Comparative study of FMC-TFM and Phased Array UT for weld inspection

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Phased array ultrasonic technique has evolved rapidly over the past 20 years and created major impact on the industrial applications for ultrasonic NDT industry. In the recent days Ultrasonic Full Matrix Capture (FMC) & Total Focusing Method (TFM) technique is growing fast for various industrial applications. With advancement in the electronics and software the equipment manufacturers can provide the live image of data intensive FMC-TFM technique in portable equipment. So, the FMC-TFM technique is experimented by the users in various fields for different applications to understand the use cases. In this paper, the study of FMC-TFM technique for weld application is discussed in detail. The effect of different mode combination of TFM imaging using FMC data for different nature of weld and its defects are illustrated in detail with the practical use cases like importance of scan plan, area of coverage of weld, probe selection (i.e., probe elements and frequency) and amplitude fidelity. Study on the effect of TFM mode selection, grid resolution, probability of detection, TFM image artifacts for different type of weld inspection images in comparison with phased array UT images are presented with examples. The advantages and challenges of different nature of weld application using FMC-TFM in comparison with phased array UT and the recommendation of FMC-TFM technique for weld inspection will be presented as part of this paper. Keyword: FMC-TFM, Full Matrix Capture, Total Focusing Method, TFM, Phased Array UT, TFM Weld Inspection