



TIER-1 AUTOMOTIVE CASE STUDY

Achieving Six Sigma Precision in Complex Manufacturing

Eliminating quality blind spots with mobile edge AI and wearable vision.

Powered by **THREAD IN MOTION**

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The 'Zero Defect' Mandate in Tier-1 Automotive Production

Tirsan Kardan brings over 60 years of expertise to the global automotive supply chain, producing critical drivetrain components including cardan shafts, steering columns, and flanges. Operating from the Manisa Organized Industrial Zone, they serve leading OEMs who demand absolute perfection.

The Operational Imperative:

Automotive contracts dictate rigorous Six Sigma-level quality standards—often allowing no more than one defective part per million (1 PPM). Achieving this is not just a contractual obligation; it is the fundamental baseline for global vehicle safety and brand survival.

Legacy Inspection Methods Create Systemic Vulnerabilities

Relying on static infrastructure and manual checks for complex, 3D mechanical parts introduces unacceptable operational friction.



Fixed Camera Blind Spots

Static machine vision systems cannot inspect dynamic, 3D geometries. Critical features—such as internal grooves, backside welds, and underside surfaces—remain unchecked, creating dangerous quality gaps.



The Human Bottleneck

To inspect hidden areas, manual operators must use mirrors or physically disassemble parts. This introduces subjective human judgment, cognitive fatigue, and severe production bottlenecks.



The Cost of "Escapes"

Undetected micro-defects that bypass static cameras and fatigued humans lead to downstream rework, elevated scrap rates, and the catastrophic financial risk of OEM vehicle recalls.

Unchaining the Camera via Mobile Edge AI

Legacy Systems (Fixed & Manual)

Mobility

Static/Tethered infrastructure

Cognition

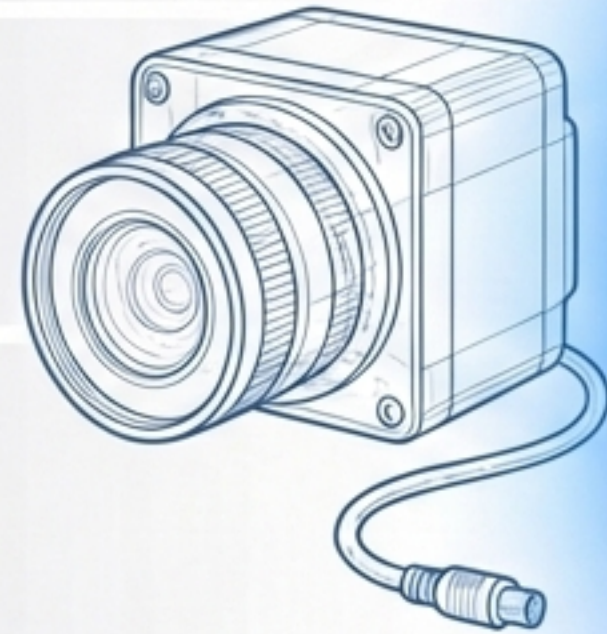
Rigid rules-based parameters
& subjective human checks

Environment

Fails under variable lighting/noise

Ergonomics

Requires bending, lifting, and
unnatural strain



TIM Inspect (VEGA X + TIM Inspect)

Mobility

100% Mobile, 360° roaming
coverage

Cognition

Deep Learning / Advanced
Pattern Recognition

Environment

Agnostic to lighting changes
and background factory noise

Ergonomics

Hands-free, wearable
continuous flow



The Anatomy of Instantaneous Defect Detection

1. Ergonomic Capture (VEGA X)

The operator naturally navigates the wearable smart glove into hard-to-reach zones. Hands-free, one-handed scanning initiates image capture of complex geometries.



2. Edge Inference (TIM INSPECT)

Deep learning algorithms—trained rapidly via AutoML using a small set of "OK" vs "NG" line images—analyze the physical geometry natively at the edge in a fraction of a second.



3. Tactile Action (Real-Time Feedback)

VEGA X delivers instant Go/No-Go visual indicators and haptic alerts directly to the operator's hand, preventing defective parts from advancing down the line.



Unprecedented Accuracy Delivered at the Speed of Production

99.99999%

Six Sigma accuracy achieved in variable factory lighting conditions, virtually eradicating false negatives.

100%

Complete visual coverage of critical part geometries, eliminating all previous static blind spots.

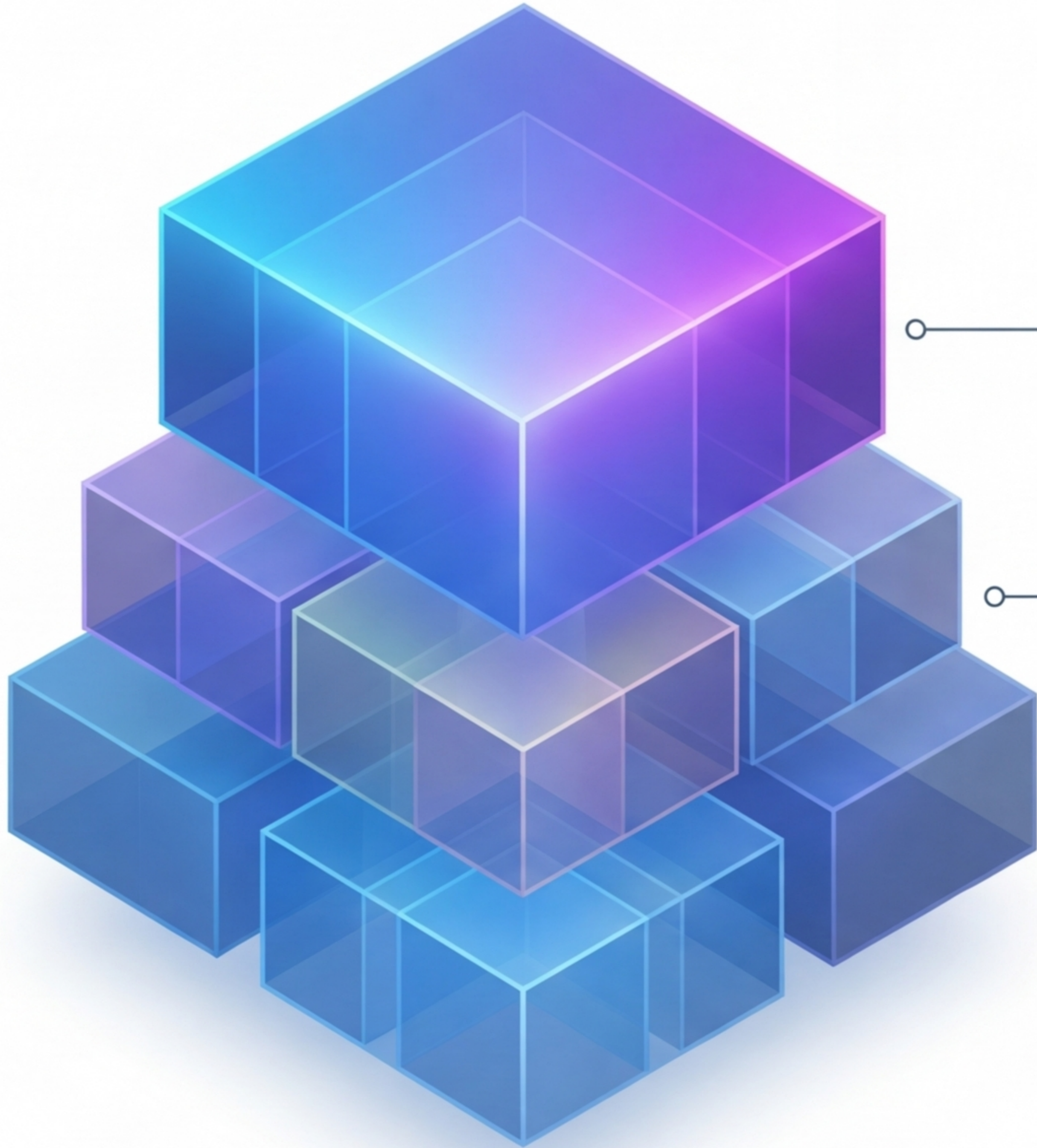
Sub-Second

Cycle time for deep-learning image analysis and instant operator feedback.

14 Days

Total time-to-value, from initial data collection and AutoML training to full production line deployment.

Building a Data-Driven Foundation for Predictive Quality



Competitive Differentiation

Deploying cutting-edge, AI-powered quality control proves uncompromising operational excellence, securing deeper trust from OEM clients and elevating Tirsan Kardan's position in the global supply chain.

Continuous Process Optimization

Rich visual analytics allow engineering teams to trace defects back to their exact source, driving upstream process improvements rather than just downstream sorting and scrapping.

The Defect Data Library

Every VEGA X scan is systematically logged. This creates a comprehensive, fully auditable database of 'OK' vs. 'NG' components, effortlessly satisfying stringent automotive ISO and IATF compliance standards.

