

QUARK - QUality Assurance with Robotic Knowledge

The QUARK pilot transforms a rigid inspection cell into a flexible, human-centric, and autonomous quality assurance station

THE CHALLENGE AND WHY IT MATTERS

High-mix, low-volume manufacturing at GERMANPLAST was severely bottlenecked by rigid, legacy AI inspection stations requiring half- to full-day manual reconfigurations by external engineers for each product changeover. Operators also suffered high cognitive and physical strain from non-contextual alarms. Solving this eliminates expensive downtime, slashes setup costs, and drastically improves floor ergonomics and operational safety.

OUR SOLUTION AND VALUE PROPOSITION

The validated prototype integrates a UR10e collaborative robot, a RealSense D435 camera pipeline, and a projector directly on GERMANPLAST's active production floor. The system executes automatic multi-part identification and spatial 3D localization across various plastic components. The robot automatically adjusts its trajectories to perform a 360° visual inspection using parallel deep-learning networks. Compliant parts are sorted autonomously, while the projector displays real-time metrics and color-coded alarm notifications to the workforce. This solution provides concrete value to GERMANPLAST and its operators: it eliminates manual reconfigurations, drops defect catch rates to a 96.2% precision level, halves alarm intervention latency to 2 minutes, and drastically reduces physical and cognitive strain.

ADDED VALUE FROM JARVIS

The pilot integrated two native JARVIS modules:

- Object Recognition & Pose Estimation (KUKA): adapted via Docker containers to automate multi-part identification and spatial 3D tracking. It eradicated manual software reconfigurations, converting complex setup procedures into a seamless workflow.
- AR Interfaces (LMS): deployed via an AR projector over a TCP/IP bridge. It lowered cognitive strain and halved alarm intervention latency.

KEY RESULTS

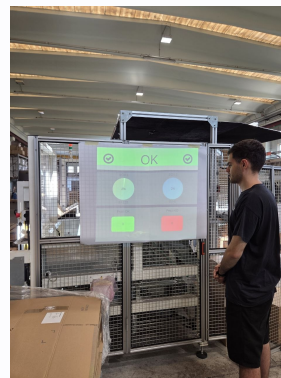
Empowering Usability Leap: system Usability Scale (SUS) scores surged from an unacceptable legacy baseline of 32.5 out of 100 up to an empowering 72.5 professional supervising experience.

Faster Alarm Response: Deploying the AR projector cut average operator alarm response and recovery times from 4 minutes down to 2 minutes, delivering a verified 50.0% reduction in intervention latency.

AI Quality Precision: enriched training with synthetic defect overlays pushed the final defect catch rate to 96.2%. This represents a 20.25% relative improvement over the legacy baseline and a net 5.70% accuracy increase driven exclusively by synthetic data injection.

POTENTIAL MARKET OPPORTUNITIES

The first target market is the high-mix plastics manufacturing sector, focusing on SMEs like GERMANPLAST. Later, the modular architecture can be adapted to packaging, automotive components, consumer electronics, and medical devices. The next scaling step will expand the deep-learning inspection networks to encompass a broader portfolio of active component families.



PILOT AT A GLANCE

Lead organization: IDEA soc. coop.

Consortium: GERMANPLAST srl

Sector / use case: Plastics Manufacturing / Inline Quality Inspection and Handling

JARVIS module(s): Object Recognition & Pose Estimation + AR Interfaces

Demonstration environment: Operational manufacturing environment (TRL 7) directly on the active production floor at the GERMANPLAST facility

MORE INFORMATION

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Videos: <https://www.youtube.com/@JARVISHorizonEuropeProject>

