



CASE STUDY

MESS Success Story

Elevating Human-Machine Synergy:
Transforming Industrial Operations
with Ergonomic Wearables and AI



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the Future of Turkish
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A Visionary Ecosystem for Industrial Transformation

The Turkish Employers' Association of Metal Industries (MESS) represents the industrial backbone of Turkey, guiding over 250 enterprise members across automotive, steel, and heavy machinery. To accelerate global competitiveness, MESS established the MESS Digital Transformation Center.

This hub is not a theoretical laboratory; it is a live-action proving ground. Operating with live production data, it demonstrates how digital, green, and AI technologies seamlessly integrate into enterprise-scale production, guiding the 'twin transition' of digitalization and decarbonization.



Context Box

Scale:
10,000 sqm high-tech campus

Capability:
170+ active Industry 4.0 use cases

Reach:
40,000+ professionals trained

Beyond Lean: The Marginal Costs of Legacy Hardware

MESS members already operate at the peak of traditional lean manufacturing. The challenge was breaking through the final efficiency ceiling imposed by legacy data capture methods and cognitive fatigue.



Cognitive Overload (Just-in-Sequence)

The Friction

Mass customization demands flawless execution. Relying on fixed screens and human memory sharply increases cognitive load.

The Impact

Leads to micro-hesitations and sequence errors in high-variance, complex assembly operations.



Reactive Quality Control (Poka-Yoke Deficit)

The Friction

Traditional camera systems and manual inspections are reactive—they catch defects after the process is completed.

The Impact

The enterprise lacks a proactive architecture to make errors physically impossible at the source.



Ergonomic Friction & Micro-Delays

The Friction

Standard handheld scanners disrupt natural operational rhythm.

The Impact

The constant “pick-up and put-down” action creates micro-time losses that compound into massive operational delays across global shifts.

VEGA-X: The Nexus of Ergonomics and Edge Computing

To bridge the gap between physical assembly and digital oversight, MESS integrated Thread in Motion's VEGA-X smart glove ecosystem directly into the workflow.

Hands-Free Mobility

Eliminated device handling, restoring natural, unrestricted movement for high-dexterity assembly tasks and eliminating "pick-and-drop" delays.

Unlimited Power Architecture

Introduced hot-swappable batteries, effectively reducing hardware-related downtime to zero during intensive 24/7 shift rotations.



Dynamic AI Vision

Deployed edge-based machine learning to execute complex, multi-angle quality assurance instantly, replacing rigid, fixed-camera infrastructure.

Architecting a Proactive, Error-Free Ecosystem



Multi-Sensory Mistake-Proofing

Engineered a real-time dialogue between system and operator. Haptic (vibration), acoustic, and optic feedback instantly alerts workers to sequence deviations, preventing scrap at the source.

Seamless IT/OT Convergence

Executed a true plug-and-play integration via Wi-Fi, BLE, and LoRa networks (up to 1km range). Directly synced physical movements with MES/WMS platforms for a Single Source of Truth.

Paperless Kanban & Agile Logistics

Empowered operators to trigger missing-part notifications directly from their workstations, achieving uninterrupted line-side supply and fully digitized, real-time workflows.

Unified Enterprise State: Paperless, Proactive, Agile

Measurable Enterprise Value & Operational Velocity

4 Seconds

Saved Per Transaction

Eliminated micro-delays from device handling, yielding up to 30 million seconds (8,333 hours) of reclaimed productivity per year in scaled automotive environments.

54%

Gain in Logistics Efficiency

Radically accelerated picking, sorting, and sequencing operations, effectively doubling output speed while minimizing error rates.

35%

Reduction in Physical Effort

Vastly improved worker ergonomics and safety by liberating cognitive load and eliminating the physical strain of carrying heavy legacy terminals.

3,000

Scans Per Battery Cycle

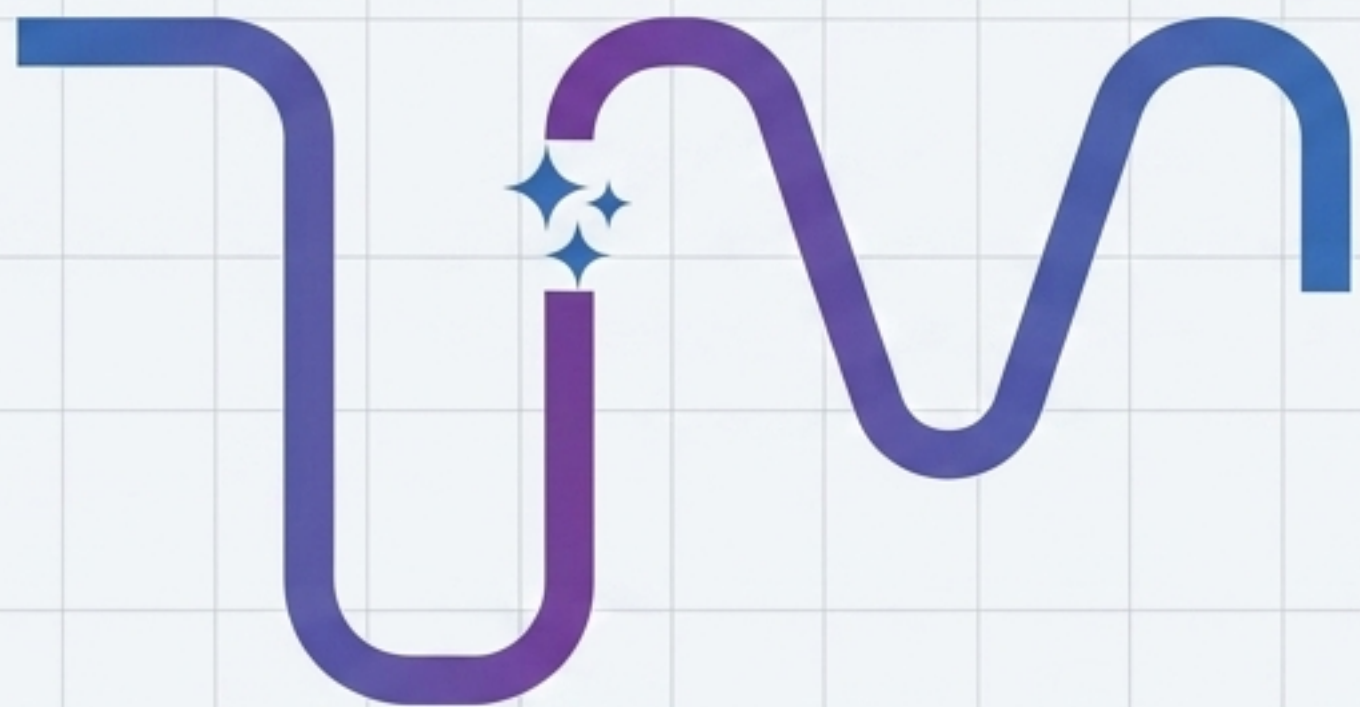
Ensured absolute operational continuity, maximizing Overall Equipment Effectiveness (OEE) and eliminating hardware-induced downtime.

A Strategic Blueprint for Human-Centric Automation

The deployment at the **MESS Digital Transformation Center** proves that the future of industrial efficiency does not lie in **isolating the human worker**, but in empowering them. By converging AI, edge computing, and wearable ergonomics, **MESS** has established a definitive **Industry 5.0 reference** model.

Operations once bound by the physical limitations of **legacy hardware** are now hyper-agile, transparent, and structurally immune to error. This scalable framework provides all enterprise members with an exact blueprint to drive sustainable, high-velocity production in the global marketplace.

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