

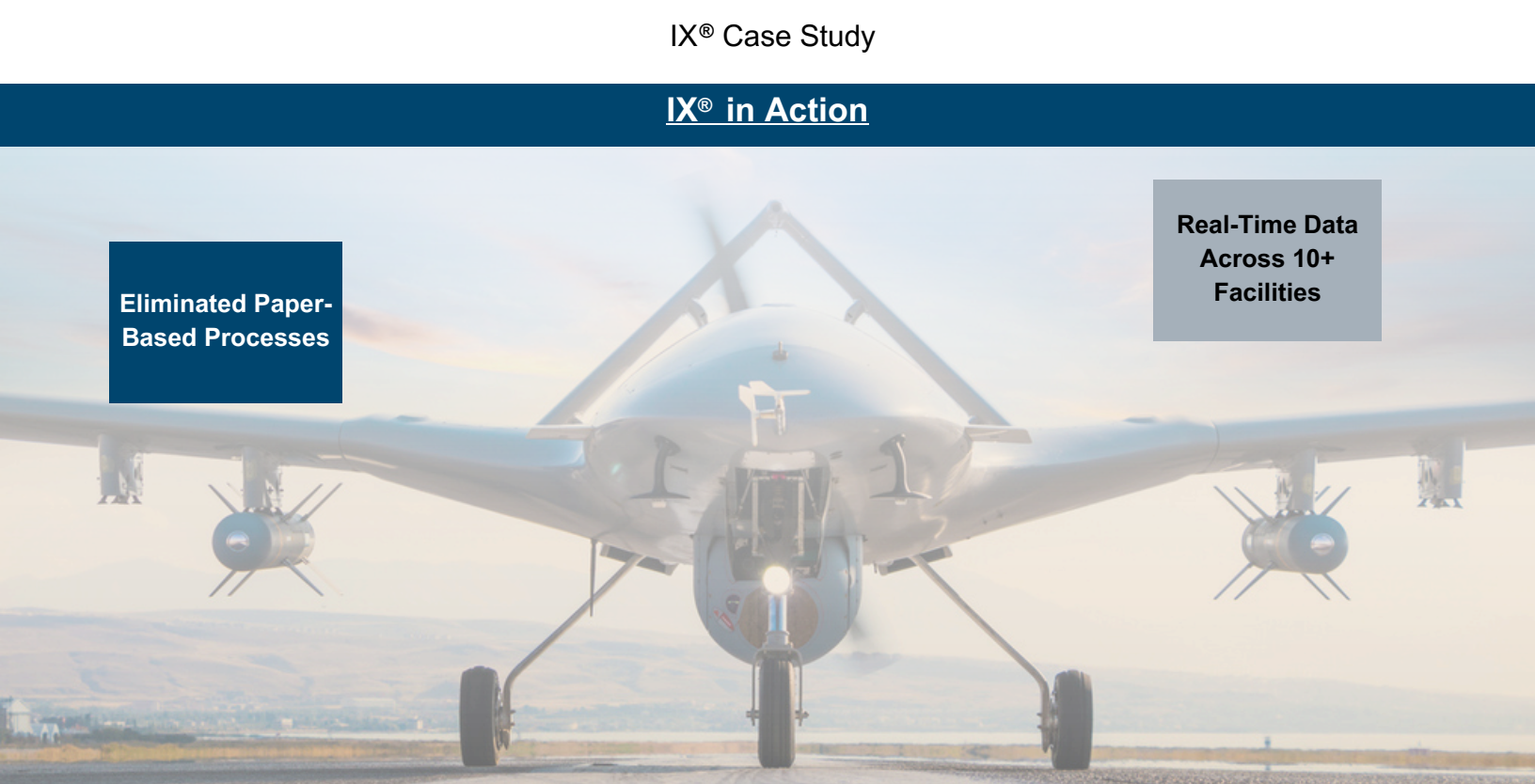


IMPLEMENTATION  
**ENGINEERS®**  
BEYOND CONSULTING



## **IX® Case Study**

**Soaring to Industry 4.0: Deploying UNS, MES, and IIoT  
Solutions in Aerospace Manufacturing**

A front-facing view of a military aircraft, possibly a B-2 Spirit, on a runway. The aircraft is white with blue and grey markings. It has a large, triangular nose and two large engines mounted on the wings. The background shows a hazy sky and distant hills. Two callout boxes are overlaid on the image: a dark blue box on the left and a light grey box on the right.

**Eliminated Paper-  
Based Processes**

**Real-Time Data  
Across 10+  
Facilities**

In the high-stakes aerospace and defense industry, seamless data integration across IT and OT systems is critical for operational excellence and future-ready scalability. Implementation Engineers partnered with a leading manufacturer to deploy a Unified Namespace (UNS) as a centralized data hub, complemented by a Manufacturing Execution System (MES) and Industrial Internet of Things (IIoT) solutions. Powered by Litmus and Ignition Perspective platforms, these solutions integrated enterprise and production systems, digitized shop-floor operations, and enabled connected devices across 10+ facilities. The result: a secure, scalable digital ecosystem delivering strategic value to C-suite leaders and operational efficiency to plant-floor experts.

## Overcoming Fragmentation and Manual Processes

The client faced complex challenges typical in aerospace manufacturing: fragmented IT and OT systems, reliance on paper-based shop-floor processes, and disconnected production devices. Enterprise IT systems (e.g., SAP ERP, Windchill PLM) were isolated from OT systems, limiting real-time data access and scalability. Manual production paperwork—work instructions, drawings, and test records—caused inefficiencies and errors. Legacy equipment and unconnected devices hindered automation and data collection. Cybersecurity was a top priority, requiring compliance with stringent aerospace standards.

C-suite executives sought a strategic transformation to drive efficiency, reduce costs, and establish Industry 4.0 leadership. Plant-level SMEs needed user-friendly tools to streamline workflows, improve data accuracy, and ensure uptime. Implementation Engineers was tasked with delivering an integrated solution that unified these needs while ensuring scalability, security, and shop-floor adoption.

# A Unified Namespace Data Hub with MES and IIoT

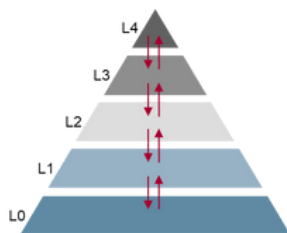
Implementation Engineers delivered a comprehensive Industry 4.0 transformation, centered on a Unified Namespace (UNS) data hub, with MES and IIoT solutions to enhance operational capabilities.

## 1 Unified Namespace (UNS) as the Data Hub

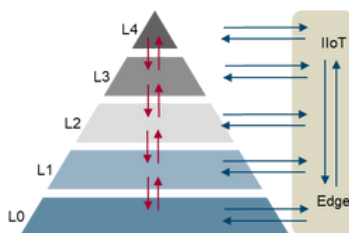
The UNS, powered by Litmus Edge and Litmus UNS software, served as a centralized, real-time data hub bridging OT and IT systems across 10+ facilities.

### ► Features

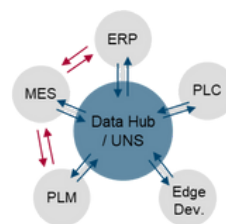
- Organized in an ISA-95 hierarchy (Enterprise > Site > Area > Line > Cell) for standardized data access
  - Event-driven via a publish/subscribe (pub/sub) model, delivering real-time operational insights
  - Enabled contextualization, modeling, transformation, and buffering of OT data
  - Integrated legacy systems “as is” for cost-effective, global scalability
  - Connected to enterprise systems (e.g., SAP ERP) for seamless IT/OT data flow
- **Litmus Edge:** Provided native drivers for robust device connectivity and native Node-RED for custom data flows, empowering SMEs
- **Point-to-Point Integrations:** Managed critical transactional data (e.g., SAP confirmations)
- **Cybersecurity:** A proxy layer with port switching ensured secure data exchange between industrial and business networks, meeting aerospace security standards



Purdue Model



Hybrid Model



Data Hub / UNS Model

**Industry is shifting  
towards Hybrid and  
Data Hub/UNS  
architectures**



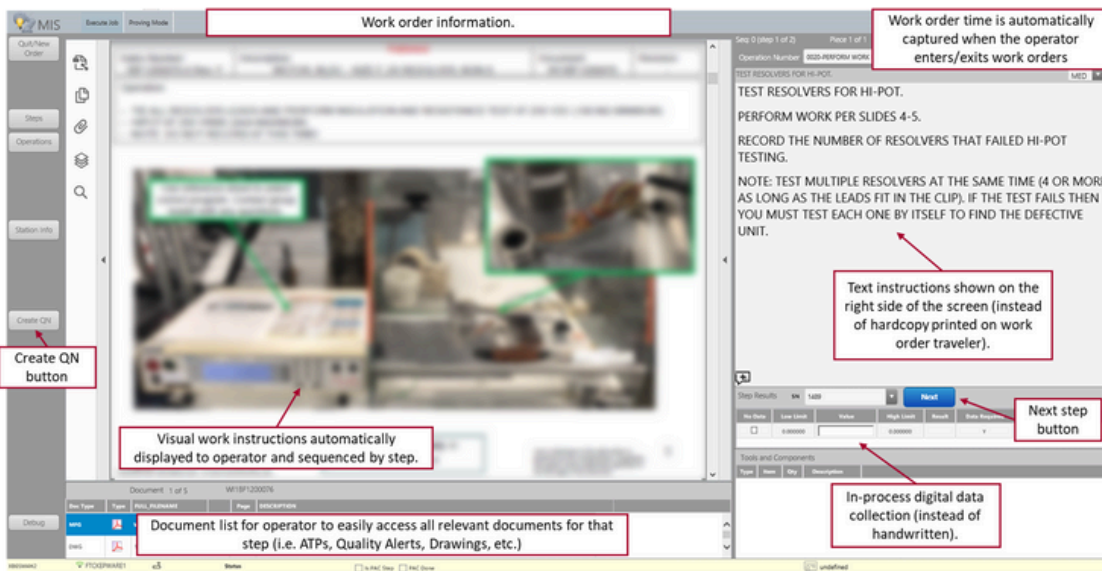
## 2 MES for Shop-Floor Digitization

An MES solution, built on the Ignition Perspective platform and integrated with SAP ERP, replaced paper-based processes across 10+ plants.

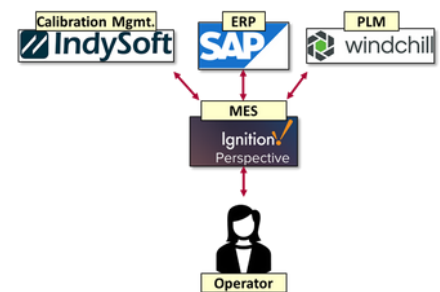
### ► Features

- Work order information via SAP integration
- Real-time capture of production times through MES transactions
- Dynamic text and visual work instructions based on operations
- Single-interface access to drawings, test sheets, and acceptance test procedures
- In-process data collection and validation (manual and device-connected)
- Direct SAP Quality Notification (QN) creation from the operator interface
- Integrated inventory transactions, including serialized BOM components with genealogy

► **Collaboration:** Developed with input from operations engineers and operators, ensuring all critical use cases were addressed for usability and adoption



**Work Order Integration**



**MES Architecture**

## 3

**IIoT for Connected Devices**

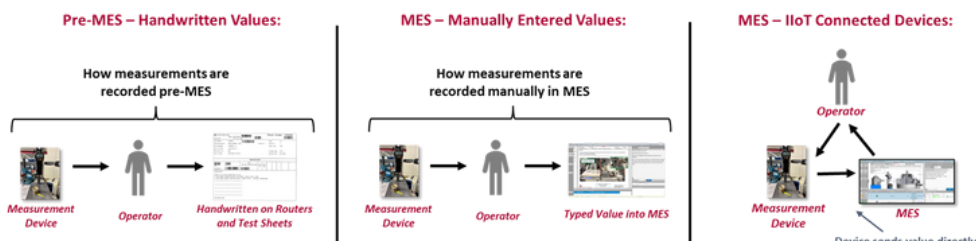
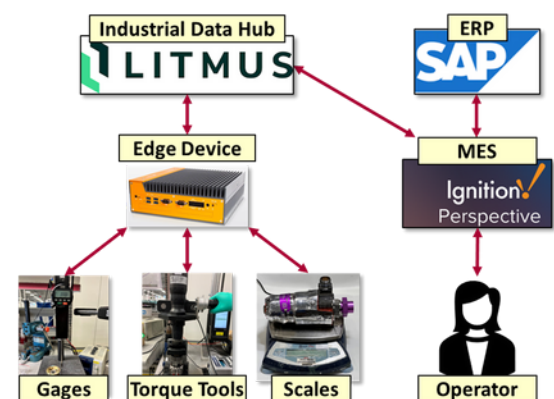
IIoT solutions enabled connected assembly and test devices, integrating with the MES and UNS.

- **Hardware:** OnLogic industrial computers connected serial devices (e.g., drop gages, calipers, scales) to the industrial network

**Software:** Litmus Edge, installed on OnLogic computers, enabled no-code Edge workflows with Node-RED, allowing operations teams to compute and aggregate data before publishing to the UNS

**Use Cases:**

- Automated data handshakes between connected devices and MES
  - Automated first-pass yield capture and visualization on test stands
  - Machine status and Overall Equipment Effectiveness (OEE) monitoring on chip-cutting equipment
  - Integration with test stands and Coordinate Measuring Machines (CMMs)
- **Change Management**  
Implementation Engineers ensured adoption through direct training, shop-floor coaching, and SME development at each site, fostering long-term sustainability of the MES and IIoT solutions.

**Evolution of Measurement Collection****Supporting Technology Architecture**

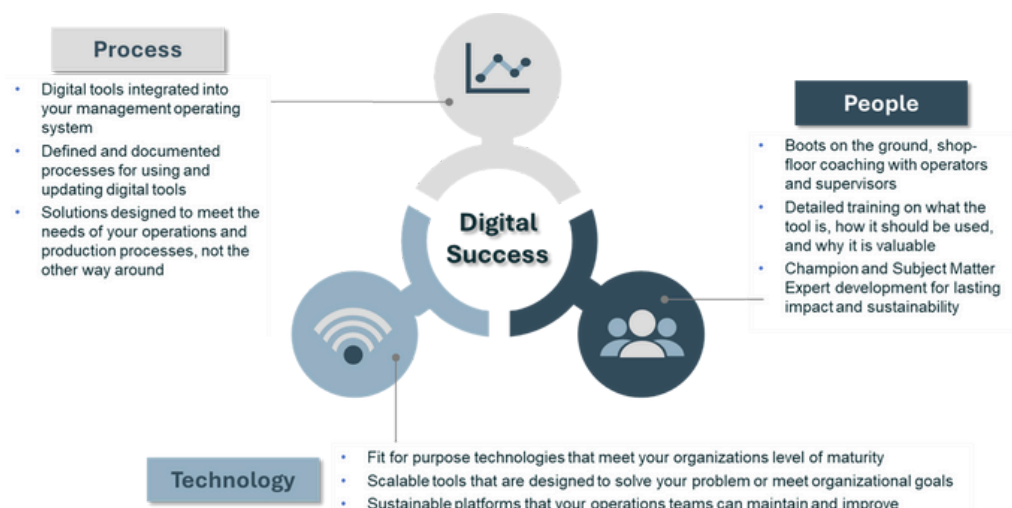
## Value Delivered

The integrated UNS, MES, and IIoT solutions delivered transformative outcomes across the client's manufacturing network:

- **Real-Time Insights:** The UNS provided instant access to operational data, enabling faster decision-making and coordination across 10+ facilities
- **Shop-Floor Efficiency:** The MES eliminated paper-based errors, streamlined workflows, and enhanced operator productivity with intuitive interfaces
- **Connected Ecosystem:** IIoT enabled automated data collection, improving accuracy and enabling real-time analytics (e.g., OEE, first-pass yield)
- **Scalability:** The UNS supported global expansion while integrating legacy systems, minimizing costs
- **Cybersecurity Assurance:** Embedded security measures ensured compliance and protected sensitive data
- **Empowered SMEs:** Enabled plant-floor teams to customize workflows, fostering agility and ownership
- **Strategic Advantage:** C-suite leaders gained enterprise-wide visibility, driving data-informed strategies and Industry 4.0 leadership

This aerospace manufacturer's transformation showcases how a Unified Namespace data hub, MES, and IIoT solutions unified IT/OT systems, digitized operations, and enabled connected manufacturing.

### Digital Success



# Let's Turn Your Vision Into Results

At Implementation Engineers, we don't just execute projects - we transform your vision into operational reality. Our proven 3-phase approach - **Align, Design, Execute** - delivers lasting value, from aligning your team on strategic goals to optimizing operations and driving measurable outcomes. Whether you're aiming to lead your market, boost efficiency, or maximize shareholder value, we're here to make it happen, step-by-step, side-by-side.

## Ready to Get Started?

Let's explore how we can bring your vision to life. Contact us today to schedule a conversation. Together, we'll chart the path to your success.

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