

Surface Adaptive Total Focusing Method for Complex Geometry and Review of various advanced TFM-based Algorithms

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Surface Adaptive Total Focusing Method for Complex Geometry and Review of various advanced TFM-based Algorithms Cyril Thibault¹, Gavin Dao¹ Ewen Carcreff², Dominique Braconnier², Zhanping Xu² ¹Advanced OEM Solutions; Cincinnati, USA ² The Phased Array Company; West Chester, USA cyril.thibault@aos-ndt.com, gavin.dao@aos-ndt.com **ABSTRACT** Total focusing methods such as SAFT, TFM, PWI are becoming standard in the nondestructive testing industry, as they generally give better image quality than conventional phased array ultrasound. Since all TFM methods are time-based approaches, they provide excellent results, as long as the geometry and the acoustic properties of the material are well known. In reality, there are often cases where the characteristics of the part being tested, such as the geometry, are not well known. In this paper, we propose an adaptive approach of the total focusing method (ATFM) and APWI in order to take into account a complex specimen shape. ATFM requires a single data set for a single image and does not need multiple acquisitions to detect the profile. We show examples from the inspection of an immersed steel part containing various flaws, inspected with a 128 element probe. Several TFM acquisitions schemes are compared in terms of image quality (resolution, contrast) and computation time. We show that with ATFM the agreement between the theoretical profile and the estimated profile is good, and moreover the flaw positioning is correct. **Keywords:** Surface Adaptive Total Focusing Method, FMC, TFM, ATFM