



LIVEWORX

PRODUCT LIFECYCLE INNOVATION

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HOW INDUSTRIAL CONNECTIVITY DRIVES DIGITAL TRANSFORMATION IN THE ENTERPRISE

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Product Strategy, Kepware

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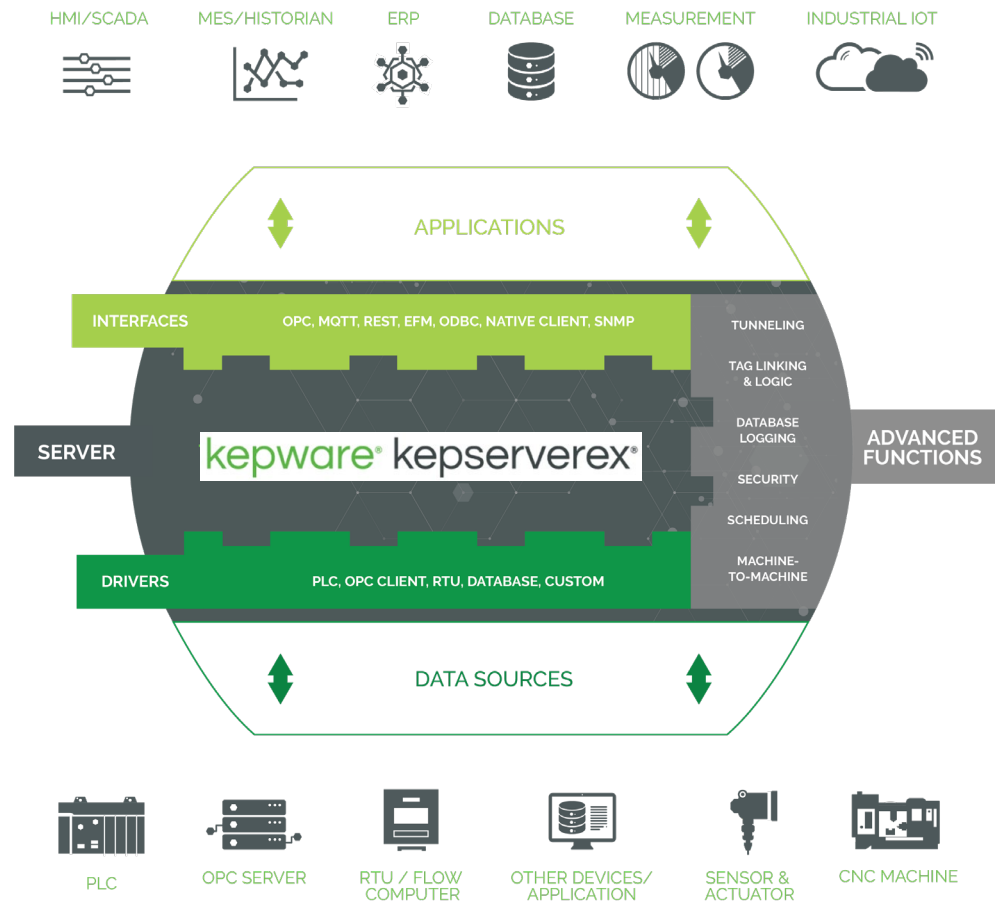
- Industrial Connectivity
- Use Cases
- Potential Next Steps

INDUSTRIAL CONNECTIVITY MAY CONNECT OPERATIONAL (OT) AND INFORMATION TECHNOLOGY (IT) PLANES

| | OT Point Solution | OT Standardized | OT-IT Standardized |
|-------------------|--------------------------------------|-------------------------------|--|
| Deployment | Project-based, ad-hoc, transactional | Enterprise or standalone | Enterprise, as component of end-to-end business application ("bundled with") |
| Primary Customers | Controls Engineer | Director+ IT, OT, Hybrid Orgs | LOB Leader, CXO, IT |
| Data Destination | HMI, SCADA | SCADA, MES, Historian | IoT Platforms, Enterprise Apps |

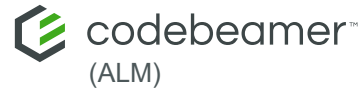
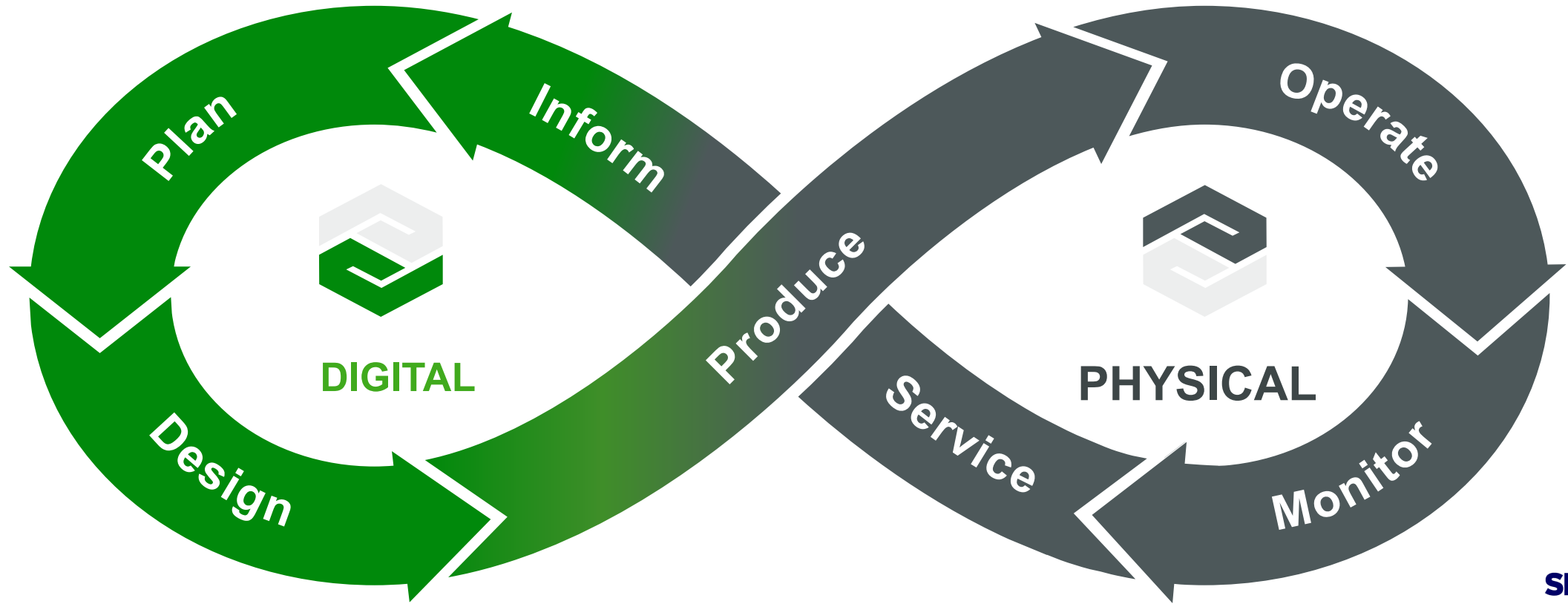
WITHIN PTC, KEPWARE PROVIDES INDUSTRIAL CONNECTIVITY

Kepware provides connectivity software that is the bridge between hardware devices and software applications



- **How it Works:**
 - **Connects** to thousands of devices through its library of 150+ drivers
 - **Translates** real-time information from hardware into a common language (OPC UA, OPC DA, MQTT, REST, AlwaysON)
 - **Serves** the data to applications that help management and factory floor workers monitor and make data driven decisions

WITHIN PTC, KEPWARE IS THE CORNERSTONE OF INDUSTRIAL CONNECTIVITY FOR THE DIGITAL THREAD

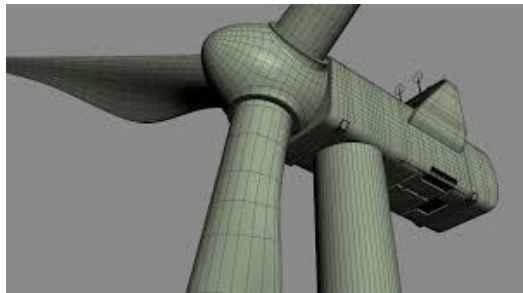


SERVICEMAX
a ptc technology

EXAMPLE: DIGITAL THREAD IN ACTION IN WIND POWER



Design



Manufacture



Operate



Service



STELLAR: CONNECTING INDUSTRIAL ASSETS TO DRIVE EFFICIENCY

- Industrial design and build firm focused primarily on the food and beverage market
 - Architecture, engineering, construction and mechanical services
- Seeking to reduce total cost of ownership for its industrial refrigeration customers.

Stellar recognized that providing insight into the true costs of building ownership could create **opportunities for efficiency**. “And to do that, we recognized we would need to collect **significantly more data**,” Luke Facemyer, Divisional VP, Stellar, “We wanted to expand our service business and help customers move to a more **proactive maintenance approach**.”



Boars Head Processing Facility (IN)



Bell and Evans Chicken Harvesting, PA

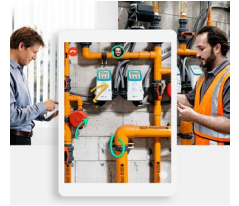
FROM REACTIVE MAINTENANCE TO PROACTIVE PREVENTION

UNDER THE HOOD: HOW STELLAR MAP SOLVES MAINTENANCE ISSUES

| Traditional Maintenance Issue | Stellar Solution |
|---|--|
| Equipment failure occurs, refrigeration and production stops, storage may spoil | Analytics engine detects anomalies and diagnoses future issues before they occur |
| Upon equipment failure, production must accommodate maintenance | Issue detection provides time to resolve before a future issue occurs |
| A. Emergency parts must be expedited and costly machine repairs performed. | Diagnosis provides information on root cause of future issue before it arises |
| B. Equipment repairs may be delayed due to long-lead-time parts | |
| Small unseen issues cause larger costly issues | Engine detects anomalies and diagnoses issue before it occurs |
| Maintenance or technician overtime is required | Issue prediction from anomalies is provided before issue occurs |
| Parts are preventatively replaced well before the end of their useful life | Issue detection and diagnosis allows parts to be replaced only when they are at the end of their useful life |
| Energy-use impacts of system changes hidden and hard to quantify | The system dashboard provides real-time system conditions and historical data |
| Staff uses majority of time collecting and reporting system information | Data is automatically collected and logged |
| Staff troubleshooting experience and knowledge requires substantial training to pass on or it is lost | Issue diagnosis is performed by the Analytics Engine |

— Courtesy of Stellar

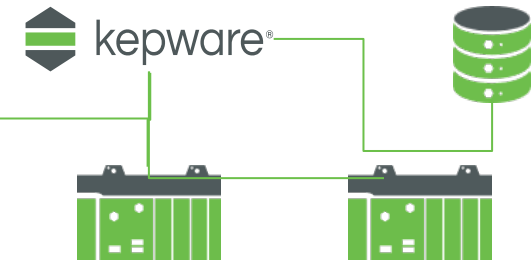
3 Interactive Maintenance Training with AR



2 Analytics Identify Potential Problems Early



1 Connected Manufacturing Shows Status



STELLAR IMPROVES UPTIME WITH CONNECTED MANUFACTURING

PROBLEM

Reducing operational costs in

- Ensuring quality and reliability
- Improving energy efficiency
- Managing Compliance

SOLUTION

Stellar Maintenance Advisor and Predictor, a service optimization solution powered by:

- ThingWorx
- Vuforia
- KEPServerEX® and the PTC Cloud

IMPACT

- Reduce downtime
- Lower total cost of ownership
- Reduce energy costs
- Improve workforce efficiency



BREMBO DRIVES EFFICIENCY, QUALITY WITH CONNECTIVITY

- International manufacturer of braking systems
 - 40 facilities, 14 countries
- Seeking greater efficiency through a centralized view of operations
 - Unique process and equipment across sites
 - Manual asset troubleshooting information
 - Quality impacts from limited visibility to manufacturing variances (scrap)
- Flexibility, deployment at scale are must-haves

“We wanted someone who not only understood the technology, but could also provide insights, ideas, and manufacturing expertise to ensure the solution was robust and solved real business problems.” - Jason Wolfe, Manufacturing Director, Brembo



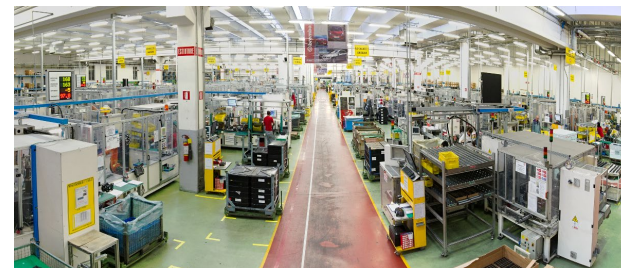
STANDARDIZING CONNECTIVITY POWERS IMPROVED OEE



- 3 Support for OT-IT Connections (inventory, ops)
- 2 Real-time Production Performance Monitoring



- 1 Standardized connections to diverse assets



BREMBO: THE IMPACT OF CONNECTIVITY

- Cycle time testing (actual vs budgeted) identifies line performance opportunities
 - Identifies waste
- Discovering asset out-of-range parameters
 - Maintenance needs
- Identifying opportunities for improvement that were previously invisible
 - Non-traditional Kepware connection to gas and power meters to drive sustainability

“The solutions delivered have shown value in weeks, rather than months, and will help us drive innovation and improve business results.” –Dan Sanberg, CEO Brembo NA

CONNECTIVITY TO INDUSTRIAL ASSETS POWERS CHANGE

- Kepware offers the first-mile connection to industrial assets
 - Standardizing data flows from both modern and legacy equipment
- Powers insights and analytics
 - Provides real-time visibility to machine data
- Can connect non-traditional assets (like power)
 - Creating new opportunities for management



**Digital Transformation Requires Connectivity;
Kepware's Simple, Secure Server Creates a Reliable Springboard of OT-OT and OT-IT Efforts**



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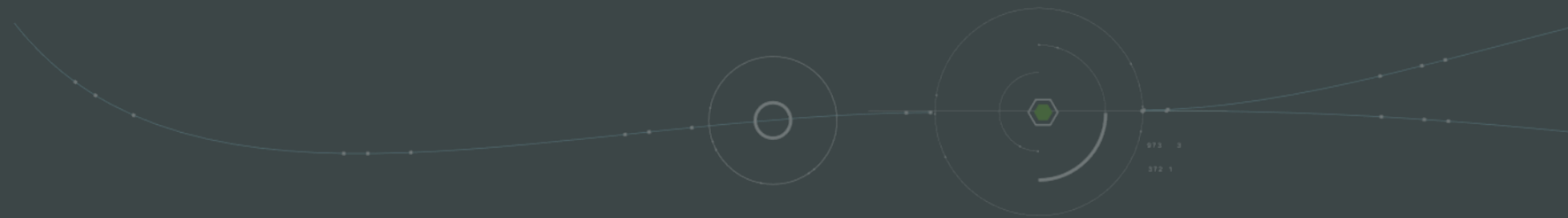
Your feedback provides us with valuable information on how to shape future content strategy for the event!



DIGITAL TRANSFORMS PHYSICAL

THANK YOU

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Problem

With 10 production lines requiring custom product recipes with multiple, changing variables, Teel needed a solution that would allow operators to control all pieces electronically and reduce human error.

Solution

Using Kepware to control all the essential components through a single web interface, while increasing visibility into the granular details of the manufacturing process.

Impact

- Reduced set-up times by 30%
- Remove manual processes
- Improved visibility, uptime, and product quality

