

# **Evaluation of the Total Focusing Method and Phase Coherence Imaging Techniques for Corrosion-Resistant Alloy Applications**

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Corrosion-resistant alloys (CRAs) offer numerous advantages in preventing corrosion in the oil and gas equipment. However, the use of these alloys, whether as cladding, dissimilar metal welds, or base material, poses several challenges for ultrasonic inspections. These challenges include beam scattering, distortion, and absorption, leading to high attenuation and a poor signal-to-noise ratio. The transmit receive longitudinal (TRL) technique is considered to provide the best inspection performance for austenitic materials. The development of Dual Matrix Array™ (DMA) and Dual Linear Array™ (DLA) probes incorporated the advantages of phased array inspection with the TRL technique, making them a very effective solution. However, there are certain limitations like reduced sensitivity at the front surface and the inherent presence of mode conversions, which can add complexity to the inspection. In this presentation, we evaluate advanced ultrasonic techniques like the total focusing method (TFM) and phase coherence imaging (PCI) for the same application. TFM offers easier image interpretation compared to conventional phased array inspection. The PCI algorithm relies solely on phase-related information, eliminating amplitude information from the elementary A-scans so that it is unaffected by material attenuation. However, these results can be affected by the choice of probe, and we explore this aspect in our comparison.