providing accurate SCC depth readings. Although ECA and Phased Array Ultrasonic Testing (PAUT) are often complementary techniques in the field, the main advantage of ECA over PAUT resides in the short amount of time required to locate and size the deepest cracks among colonies containing sometimes thousands of cracks. Within a few minutes, technicians and engineers know where to concentrate and how critical SCC really is so that decisions can be made instantly. Combining ease of use and repeatability (ways to control the human factor) is another key benefit of ECA technology. This paper provides information about a complete ECA solution for SCC detection and depth sizing on pipelines. It reveals results from the field, comparing ECA with MPI, covering several key points and demonstrating how ECA stands out as improving the overall screening process efficiency during examinations in digs. Furthermore, it also exposes and compares ECA data with both destructive and non-destructive testing performed on test pieces containing real SCC. Keywords: Non-Destructive Testing, Stress Corrosion Cracking, Direct Assessment, Carbon Steel, Eddy Current Array, Pipeline Integrity, Magnetic Particle Inspection