

SUCCESS STORY

Transforming “Just-in-Sequence” Logistics

Achieving flawless assembly line feeding through AI-integrated wearable technology and cognitive ergonomics.

2025

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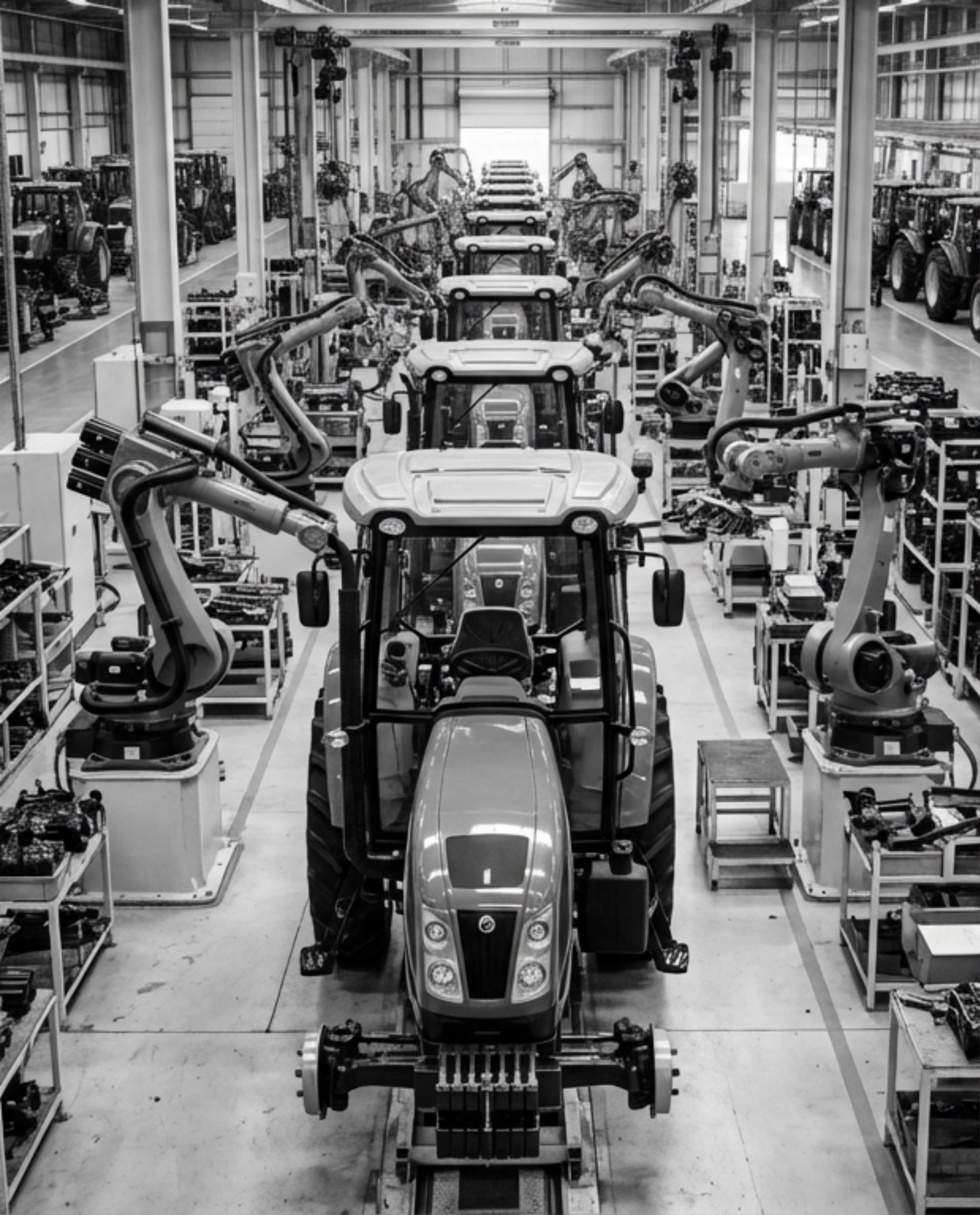
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01 | INTRODUCTION

Elevating "Just-in-Sequence" Manufacturing

Türk Traktör sets the global standard in heavy machinery manufacturing. Operating at massive scale, the facilities rely on a hyper-disciplined production philosophy: "Just-in-Sequence."

Unlike traditional "just-in-time" models, this approach demands that tens of thousands of components arrive at the assembly line not only at the exact millisecond they are needed but in the precise sequence of the tractor variants being built. A single misstep halts the line.

A DNA of Continuous Innovation

The organization refuses to settle for the status quo. Driven by an Endüstri 4.0 vision, Türk Traktör continuously upgrades its human and technological capital—evidenced by their VR Training Labs, which pre-emptively eliminate operational errors in a virtual environment.

This project represents the next logical leap: merging human agility with machine intelligence on the physical floor.

02 | HIDDEN COSTS OF OPERATIONAL INEFFICIENCY

The Limits of Traditional Mobility

While traditional handheld terminals digitized the warehouse, their physical constraints created unavoidable bottlenecks in high-velocity operations.

The Anatomy of a Micro-Delay (Traditional Process):



Diagnostic Breakdown:

Ergonomic Friction

The mandatory, repetitive cycle of picking up and putting down devices adds cumulative seconds to every single pick, draining efficiency over a shift.

Cognitive Load

Forcing operators to shift visual focus from their physical environment to a digital screen introduces "cognitive fatigue." Under pressure, this visual distraction breeds the rare, but costly, misrouted part.

Hardware: Total Natural Movement



To eliminate ergonomic friction, Türk Traktör partnered with Thread in Motion. The solution is Vega-X: an ultra-lightweight, industrial smart glove designed around the principles of cognitive ergonomics. It operates as a wearable mini-computer, granting complete natural movement.

Engineered for the Frontline:



45 Grams of Freedom: Completely eliminates the physical strain of carrying heavy devices. Hands are 100% free to safely maneuver heavy tractor components.



14-Meter Range: High-speed scanning capabilities allow operators to scan from forklifts or high racks without dangerous maneuvering (~0 seconds between scans).



Continuous Operations: Hot-swappable batteries (up to 6,000 scans per charge) ensure zero operational downtime during shift changes.

03 | FROM MANUAL OPERATIONS TO INTELLIGENT AUTOMATION

Mistake-Proofing: Multi-Layered Feedback

Vega-X eliminates "cognitive load" by speaking directly to the operator's reflexes. Instead of forcing workers to read text on a screen to confirm a pick, the system utilizes synchronized Haptic (vibration), Acoustic (sound), and Optic (light) feedback.

Cognitive vs. Reflexive Comparison Matrix		
	Traditional (Visual Only)	Vega-X (Haptic, Acoustic, Optic)
Information Processing	Visual only (Reading a screen)	Reflexive sensory input
Cognitive Load	High: Requires breaking physical focus.	Low: Reflexive, instant recognition.
Mistake-Proofing (Poka-Yoke)	Reactive: Error caught after visual check.	Proactive: Hard vibration/red light instantly halts physical action before the error occurs.
Operational Speed	Requires double-checking.	Instant, continuous flow.



03 | FROM MANUAL OPERATIONS TO INTELLIGENT AUTOMATION

The Digital Thread: Real-Time SAP Integration

Hardware is merely the nervous system; true intelligence requires a brain. Vega-X is integrated directly into Türk Traktör's core SAP ERP and PLM architecture via the SAP Integration Suite.



Plug-and-Play Cloud Architecture

Utilizing pre-packaged integration content and secure open connectors, the system established zero-latency communication without burdening IT infrastructure.

Data in Motion

Every scan, movement, and physical action instantly synchronizes with the SAP ecosystem via Wi-Fi. This creates an unbreakable "Digital Thread" from the warehouse rack to the tractor assembly line, granting leadership real-time visibility into inventory accuracy, line requirements, and operator metrics.

04 | RESULTS & GAINS

The Power of Vega-X

20%

Faster Logistical Operations

By eliminating the “ergonomic friction” of picking up, holstering, and reading traditional devices, raw speed increased dramatically. The same workforce now completes operations with zero wasted motion, ensuring highly agile assembly line feeding.

100%

Accuracy in Just-in-Sequence Picking

Human-induced errors have been entirely eliminated. The multi-layered haptic and acoustic feedback provides absolute “mistake-proofing,” eradicating costly assembly halts, part misroutes, and rework.

45g

Maximum Ergonomic Safety

A revolutionary improvement in Occupational Health and Safety (OSG). The ultra-lightweight, hands-free design removed the cumulative joint and muscle stress caused by heavy scanners, dramatically improving worker welfare and comfort.

05 | A STRATEGIC STEP TOWARDS INDUSTRY 5.0

Beyond the Assembly Line

This transformation extends far beyond immediate operational metrics, aligning perfectly with Türk Traktör's 2025 vision and the Koç Group Climate Change Strategy.

Proactive Sustainability

By eliminating rework, reducing scrap materials caused by logistical errors, and enabling leaner operations with less wasted energy and movement, the Vega-X deployment actively shrinks the facility's carbon footprint.

The Industry 5.0 Foundation

This is not automation replacing humans; it is "Humans & Robots Together." The millions of operational data points seamlessly gathered by Vega-X today are creating the proprietary Machine Learning training datasets required for tomorrow's predictive supply chain algorithms. A highly scalable template for enterprise-wide excellence.

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