

R-AXIS

ASSEMBLY MONITORING SYSTEM

A SMARTER WAY TO CONNECT SHOP-FLOOR OPERATIONS WITH QUALITY,
TRACEABILITY AND PRODUCTION VISIBILITY.

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FROM ASSEMBLY ACTIVITY TO PRODUCTION INTELLIGENCE

- 33 Configured Stations
- 100% Engine-Level Traceability
- CLOSED-LOOP Quality Gate Control
- REAL-TIME Torque & Station Monitoring

Digital control for critical automotive engine assembly operations

The R-Axis Assembly Monitoring System is a real-time production and quality-control solution designed for automotive engine assembly. It brings engine identification, BOM mapping, station progression, torque results, line-control decisions, dashboards, alerts, reporting and historical traceability into one connected workflow.

Why it matters: an assembly operation is not considered complete simply because a tool produced a reading. The system validates the quality result and required action count before allowing the engine to move forward



THE MANUFACTURING CHALLENGE

- Critical torque operations require consistent control against predefined quality limits.
- Disconnected tool, station and production data can delay identification of non-conforming operations.
- Manual recording makes complete engine-level traceability difficult to maintain.
- Stations with multiple required actions need a reliable mechanism to prevent incomplete work from progressing.
- Production, quality and management teams need a shared real-time view of line performance.



THE R-AXIS SOLUTION

R-Axis creates a digital quality gate at critical assembly stations. Engine identity is established at entry, the applicable BOM/model configuration determines expected operations, and each production event is captured, validated and linked to the engine journey.

- Barcode-based engine and BOM identification
- Configurable station, tool, shift, model and BOM master data
- Real-time torque-result capture and validation
- Station-level action-count verification
- PLC-oriented Stop/Go production control
- Engine journey and tightening traceability
- Live production, quality and alert dashboards
- Historical reports and PDF/CSV-oriented exports



HOW THE SYSTEM WORKS

Step 1: Scan

Engine barcode and BOM are captured at line entry.

Step 2: Configure

The system identifies the applicable model, stations, tools and expected actions.

Step 3: Execute

Operators perform the required assembly/tightening operations.

Step 4: Validate

Torque results are checked against configured quality limits.

Step 5: Verify

Required action counts are confirmed before station completion.

Step 6: Decide

The line permits movement only when required conditions are satisfied.

Step 7: Trace

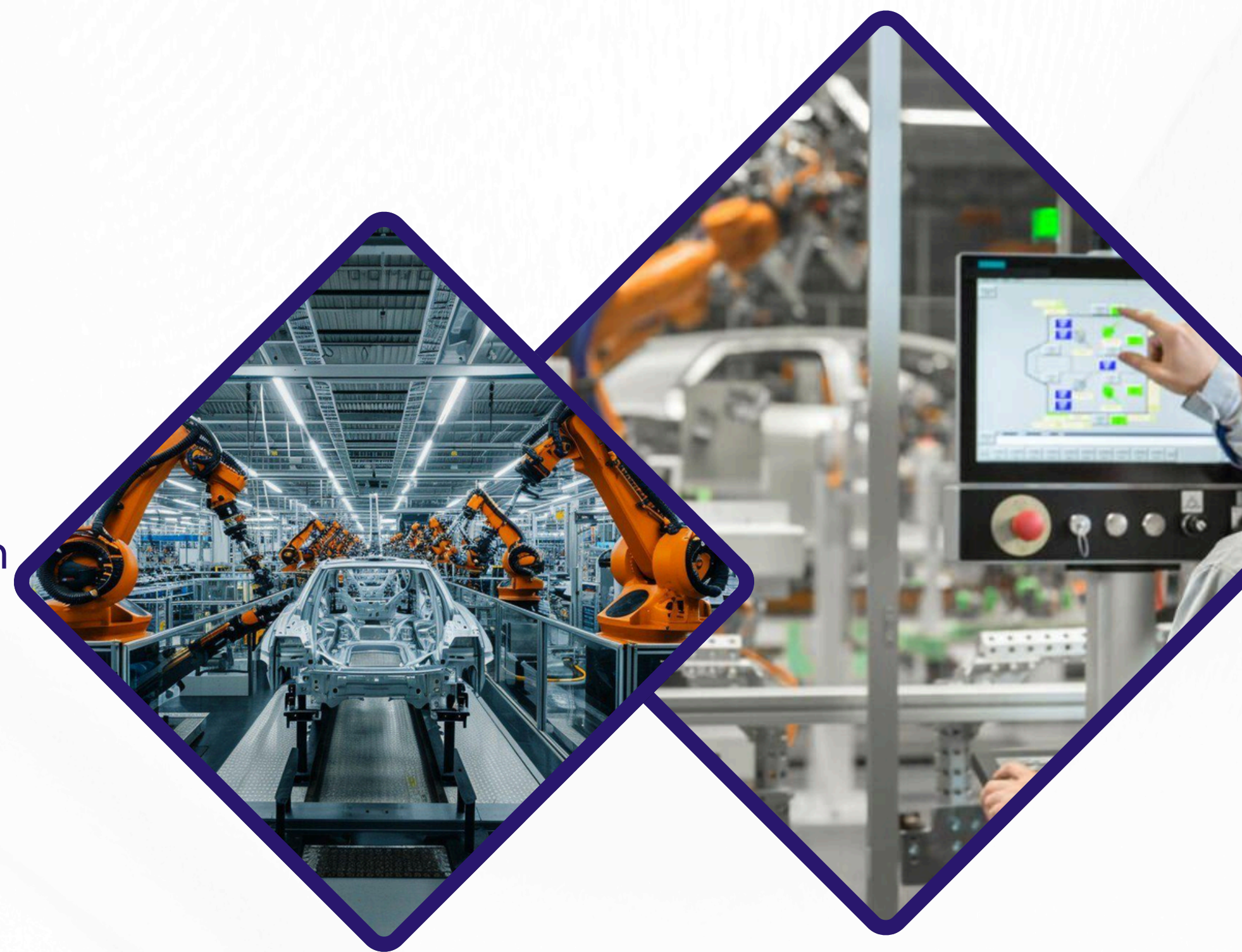
Station activity, results, timestamps and status are stored as production evidence.



QUALITY GATE: THE CORE DIFFERENTIATOR

R-Axis closes the gap between what happens physically on the shop floor and what the production system considers acceptable.

Even when all three recorded readings are valid, the engine does not advance until the required fourth action is completed and the station is revalidated.



EXECUTE → CAPTURE → VALIDATE → DECIDE → PERMIT / HOLD → RECORD



TURN PRODUCTION DATA INTO ACTIONABLE KPIs

- Total Engines & production output
- First Pass Yield (FPY)
- Throughput and average cycle time
- Torque compliance
- Active alerts and top NOK stations
- Target vs. actual production
- Production by model
- Shift-wise performance comparison



BUSINESS VALUE

- Earlier visibility of non-conforming tightening events
- Reduced dependence on manual production records
- Improved engine-level traceability for quality investigations
- More consistent enforcement of torque and operation-count requirements
- Better coordination between shop-floor events, PLC logic and management reporting
- Centralized production evidence for engineering, quality and management teams
- A scalable foundation for further automation, predictive quality and advanced analytics



CONNECTED ARCHITECTURE

- Shop Floor: torque tools, barcode/BOM scanner, station devices and PLC/line-control signals
- Integration: real-time communication, event ingestion, PLC communication and validation
- Application & Data: engine journey, station state, master data, torque records, alerts and production records
- User & Analytics: live monitoring, dashboards, progress matrix, historical reports and exports.

INDUSTRY 4.0, APPLIED TO THE ASSEMBLY LINE

R-Axis is positioned as a practical Industry 4.0 production-monitoring solution that connects physical assembly operations with real-time digital traceability and quality decisions.



DESIGNED FOR WHAT COMES NEXT

- Predictive identification of rising NOK and cycle-time trends
- Automated escalation for repeated torque failures
- Advanced OEE analysis
- Root-cause analytics by station, tool, model, shift and failure type
- Tool health and calibration tracking
- Electronic Andon and escalation workflows
- Integration with MES / ERP / QMS platforms where required



LET'S BUILD A MORE CONNECTED PRODUCTION LINE



If your manufacturing environment needs stronger traceability, real-time quality control and better production visibility, R-Axis provides a practical foundation for digital transformation.

R-AXIS

Developed by REDO Group

CONTACT US

We welcome the opportunity to connect and collaborate with you. Please feel free to contact us for inquiries, partnerships, or further information about our services and solutions.

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