Automated Phased Array CFRP Structural Component Inspection & AI analysis

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The aviation industry is gradually returning to pre-pandemic production levels, and the rates of new airplane production are expected to increase in the coming years. Consequently, aviation component manufacturers are preparing for this surge in production rates while grappling with a shortage of skilled personnel. In response to these challenges, this paper proposes an innovative automated ultrasonic phased array (PA) solution to achieve full volumetric coverage of CFRP structural components including the web, flanges, and radiuses. The system comprises an inspection head mounted on a gantry on , a water and vacuum management system and an immersion tank, wherein the part is supported by pedestals equipped with suction cups. The dedicated inspection head, hosting multiple linear and radius phased array probes, capable of adapting to various geometries, is inserted onto the part to be inspected, enabling the examination of the entire part with minimal user intervention. Additionally, to further support users in the intricate process of data analysis, artificial intelligence (AI) is under investigation as a companion to simplify and expedite the analysis by automatically identifying the location and dimensions of the potential flaws in a 3D environment. The paper will present the automated system components and the results obtained from AI data analysis.