

AI-Powered Zero-Defect Manufacturing

Transforming Automotive Quality Control at Assan Hanil with Wearable Vision Technology

**A Case Study on Eliminating
Operational Blind Spots**

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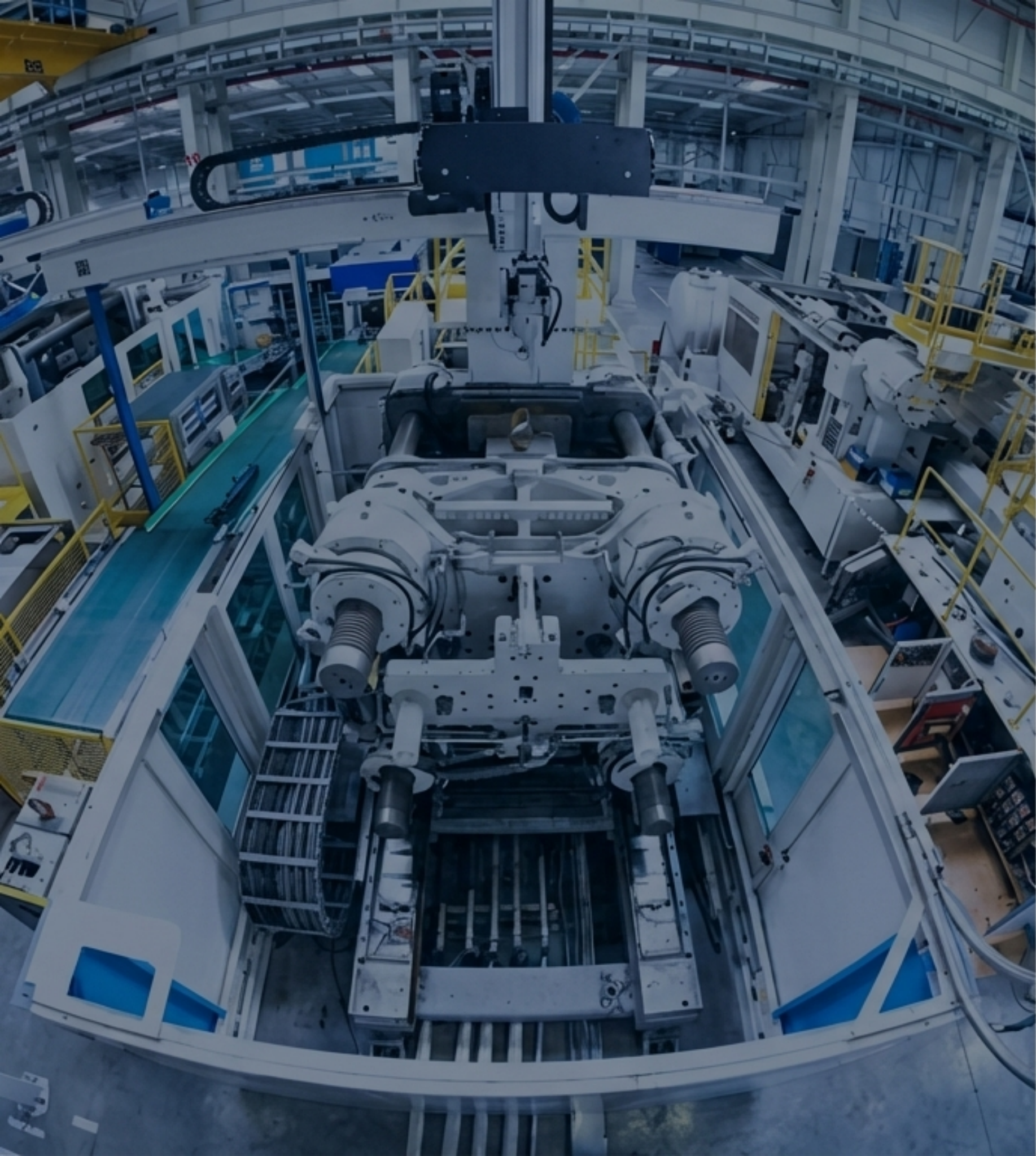
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The Imperative for 100% Assembly Precision

As a Tier-1 automotive supplier producing large, complex plastic components, Assan Hanil operates in an environment where achieving absolute accuracy in assembly is a non-negotiable mandate.

- » **High-Volume Velocity:** Balancing rapid production line speeds with zero-tolerance quality mandates.
- » **Complex Geometries:** Manufacturing parts with hidden, interior, and occluded features that resist standard visual inspection.
- » **The Precision Gap:** Bridging the divide between legacy mechanical inspection limits and modern OEM perfection requirements.

The Hidden Costs of Operational Blind Spots



Technological Limitations

Operational Friction Flowchart

Fixed legacy industrial cameras rely on consistent lighting and strictly stationary angles.

Result: Complete inability to inspect occluded, interior, or complex surfaces.



Human Vulnerability

Operational Friction Flowchart

Blind spots force workers to perform visual checks by eye.

Result: Fatigue-driven variability, subjective assessment, and slower cycle times.



Enterprise Business Risk

Operational Friction Flowchart

Imperfect inspection allows assembly defects to slip down the line.

Result: Costly downstream rework, degraded quality assurance, and critical workflow bottlenecks.

Key Insight Callout Box: Current technologies are insufficient for analyzing parts that are further inside and not visible. A new approach was required to reach hidden areas under any conditions.

From Manual Operations to Intelligent Automation

The Tech Stack Synergy

VEGA-X Smart Scanner

- Next-generation wearable device enabling hands-free operation.
- Equipped with a dynamic mini camera and onboard processing.
- Transforms the worker's hand into a mobile, 360° validation tool.



TIM INSPECT Platform

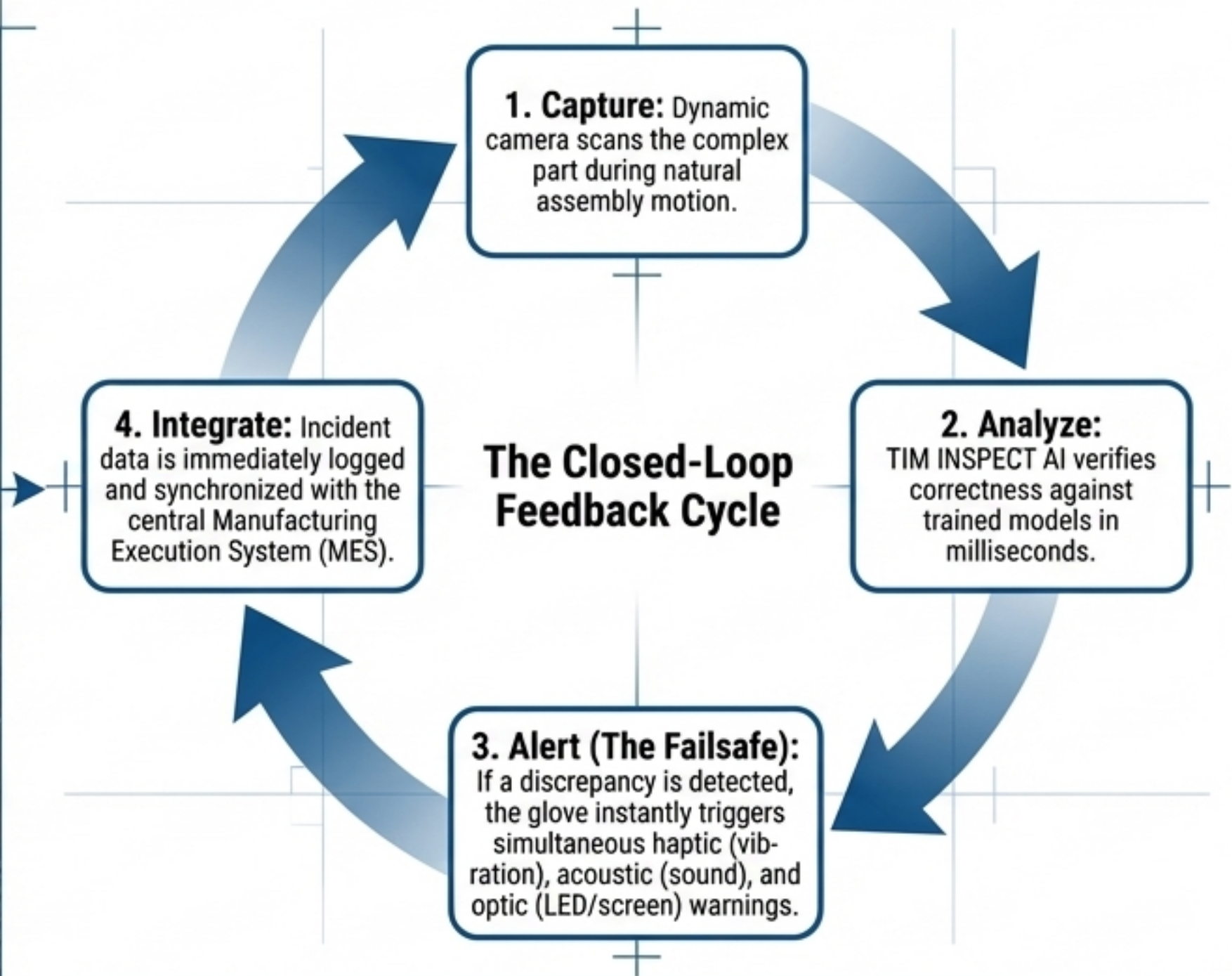
- Advanced machine vision AI natively integrated with the VEGA-X.
- Pre-trained on proprietary Assan Hanil CAD models and part data.
- Executes real-time, on-the-fly component verification regardless of background lighting.

The Capability Matrix: Eliminating the Compromise

	Legacy (Fixed Cameras)		VEGA-X + AI Vision
Coverage & Visibility	Leaves critical blind spots; unable to see interior cavities.	➤	360° dynamic validation ; inspects every nook and angle seamlessly.
Ergonomics & Agility	Requires workers to physically maneuver large parts into stationary camera views.	➤	Highly mobile, hands-free wearable scanner functioning as a natural extension of the operator.
Quality Assurance Mode	Reactive. End-of-line checks allow errors to accumulate.	➤	Proactive . Continuous, on-the-fly verification at the exact point of assembly.
System Scalability	High infrastructural cost per viewing angle.	➤	Plug-and-play wearable ecosystem; replaces multiple fixed installations with one device.

Real-Time Error Prevention: The Multilayer Poka-Yoke

Transforming end-of-line inspection into point-of-assembly prevention.



Insight Sidebar

This instantaneous alerting mechanism acts as an unbreachable safety net, guaranteeing that no error goes unnoticed and every operator acts as a definitive quality gate.

Operational Impact & Measured Gains

100% Inspection Coverage

Complete elimination of visual blind spots. Near-zero overlooked defects through comprehensive interior and exterior part validation.

3-Week Pilot-to-Live

Accelerated Time-to-Value (TTV). Rapid deployment enabled by plug-and-play architecture, requiring zero extensive downtime or complex external OS installations.

Seamless MES Integration

Zero-disruption connectivity. Real-time synchronization of defect alerts and inspection data directly into Assan Hanil's existing quality monitoring dashboards.

Proactive Error Containment

Eradication of downstream defect escalation. Instantaneous Poka-Yoke feedback ensures human errors are caught and corrected on the spot, prior to line advancement.

A wide-angle photograph of a modern industrial factory floor. The scene is dominated by a long, straight line of industrial machinery, including several robotic arms mounted on workstations. The floor is polished and reflects the overhead lights. The ceiling is high with a complex network of pipes and lighting fixtures. The overall atmosphere is clean, organized, and technologically advanced.

Strategic Vision: The Smart Factory Blueprint

Assan Hanil has established a closed-loop quality assurance system that successfully marries human agility with unblinking AI oversight.

- **Future-Proofing Quality:** Secures Assan Hanil's position against increasingly stringent OEM zero-defect demands.
- **Workforce Empowerment:** Equips operators with cognitive safety nets, reducing fatigue-driven stress while improving cycle time ergonomics.
- **Scalable Architecture:** Proves a highly adaptable, minimal-disruption integration model primed for rapid facility-wide rollout and continuous operational excellence.

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