CleanSky project enables non-destructive testing of complex carbon fiber parts for aerospace applications

PROFACTOR develops robot-based ultrasonic testing

Safety has top priority in aerospace. In order to guarantee that important structural carbon fiber parts are defect-free, appropriate quality control is required. A common technology used to inspect the integrity of parts is ultrasonic testing. However, the inspection process is difficult to automate, given the complex part structures that are present in many situations. Strong curvatures and high wall thicknesses put challenging requirements on the inspection procedure. Project SonicScan is dedicated to lift automated ultrasonic inspection to the next level.

In the context of project SonicScan, Profactor is currently developing an automated robotic work-cell for ultrasonic inspection. Strong partner in the project is ACS with excellent know-how in ultrasound technology. The project is part of the EU CleanSky Programme. "In the longer term, the technology will ensure that high quality requirements in aerospace industry are implemented efficiently." explains Sebastian Zambal, project manager at PROFACTOR. Initial results from the project will be presented to the wider public on May 8th during the Austrian science night 2020 ("Lange Nacht der Forschung") directly at the laboratory of Profactor in Steyr (Upper Austria).
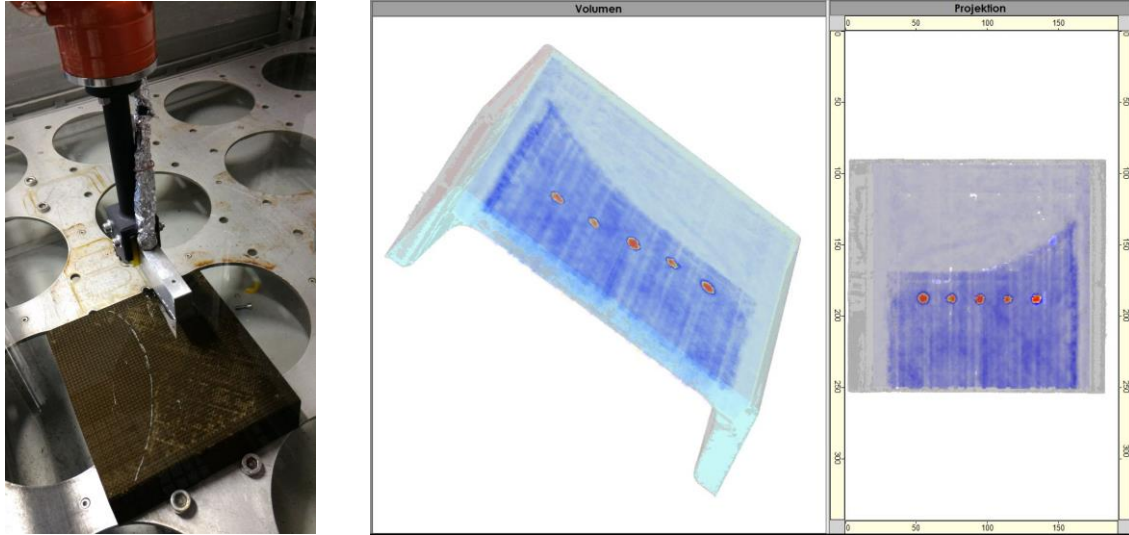
Optimal coverage

Important for the ultrasonic testing of parts is that all regions of a part are actually covered. Therefore, the test head must travel across the part's surface at a defined distance. In order to execute this motion with an industrial robot, multiple things need to be taken into account: propagation of the ultrasonic signal, geometry of the part, shadowing, accessibility, and spacing between part and test head. To solve such a complex path-planning problem, Profactor develops special software.

New methods for analysis

Reflections of ultrasound signals provide information about irregularities or defects within a part. The correct interpretation of these measurements made on carbon fiber parts poses specific challenges. Because such parts are made up of many layers of carbon fiber material, scattering within the material leads to a reduction of measurable signals. Algorithms that are

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adjusted to these specific requirements are being developed in order to effectively look for defects. Advanced computer models enable the 3-dimensional reconstruction of a part's inside. Machine learning is used for detection of critical defects.

Ultrasonic testing enables a view into carbon parts.

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SonicScan fact sheet

Project title:	SonicScan - Innovative quality inspection methods for CFRP primary structural parts
Coordinator:	PROFACTOR GmbH
Partner:	ACS
Duration:	2019 - 2021
Funding:	EU Clean Sky 2
Website:	http://sonicscan.eu/

PROFACTOR was founded in 1995 by the Austrian association "Vereinigung zur Förderung der Modernisierung der Produktionstechnologien in Österreich (VPTÖ)".

2014 the Upper Austrian Reserach GmbH (UAR) acquired 49 percent of the company. Since June 2018 the AIT Austrian Institute of Technology holds 51 percent of PROFACTOR GmbH.
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