Newsletter 2

TMCOMAS, AIMEN, and Ziknes take on R3-Mydas, where they aim to fully automate and optimize Oil & Gas crankshaft repair processes

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Advancements in Automated Crankshaft Repair in the Oil & Gas Sector

As part of our ongoing efforts to revolutionize crankshaft repair in the Oil & Gas sector, we have progressed to the next stage of our project by conducting more specific tests on crankshafts sourced directly from the industry. These tests have been crucial in refining techniques and ensuring that methods are highly effective under real-world conditions.

Integrating Sensors into Robotic Systems

To further automate the repair process, it was integrated both sensors into the robotic system. As part of this integration, it was conducted a visit to the facilities to define the requirements and capabilities of the work cell.

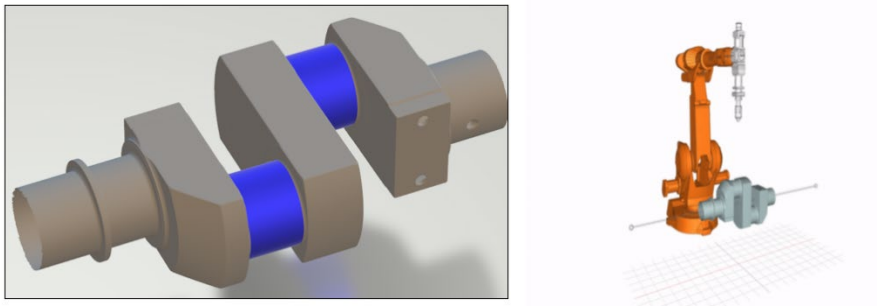

Figure 1. Journals to be repaired (left) and process simulation (right)

This visit was crucial for starting the definition of the virtual environment aimed at robotic simulation. The simulation will be responsible for generating collision-free robot trajectories for both the cladding and scanning processes. By ensuring these trajectories are optimized, it is possible to further enhance the efficiency and precision of the automated repair system.

Comparative Analysis of Scanning Technologies

To enhance the accuracy of the repair process, it was conducted a comparative study between a manual 3D metrology scanner and a snapshot camera. This study aimed to investigate the differences in the results produced by these two scanning technologies.

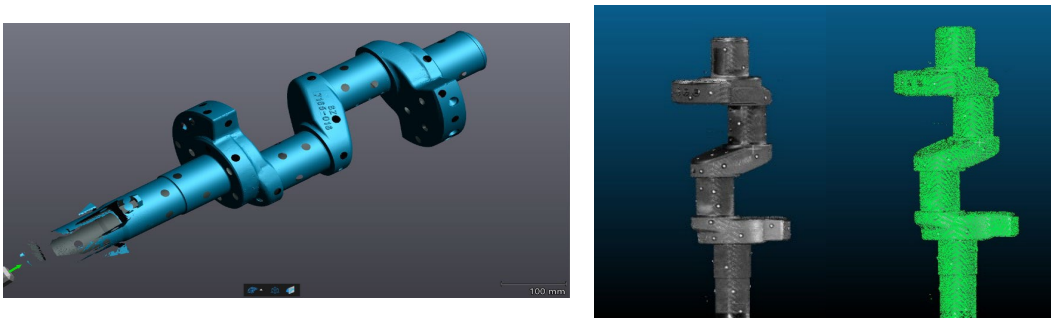

Figure 2. Oil&Gas Crankshafts digitalized with a 3D Metrology Scanner (left) and with a Snapshot camera (right)

The 3D metrology scanner, known for its precision, served as a reference standard. It generated point clouds from both the metrology scanner and the snapshot camera and then conducted a detailed comparison.

Results and Findings

In the initial approach, it was observed a deviation of 0.8 mm in the area of interest when comparing the point clouds obtained from the snapshot camera against the reference metrology scanner. This deviation highlighted areas for improvement in the snapshot camera's scanning accuracy.

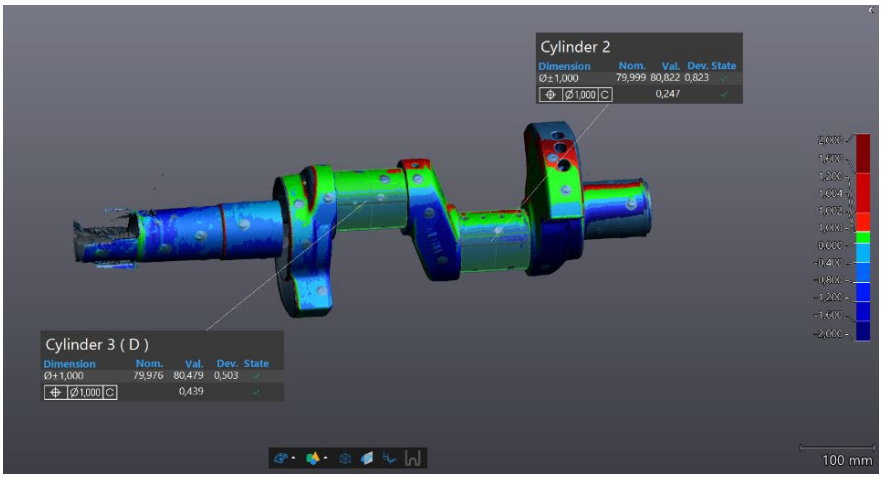

Figure 3. Entities analysis from an Oil & Gas Crankshaft

Regarding Sensor-Robot integration, it was possible to conclude that is important to have good precision of all the crankshaft and the environment since it will restrict the robot's movement in all the steps of the process.

Future Steps

Moving forward, the focus will be on optimizing the scanning algorithm of the snapshot camera. The goal is to achieve results that are as close to reality as possible. Once this algorithm is refined, it will be done an integration of the snapshot camera into the robotic system for further automation trials.

Also, studies will be developed on the parametric identification from mesh and 3D repair volume, the tool orientation, the coordination between the robot and the gripping tool and the toolpath generation.

This next phase will enhance the precision of our automated repair process while streamlining operations, thereby reducing both time and resource consumption. The commitment to innovation continues to drive us towards setting new standards in the industry. Stay tuned for more updates on our progress.