

CASPR, toward flexible and automated NDE 4.0 platform for manufacturing

Nicolas Colin¹, Camille Trottier¹, Baptiste Véron²

¹Monitoring, Inspection & Process Control, Nantes Université, IRT Jules Verne, F 44000 Nantes, France, France, ²Robotics & Cobotics, Nantes Université, IRT Jules Verne, F 44000 Nantes, France, France

The increase in production rates in the aerospace sector brings out the needs for flexibility, reduction of the human factor and development of digital functionalities in the field of NDT. The CASPR platform, presented here, aims to address these three major needs. To do this, a fully cobotized inspection system for large CFRP structures or complex geometry requiring flexible systems will be developed, as well as the tools necessary for the relevant interpretation of inspection data. CASPR will enable complete integration of flexible and mobile NDT systems closer to manufacturing processes in the aerospace industry. At the end of three years of development, we are aiming four main achievements. First, a cobotic architecture fully optimized for NDT, an application that requires precise mapping of the entire surface of the part, whether flat, cylindrical, or truly complex. Particular attention will be paid to the automatic generation of inspection trajectories adapted to the real geometry of each part. Secondly, the adaptation and optimization of inspection tools to complex geometries (such as radii, holes, part edges, openings, variations in thickness) through simulation, adaptative piloting software, smart effector offering several inspection tools to improve the reliability of the diagnosis and to reduce the time spent on rechecking for false positives (ultrasonic NDT with optimized coupling, visual inspection and dimensional control). Thirdly, combined analysis tools adapted to complex and very large geometries for diagnostic. Fourthly, developed data fusion tools in order to optimize the restitution to the operator through augmented reality. The presentation will focus on the objectives of the project in relation to NDE 4.0, the first results and the challenges to come.