

# PRESS RELEASE

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**Fraunhofer Vision at Control 2023**  
May 9<sup>th</sup> – 12<sup>th</sup>, 2023 in Stuttgart, Hall 7, Booth 7301

## **Intelligent assistance system with interactive visualization for laboratory and service tasks in non-destructive testing**

### **Short text**

**A planned service life of components and structures can only be achieved if quality-assured designs and the maintenance measures during the service life phase are coordinated. Therefore, it is often necessary to record component-specific characteristic values non-invasively with a high accuracy of the measured value and location. "3D-SmartInspect" from Fraunhofer IZFP is an intelligent assistance system for digital hand-guided inspection. The system consists of a low-cost webcam, a computer with special software and can optionally be combined with a HoloLens. After a quick set-up process, the tracking module records the movement of the probe and fuses inspection positions and measurement signals. In this way, testing tasks especially in the field are facilitated such as examination of safety-relevant industrial components or infrastructure. Assisted ultrasonic inspection with subsequent data reconstruction will be demonstrated. The result can be transferred to DICONDE (Digital Imaging and Communications for Non-Destructive Evaluation) in the form of a digital component file. The assistance system thus provides the potential to feed digital twins in different industrial application areas such as construction, transport, aerospace or other with in-situ quality data.**

### **Long form**

#### **Manual inspection of industrial components and structures**

A planned service life of structures can only be achieved if planning, dimensioning, constructional requirements, quality-assured designs and the necessary maintenance measures during the service life phase are coordinated. Therefore, it is often necessary to record component-specific characteristic values non-invasively with a high degree of accuracy in the recording and location of the measured values. The testing of safety-

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relevant industrial components and structures is in many cases carried out by hand. With hand-held testing, the quality of the test depends heavily on the personnel and the environmental conditions. Correct analysis of the measured values and complete coverage of the test area require a great deal of experience. In addition, there are considerable challenges for companies in terms of test execution. Up to now, test protocols have been written by hand and detected anomalies have been marked on the components themselves. A digital connection between the test object and the test performance is not established.

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### **Digital documentation and interactive inspection by »3D-SmartInspect«**

With the "3D-SmartInspect" technology developed at the Fraunhofer Institute for Non-destructive Testing IZFP, Saarbrücken, a system with interactive assistance and digital documentation is now available for manual inspection. The intelligent assistance system optically records the inspection process (e.g. eddy current method, ultrasonic method, impulse or micro magnetics), a tracking module follows the movement of the inspection head and logs inspection positions and measurement signals. Recorded measurement signals and volume data are evaluated AI-supported and fused with location coordinates for the live image. The registered fault indications are displayed on a control screen (notebook or tablet). Augmented reality (AR) also enables visualization with HoloLens glasses.

In the spirit of Industry 4.0, the results are finally transferred to DICONDE (Digital Imaging and Communication for Non-Destructive Evaluation) in the form of a digital component file. Such a supplement relieves the inspectors to a considerable extent. Time-consuming and error-prone preparatory work and manual documentation become redundant. Engineers can correctly record relevant data with intelligent assisting sensor systems and profitably use it in the digital product memory, in every product life phase. Through the DICONDE environment, the recorded data can be compared and analyzed with other NDT processes.

### **Areas of application for 3D-SmartInspect**

The assistance system is suitable for all application areas of manual inspection, including civil engineering, aerospace (safety-relevant components), energy plants (turbines, generators, high-pressure vessels, etc.) and large-scale equipment manufacturing.

### **Advantages**

- 100 percent inspection: the system ensures that the inspection area is completely scanned and all detected defects (e.g. corrosion, cracks, concrete cover) are localized.
- Reduction of inspection time: The inspector's work is accelerated by the interactive visualization of areas already inspected and areas still to be inspected. Multiple scanning of an area is avoided.

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- Fast display of reconstructed data: The fusion of location data and measurement data makes it possible to calculate and display reconstructed data while still on site.
- Digital inspection memory: Automatic documentation of inspection results as proof of correct inspection performance in accordance with quality assurance requirements.
- DICONDE interface: Transmission and storage of the evaluated material data as a digital component file (central data storage).
- Combination with collaborative robotics and additional sensors based on further inspection principles.

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**FRAUNHOFER VISION BUSINESS UNIT****Image in print quality**

Image 1: (fraunhofer-vision-control-2023-izfp-ultraschallpruefung-bild1.JPG) Ultrasonic inspection of concrete using 3D-SmartInspect (Source: Fraunhofer IZFP).

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**Exhibition dates**

Control 2023 in Stuttgart  
May 9<sup>th</sup> – 12<sup>th</sup> 2023  
Hall 7, 7301

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