



JARVIS

DRIVING HUMAN-ROBOT COLLABORATION:

**REPAIR: Advancing Human-Robot
Collaboration in Industrial Maintenance
and Remanufacturing**



Funded by
the European Union

The project has received funding from the European Union's Horizon Europe

JARVIS-REPAIR: Advancing Human-Robot Collaboration in Industrial Maintenance and Remanufacturing

The Vision of Jarvis Repair

Jarvis Repair is a pilot project designed to revolutionize the inspection and refurbishment of mechanical components by creating a seamless collaborative environment where AI-driven robotic precision assists human expertise through intuitive spatial augmented reality.

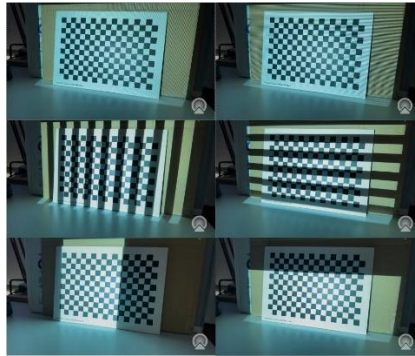


Integrating the JARVIS Framework: Technology & Impact

Our project is deeply rooted in the **JARVIS framework**, leveraging its core philosophy of creating "aware" and "responsive" industrial environments. By integrating high-level AI modules with robust hardware, we are transforming how Bonfiglioli approaches quality control and repair, preparing the ground for future remanufacturing processes.

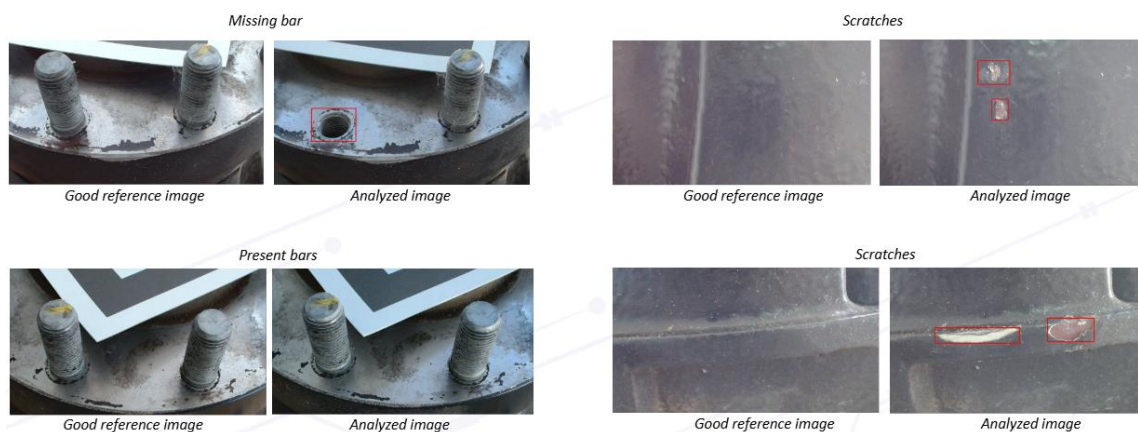
Key Technical Milestones & Integration

Thanks to Deep Vision Consulting's technical expertise, we have made significant strides in hardware optimization and software intelligence. Currently, the **vision system** is physically mounted on the robot flange and perfectly calibrated. This setup works in tandem with our **3D localization module**, which identifies mechanical parts and calculates their pose with high precision.



- **Smart Path Planning:** We have successfully integrated the Jarvis tool for Robot Trajectory and Path Planning interfaces, that allows the robot to navigate complex geometries autonomously.
- **Anomaly Detection:** We are currently testing our first **AI-based anomaly detection module**. This system is designed to automatically identify defects on mechanical surfaces, reducing the margin for human error.

Anomaly Detection Results



- **Spatial AR Guidance:** One of our most exciting developments is the **AR projection module**, currently on testing. By improving the positioning of the camera-projector system on the robot, we can now project digital information directly onto the physical part. This guides operators by highlighting defects and providing a manual positioning guide during the initial configuration phase.

Projection Results



Current Status: While we are still refining the automatic reporting features, the system has reached a major milestone: **it is now capable of recording a specific part configuration and replicating the entire inspection process autonomously.** This move from manual oversight to robotic autonomy, supported by JARVIS mentoring, significantly boosts our operational efficiency.

The Power of the JARVIS Ecosystem

The success of Jarvis Repair is not just a result of internal development but a testament to the collaborative power of the **JARVIS ecosystem**. Being part of this network has provided us with more than just technical frameworks; it has provided a springboard for innovation.

- **Technical Synergy:** The collaboration has facilitated the integration of complex technical modules, with JARVIS-supported mentoring playing a key role in enhancing the robot's path planning capabilities and enabling more efficient, reliable navigation strategies.
- **Strengthened Outreach:** The framework has provided a platform for dissemination, ensuring that the results of our pilot project contribute to the broader European knowledge base on human-robot interaction (HRI).

As we move into the final testing phases of our AR and anomaly detection modules, we look forward to finalizing a system that detects errors and empowers our workers to take relevant decisions faster and more accurately than ever before.