Ultrasonic Total Focusing Method (TFM) for AIRBUS aerospace applications

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As the ultrasonic phased array (PAUT) applications and equipment became more and more widespread in aerospace, the newest generation of equipment offers additionally the total focusing method, TFM, based on full matrix capture, FMC. AIRBUS continuously strives to enhance the current capabilities of our inspection procedures and makes use of these options and develops dedicated In-Service and manufacturing inspection procedures. For the In-Service application metal T-shaped components need to be inspected in order to detect fatigue cracks in webs with various configurations in terms of thickness, bore hole diameter and bore hole depth, with only one setup. To resolve the complexity of challenging procedures with many different equipment settings using conventional PAUT, the inspector can now inspect these different components and configurations with one equipment configuration, thanks to the TFM reconstruction. This TFM procedure was developed and qualified, supported by a probability of detection (PoD) study, with a wide range of typical metal structural build ups. It has been demonstrated that small fatigue cracks can be detected reliably. Another example for an application of the TFM method is related to manufacturing for the inspection of Additive Manufactured Parts made by Direct Energy Deposition (DED). Due to its dedicated focussing on each pixel of the Region of Interest (ROI) the TFM method enables a significant improvement in sizing of small irregularities in those metal parts. Furthermore, the entire thickness of the inspection area can be inspected without adapting the setup / focussing parameters which leads to an improved and accelerated inspection process.