

IIoT
INDEPENDENT CONCEPT

Connected Manufacturing

Automation + Data + Intelligence

Connected Manufacturing. Smarter Operations.

Industrial automation, IIoT, data analytics,
and AI-assisted operational intelligence.



PRECISION
ENGINEERING



ELECTRIFIED
SOLUTIONS



RELIABLE
PERFORMANCE



SUSTAINABLE
FUTURE

ENGINEERED
FOR RELIABILITY

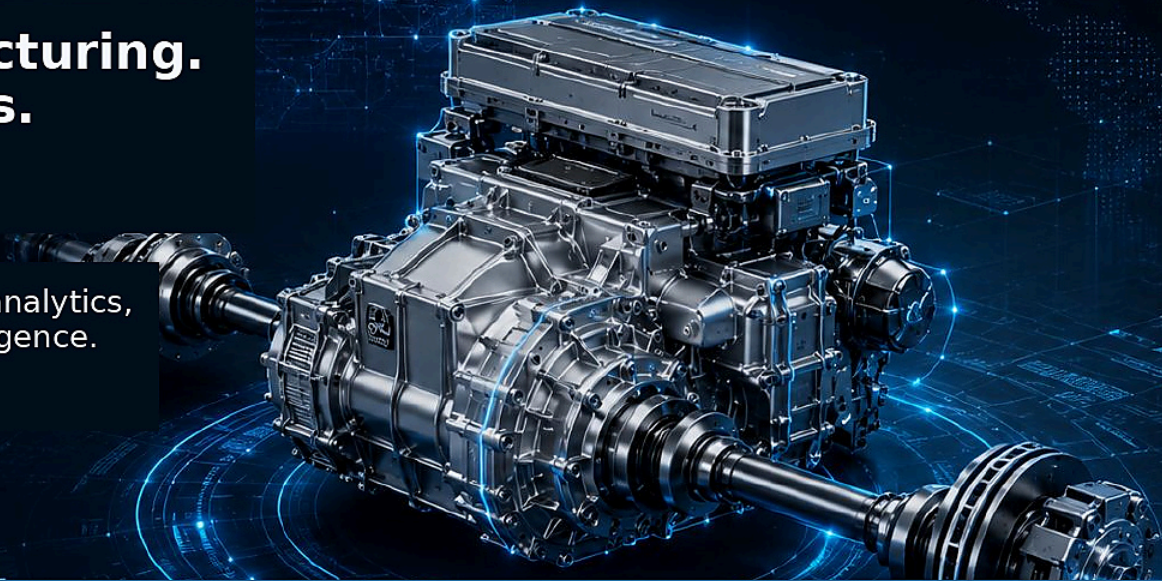
BUILT FOR
OPERATIONS

DATA-DRIVEN
SYSTEMS

Independent engineering concept

No company, client, or facility affiliation.

**CONNECTED
MANUFACTURING**



Future State, Industry 4.0 (Connected Plant Intelligence):

1) Move from isolated to connected intelligence

Bring together PLC data, sensors, maintenance logs, downtime history, quality records, production reports, and operator knowledge into one connected, AI-assisted IIoT intelligence layer.

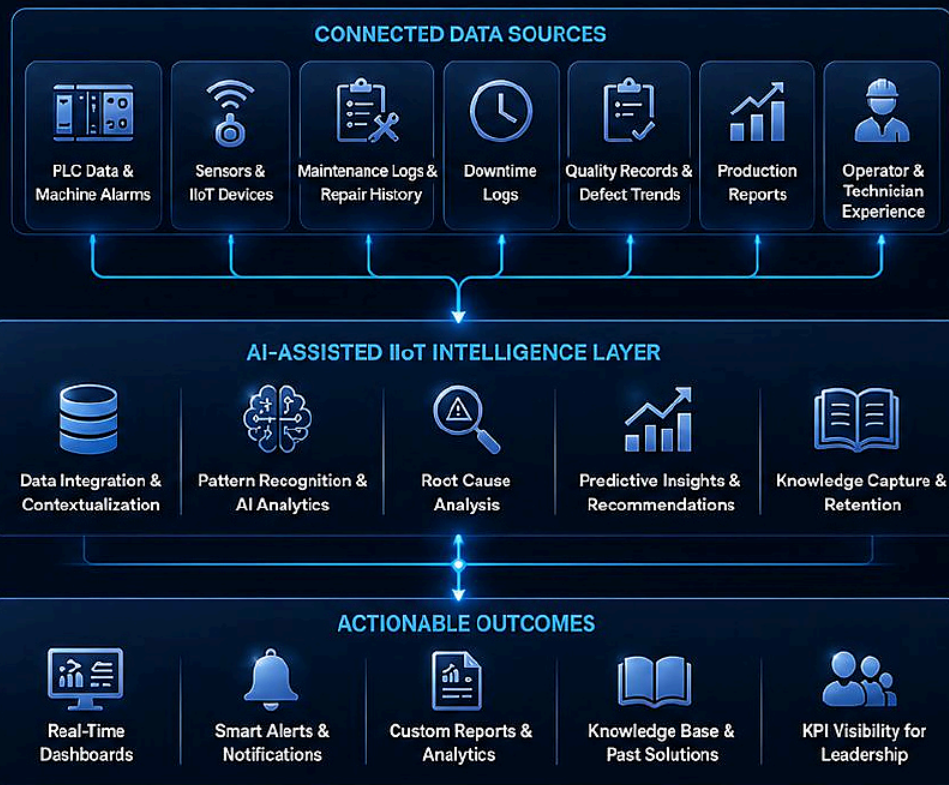
2) Organize plant information into actionable insights

The system provides a practical dashboard for:

- ✓ Faster troubleshooting
- ✓ Better visibility into recurring machine issues
- ✓ Improved maintenance planning
- ✓ Stronger production and quality tracking
- ✓ Leadership-level KPI awareness
- ✓ Long-term knowledge retention

3) Support people with better information

Goal: Not to replace experienced employees, but to support them with faster access to data, patterns, and previous solutions.



Outcome: Faster decisions, fewer repeat issues, better maintenance planning, stronger quality control, and improved plant performance.



INDUSTRY 4.0

Connected. Intelligent. Actionable.

Industry 4.0 System Architecture:

- 1) **Connect approved plant data** from PLCs, sensors, MES, maintenance logs, quality records, and production reports into one structured data hub.
- 2) **Analyze patterns and recurring issues** using an AI layer that supports root-cause trends, downtime visibility, predictive maintenance, and quality monitoring.
- 3) **Turn data into action** through dashboards, alerts, reports, and a searchable knowledge base for maintenance, production, quality, and leadership teams.



Simplified Architecture – Industry 4.0 Connected Plant Intelligence

1. DATA SOURCES (Plant Floor & Systems)



PLCs & Machines



Sensors & IoT Devices



MES Platform



Maintenance Logs & Work Orders



Quality Records



Production Reports & Historians



Operator Inputs

2. DATA INTEGRATION & PLATFORM LAYER



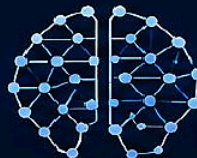
Centralized Data Platform (Secure & Scalable)

- ✓ Data Collection & Normalization
- ✓ Data Validation & Cleansing
- ✓ Time Synchronization
- ✓ Secure Storage
- ✓ Role-Based Access Control



Cybersecurity & Data Governance

3. AI & ANALYTICS (INTELLIGENCE LAYER)



Pattern Recognition & Correlation



Anomaly Detection & Alerts



Root Cause Analysis & Diagnostics



Predictive Maintenance & Risk Scoring



Quality & Performance Analytics

4. ACTIONABLE OUTPUTS & USER INTERFACE



Real-Time Dashboards
Live visibility into machines, lines, and plant performance



Alerts & Notifications
Proactive alerts for issues, risks, and maintenance needs



Reports & Analytics
Downtime, quality, production, maintenance, energy, and KPI reporting



Knowledge Base
Troubleshooting library, repair notes, and best practices



Role-Based Access
Maintenance, production, engineering, quality, and leadership views



OUTCOMES



Faster
Troubleshooting



Reduced
Downtime



Predictive
Maintenance



Improved
Quality



Better Plant
Performance



Smarter Decisions
Across the Plant



Secure. Connected. Intelligent. Driving operational excellence with data and AI.

Business Value:

This concept could support the plant by helping to:

- Reduce repeated troubleshooting from scratch
- Identify recurring faults faster
- Preserve technician and engineering knowledge
- Improve visibility into downtime drivers
- Support predictive maintenance planning
- Track production performance by line or machine
- Strengthen quality and scrap visibility
- Give leadership a clearer real-time view of plant performance

Overall impact:

A smarter, more connected plant-floor system that supports productivity, quality, maintenance, and continuous improvement.



AI-DRIVEN
OPERATIONS



MACHINE VISION
INSPECTION



REAL-TIME
ANALYTICS



TRACEABILITY &
QUALITY



Component Assembly & Traceability Flow

Generic Manufacturing Cell - Independent Concept Demonstration

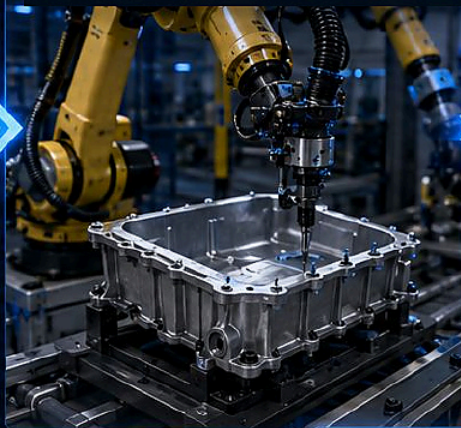
1 Operator Load

Operator places a component on the fixture for processing.



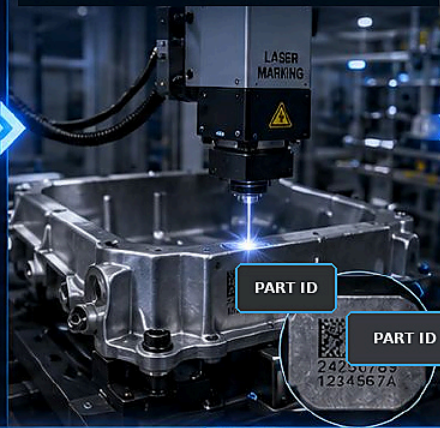
2 Robotic Fastening

Robots automatically fasten components to the required specification.



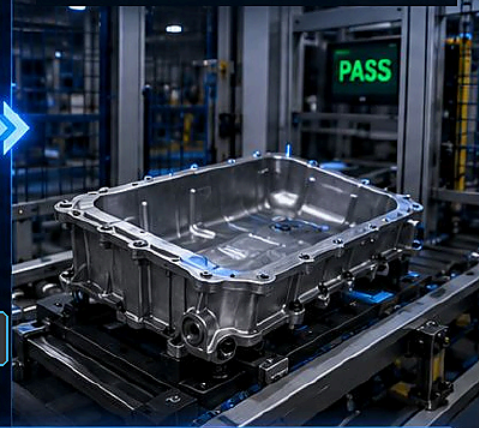
3 Barcode Etching

Laser applies a barcode / data-matrix for traceability and part identification.



4 Finished Product

Completed component exits the cell ready for downstream operations.



Manual Loading
Ergonomic & Safe



Automated Screwdriving
Consistent Torque & Quality

MACHINE VISION INSPECTION

Vision camera verifies barcode readability and presence.



READABLE
PASS



AUTOMATION. TRACEABILITY. QUALITY.
Built Right. Every Time.



Automated
Process Control



100% Traceability
& Part Identification



In-Process
Quality Assurance



Data Driven
Continuous Improvement

IMPLEMENTATION ROADMAP

5-STEP DEPLOYMENT PLAN FOR A CONNECTED MANUFACTURING PILOT

1



Organize Existing Knowledge

Collect and structure maintenance notes, downtime history, quality issues, machine faults, and recurring equipment concerns.

2



Identify Approved Data Sources

Review approved plant systems, PLC data, MES reports, quality records, and logs with management and IT approval.

3



Build a Prototype Dashboard

Create a limited proof-of-concept using approved sample data and selected plant KPIs.

4



Pilot on Selected Lines

Test the dashboard in a small plant area to evaluate usefulness, accuracy, workflow fit, and maintenance value.

5



Expand Plant-Wide

Scale gradually after validation, cybersecurity review, leadership approval, and demonstrated value.



Trusted Data

Reliable, secure, and approved data sources.



Operational Visibility

Real-time insights to improve performance and uptime.



Pilot Validation

Prove value with a focused, low-risk deployment.



Scalable Rollout

Grow across the plant with confidence and governance.



RETURN ON INVESTMENT (ROI)

The Value of an AI-Driven IIoT System

1



REDUCE DOWNTIME AND TROUBLESHOOTING DELAYS

Faster fault identification and access to historical repair knowledge helps reduce repeated troubleshooting, improve machine uptime, and lower production interruptions.

LESS DOWNTIME. MORE UPTIME.



ROI IMPACT

More production time, fewer interruptions, and higher overall output.

2



IMPROVE MAINTENANCE EFFICIENCY AND PLANNING

Predictive insights and centralized machine data help reduce emergency repairs, optimize maintenance scheduling, and extend equipment reliability.

FROM REACTIVE TO PREDICTIVE MAINTENANCE



ROI IMPACT

Lower maintenance costs, less emergency work, and longer equipment life.

3



INCREASE OPERATIONAL VISIBILITY AND DECISION-MAKING

Real-time dashboards and KPI tracking provide leadership with clear visibility into production, quality, maintenance, and plant performance trends.

REAL-TIME INSIGHTS. BETTER DECISIONS.



ONE VIEW. ONE SOURCE. BETTER DECISIONS.



ROI IMPACT

Faster, data-driven decisions that improve performance across the plant.

4



PRESERVE CRITICAL PLANT-FLOOR KNOWLEDGE

Capturing technician experience, repair history, and recurring issues into a searchable system helps reduce knowledge loss and supports faster onboarding and training.

CAPTURE. ORGANIZE. PRESERVE.



ROI IMPACT

Less knowledge loss, faster problem solving, and stronger team capability.

5



SUPPORT LONG-TERM PRODUCTIVITY AND CONTINUOUS IMPROVEMENT

A connected Industry 4.0 framework improves quality visibility, reduces recurring issues, strengthens operational consistency, and supports future scalability.

CONTINUOUS IMPROVEMENT. SUSTAINABLE GROWTH.



ROI IMPACT

Stronger productivity, higher quality, and long-term value creation.



OVERALL ROI: A SMARTER, MORE CONNECTED PLANT THAT DELIVERS MEASURABLE RESULTS.



Reduced Downtime



Lower Costs



Higher Productivity



Better Quality



Stronger Teams



Future-Ready Operations

EXAMPLE WORKFLOW

FROM FAULT TO RESOLUTION

How the AI-Driven IIoT System Supports Faster Troubleshooting and Smarter Decisions

1 PLC FAULT / EVENT DETECTED



- PLC, sensors, or machine generates a fault or alarm
- Event is time-stamped and captured

Raw Fault Data
Captured

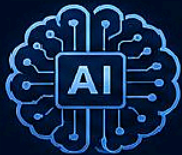
2 DATA CAPTURE & TRANSFER



- Fault data is securely collected from PLCs, sensors, and systems
- Sent to the IIoT platform (read-only)

Secure Data
Ingestion

3 AI CORRELATION & PATTERN ANALYSIS



- AI analyzes the fault against historical data
- Correlates with similar events, machines, conditions, and repairs
- Identifies patterns and contributing factors

Patterns
Identified

4 LIKELY CAUSE & RECOMMENDATION

LIKELY ROOT CAUSE

Hydraulic pressure
sensor intermittent

CONFIDENCE: 92%

RECOMMENDED ACTIONS

- ✓ Check sensor connector
- ✓ Inspect wiring harness
- ✓ Check hydraulic pressure

- System shows the most likely root cause
- Provides recommended checks and actions
- Displays confidence score and references

Actionable
Insight

5 TECHNICIAN ACTION



- Technician reviews insights on tablet or workstation
- Follows recommended steps to diagnose and fix the issue

Diagnosis &
Repair in Progress

6 RESOLUTION LOGGED



- Technician logs the root cause
- Records corrective action and notes
- System captures downtime and repair details

Resolution
Stored

7 KNOWLEDGE CAPTURE & CONTINUOUS IMPROVEMENT



- Resolution is added to the knowledge base
- Improves future AI accuracy
- Reduces repeat issues and troubleshooting time

Smarter System,
Better Results

SYSTEM SUPPORTING COMPONENTS (RUNNING CONTINUOUSLY)



Cybersecurity
& Access Control



Data Validation
& Quality Checks



Real-Time Monitoring
& Alerts



Secure Cloud /
On-Prem Platform



Role-Based Dashboards
& Notifications

BUSINESS IMPACT



Faster
Troubleshooting



Less Downtime
More Uptime



Lower Repair
Costs



Preserved Knowledge
& Expertise



Continuous
Improvement



Better Decisions
Stronger Performance

AI-POWERED SMART PLANT ECOSYSTEM

Turning Plant Data into Intelligence. Delivering Performance, Reliability & Value.

IIoT
CONCEPT DEMO

1

AI PREDICTIVE MAINTENANCE

Predict failures before they happen

Stamping Press #3

84%

Failure probability within 48 hours

HIGH RISK

71%

Predicted Issue

Hydraulic Pressure Instability

Estimated Impact

3.6 hrs downtime \$11,450

Recommended Actions

✓ Inspect hydraulic seals

✓ Check accumulator pressure

✓ Inspect pump & filters

✓ Monitor feeder wear

2

REAL-TIME PLANT HEATMAPS

Live view of plant status

Healthy

Warning

Critical

Offline

3

PLC + SENSOR ANALYTICS

Real-time data. Deeper understanding.

Press Force

986 kN

Vibration (RMS)

2.35 mm/s

Temperature

68.4 °C

Motor Load

76%

Cycle Rate

14.8 spm

PLC

Presses

Feeder

Robots

Conveyors

Vision

SCADA

EXECUTIVE KPI TRACKING

OEE

88.7%

↑ 6.4% vs yesterday

Availability

93.2%

↑ 4.9%

Performance

90.1%

↑ 3.6%

Quality

96.0%

↑ 1.9%

Downtime (Today)

2.32 hrs

↓ 0.78 hrs

Scrap Rate

1.18%

↓ 0.29%

Throughput

1,246 pcs/hr

↑ 7.5%

Energy Usage

1,318 kWh

↓ 4.2%

PLANT ECOSYSTEM OVERVIEW

Possible Line Extension

Line

Line

Stamp #1

Stamp #2

Stamp #3

Stamp #4

Stamp #5

Stamp #6

Storage Racks

Oil Sump Line

Healthy

Warning

Critical

Offline

9

LIVE ALERTS & OPERATIONAL INSIGHTS

Instant alerts. Smarter decisions.

CRITICAL

Stamp Line 3 - Press #6 Overload

10:23 AM

WARNING

Oil Sump Line - Pump Pressure High

10:18 AM

WARNING

Barcode Eather #2 - Contrast Low

10:11 AM

INFO

Storage Rack Zone B - Pallet Low

10:05 AM

Operational Insights (AI)

Stamp Line 1 running at optimal efficiency.

Scrap rate improved 21% vs last 24 hrs.

Business Impact (Today)

Production Gain

1,246 pcs

Energy Savings

12%

Barcode readability trending strong.

4

AI TROUBLESHOOTING ASSISTANT

Ask. Analyze. Act.

You

Why is Stamp Line 2 stopping intermittently?

10:23 AM

AI Assistant

Intermittent stops detected on Stamp Line 2.

10:23 AM

Likely Causes:

• Feeder misfeed

• Part jam at transfer

• Sensor false trigger

• Hydraulic pressure drop

Top Recommendation:

Inspect feeder feed length and transfer area sensors.

View Recommended Actions

5

ROOT-CAUSE ANALYSIS

Find the real cause. Prevent repeat.

Problem

Stamp Line 2 Intermittent Stops

Why #1

Why did the line stop?

Why #2

Why did the feeder stop?

Why #3

Why did the feeder misfeed?

Why #4

Why was the feed length incorrect?

Root Cause

Feed length drift due to worn feeder roll

Corrective Action

Replace feeder roll & recalibrate feed length

6

PRODUCTION INTELLIGENCE

Optimize. Balance. Maximize.

Line Performance

Stamp Line 1

Stamp Line 2

Stamp Line 3

Oil Sump Line

92%

88%

76%

91%

Throughput (Today)

29,904 pcs

Target

32,000 pcs

93.5%

of Target

Scrap Rate (Today)

1.18%

vs target 1.50%

↓ 21.3%

7

QUALITY AI VISION - BARCODE ETCHING

Barcode & data-matrix traceability

Barcode Readability

Pass Rate

97.2%

Presence Verification

Pass Rate

98.5%

Etch Quality

Pass Rate

96.1%

Scan Result (Live)

Pass

97.2%

Fail

2.3%

Unreadable

0.5%

High Contrast Grade A

Good Contrast Grade B

Poor Contrast Unreadable

Inspection Station: Barcode Eather #2

Last Update: 10:23 AM

8

SMART MAINTENANCE FORECASTING

Plan ahead. Reduce downtime.

Asset

RUL

Next Service

Risk

Press #3

~ days

05/19/2024

High

Barcode Eather #1

12 days

05/24/2024

Medium

Vision Camera #2

14 days

06/02/2024

Low

Conveyor Belt #4

21 days

06/09/2024

Low

Oil Sump Pump #1

27 days

06/15/2024

Low

DATA SOURCES

PLC / SCADA

Sensors

Vision Cameras

Historians

MES

CMMS

Quality Systems

Manual Input

SECURE & INTEGRATED

API Integration

Cybersecurity

Role-Based Access

Data Governance

OUTCOMES

Higher Availability

Lower Downtime

Better Quality

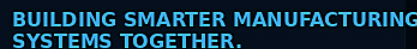
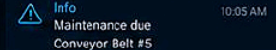
Lower Cost

Smarter Decisions

One Intelligent System.

Every Machine. Every Insight.

Stronger Plant. Smarter Future.





AI INSIGHT EXPLAINER

Natural Language Explanation

Hydraulic Press #4 is showing abnormal pressure fluctuations and cycle time variations similar to historical patterns preceding seal failure.

Based on 23+ similar cases, the probability of failure within the next 72 hours is 82%.

Recommended action: Inspect hydraulic seals and pressure system.

Top Contributing Factors

Pressure Instability		62%
Seal Wear		21%
Temperature Variation		9%
Cycle Time Deviation		5%
Oil Contamination		3%

Similar Historical Cases

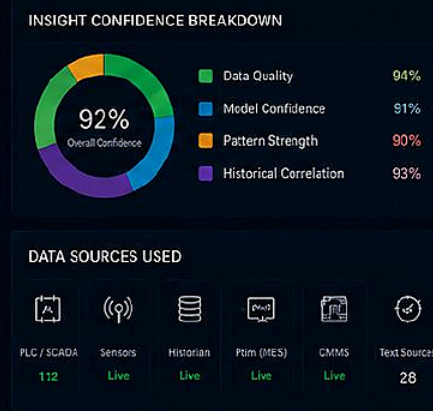
2,314

Average Time to Failure

68 hrs

Successful Fix Rate

89%



PATTERN RECOGNITION View Patterns >

AI has identified repeating patterns across your plant.

Most Frequent Pattern

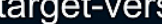
Hydraulic Pressure Instability

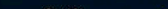
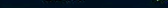
Detected 17 times this week.

Most Affected Area

Forging & Pressing

A screenshot of a mobile application interface. At the top, a dark blue header bar contains the text 'TURAL LANGUAGE AI ASSISTANT' in white, followed by a blue pill-shaped button with the word 'BETA' in white. Below the header, a white card with a blue border displays the text 'Why did Line 3 stop most today?' in a large, bold, black font. To the right of this card, a blue button with the text '10:23 AM' is visible. Below the card, a light blue background features a white text box containing the message: 'Line 3 stopped 3 times today. The primary cause was hydraulic pressure instability due to a dirty pressure sensor. The sensor has occurred 17 times in the last 30 days. Recommended action: Clean or replace pressure sensor and check for fluid leaks, fluid contamination.' To the right of this text box, another blue button with the text '10:23 AM' is visible. At the bottom of the screen, a dark blue bar contains the text 'Ask me anything about your plant...' on the left and a white right-pointing arrow icon on the right.



Production by Line (Today)					Output				Tact Time (Sec)		Utilization (%)	Trend (Output)	Actions
Line	Process	Status	OEE	Total	Good	Rejects	FPY (%)	Actual	Target				
1		Stamping Press	● On Track	 82.6%	185,420	176,230	9,190 (4.9%)	95.1%	4.72	5.00	82.6%		...
2		Robot Gripper #1	● On Track	 81.4%	162,310	153,680	8,630 (5.3%)	94.7%	4.61	5.00	81.4%		...
3		Robot Gripper #2	● On Track	 80.1%	158,950	149,840	9,110 (5.7%)	94.3%	4.68	5.00	80.1%		...
4		Axle Manufacturing	● On Track	 79.2%	167,880	159,120	8,760 (5.2%)	94.8%	4.89	5.00	79.2%		...
5		Axle Cap Coiler #1	● On Track	 76.8%	149,760	141,280	8,480 (5.7%)	94.3%	4.95	5.20	76.8%		...
6		Axle Cap Coiler #2	● Behind	 76.5%	142,210	132,850	9,360 (6.6%)	93.4%	5.02	5.20	76.5%		...
7		Axle Cap Coiler #3	● On Track	 74.5%	144,350	136,160	8,190 (5.7%)	94.3%	5.05	5.20	74.9%		...
8		Axle Cap Coiler #4	● On Track	 74.1%	143,120	138,020	5,100 (3.6%)	96.4%	4.98	5.20	74.1%		...



Production Intelligence Dashboard: This view supports production tracking by showing output, target-versus-actual performance, rejects, line performance, cycle trends, and bottleneck indicators.

Overview

AI Insights

Plant Map

Machines

Production

Quality

Maintenance

Downtime

Energy

Reports

Knowledge Base

Settings

System Status

All Systems Operational

10:16:28 AM

05/16/2024

Data Flow

LIVE

MAINTENANCE CENTER

Predict. Plan. Prevent. Maximize Uptime.

OVERVIEW

PREDICTIVE MAINTENANCE

WORK ORDERS

MAINTENANCE HISTORY

ASSETS

FAILURE ANALYSIS

Export Report

Overall Maintenance Health

89

/100

Good

↑ 7 pts vs yesterday

Asset Availability

92.3%

↑ 2.4% vs yesterday

Planned Maintenance

26

This Week

Unplanned Downtime

2.45 hrs

↑ 0.85 hrs vs yesterday

Maintenance Cost (MTD)

\$118,450

↓ 7.6% vs last month

Work Orders

52

Open

MTBF (ALL Assets)

412 hrs

↑ 10.3% vs last month

MTTR (ALL Assets)

1.58 hrs

↓ 0.21 hrs vs last month

ASSET HEALTH – BY EQUIPMENT TYPE

EQUIPMENT	HEALTH SCORE	STATUS	REL. UPTIME TREND
Stamping Press Line 1 3300 Ton Hydraulic	95%	Good	16 days Hydraulic Dftrs
Stamping Press Line 2 3000 Ton Mechanical	84%	Medium	7 days Chain Wear
Stamping Press Line 3 3000 Ton Hydraulic	58%	High	4 days Slide Guide Wtr to 96
Robot/ Gripper Cell Fanuc R-2000iC	91%	Good	21 days Gripper Air Leak
Robotic Torque Cell Atlas Motor Cnt	76%	Medium	11 days Motor
Cool Feed Line Kranes Autoclean	72%	Medium	9 days Back Roll Roll
Die Change System Auto Die Change	63%	Medium	8 days Hydraulic Pressure
Lubrication System Central Lub Unit	85%	Good	13 days Pump Filter

EQUIPMENT LAYOUT – OIL SUMP LINE AUTOMATION FLOW

2 ROBOTIC FASTENING CELL

3 LASER BARCODE ETCHING

4 VISION INSPECTION

1 OPERATOR LOAD STATION

5 FINISHED PRODUCT OUTFEED

WORK ORDER OVERVIEW

52

Total

Open: 52 (98%)

In Progress: 28 (22%)

On Hold: 10 (12%)

Completed: 46 (28%)

MAINTENANCE SCHEDULE (THIS WEEK)

	MON 13	TUE 14	WED 15	THU 16	FRI 17	SAT 18	SUN 19
09:00 AM	Work Orders	12	12	26	15	10	8
09:00 AM	Stamping Press #1 – Preventive Service			In Progress	High		
11:00 AM	Robot Cell 1 – Gripper Valve Inspection			Scheduled	Medium		
01:00 PM	Stamping Press #2 – Clutch Inspection			Scheduled	Low		
03:00 PM	Die Change System – Hydraulic Check			Scheduled	Low		

DOWNTIME TREND (MTD)

Planned

Unplanned

Takt (hrs)

May 1

May 6

May 11

May 16

Planned Downtime

12.8 hrs

↓ 2.1 hrs vs last month

Unplanned Downtime

2.45 hrs

↑ 0.85 hrs vs

Status: Medium

15.25 hrs

↑ 6.8 hrs

CRITICAL ALERTS

CRITICAL

Stamping Press #3 – Slide Vibration High
Possible Bearing Failure

10:21 AM

WARNING

Robot Cell 1 – Gripper Air Leak
Air pressure below threshold

10:18 AM

CRITICAL

Stamping Press #2 – Clutch Wear
Clutch life 15% remaining

10:15 AM

WARNING

Cool Feed Line – Feed Roll Wear
Replace roll kit within 7 days

09:50 AM

INFO

Lubrication System – Filter Change Due
Next service due in 15 days

09:30 AM

UPCOMING MAINTENANCE

Stamping Press #1 – Preventive Service

05/17/2024

Medium

Robot Cell (Torque) – Gearbox Inspection

05/17/2024

Low

Stamping Press #2 – Clutch Inspection

05/18/2024

Medium

Die Change System – Hydraulic Check

05/19/2024

Low

Cool Feed Line – Roll Replacement

05/20/2024

Medium

MAINTENANCE COST BREAKDOWN (MTD)

Total Cost

\$118,450

↓ 7.6% vs last month

Planned Maintenance

\$36,280

30.6%

Unplanned Maintenance

\$54,620

46.1%

Parts & Materials

\$19,850

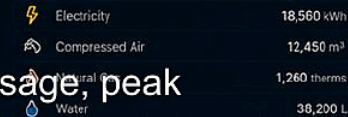
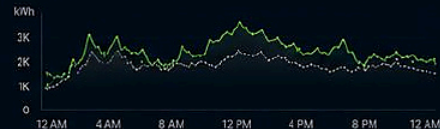
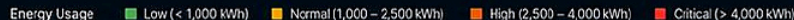
16.8%

Labor

\$7,690

6.8%

Maintenance Planning and Reliability Center: This concept supports maintenance teams with work orders, equipment health, predictive alerts, downtime trends, and upcoming service needs.



Energy Optimization Map: This view shows how the plant could monitor energy usage, peak demand, power consumption by area, and cost-reduction opportunities.

[View All Categories](#)

All Categories

 Die & Tooling
67 articles

 **Safety**
72 articles

NEW ARTICLES

Stamping Press Vibration Troubleshooting

May 14, 2024

Robot / Grippers	Gripper Fault	Troubleshooting
1. Robot gripper is not moving 2. Robot gripper is not holding the part 3. Robot gripper is not releasing the part	1. Gripper is not receiving power 2. Gripper is not receiving signal from the robot 3. Gripper is not receiving signal from the PLC 4. Gripper is not receiving signal from the HMI	1. Check the power supply to the gripper 2. Check the signal lines between the gripper and the robot 3. Check the signal lines between the gripper and the PLC 4. Check the signal lines between the gripper and the HMI

May 12, 2024

Axle Manufacturing	Quality	Dimensions
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May 10, 2024

Capacitor Color Tension Settings

May 9, 2024

by organizing

5

0 100

[View All](#)

5 Die Change – Best Practices 21K views

[View All](#)

BETA

Ask questions. Get instant answers from our knowledge base.

What causes axle OD out of tolerance?

Orskov and

AI responses may be inaccurate. Verify critical information.

Plant Knowledge Base and Troubleshooting Library: This concept preserves

CYBERSECURITY & DATA GOVERNANCE

SECURE. CONTROLLED. APPROVED.

1

APPROVED DATA ACCESS ONLY



- Use limited, management-approved plant data for the pilot.
- No uncontrolled access to PLCs, production systems, or confidential files.

2

READ-ONLY INTEGRATION FIRST



- Start with read-only data connections.
- Monitor and analyze information without changing machine logic or plant operations.

3

IT & CYBERSECURITY REVIEW



- Validate network access, data flow, user permissions, and system security.
- Approve before any prototype or pilot deployment.

4

ROLE-BASED USER ACCESS



- Separate views for maintenance, engineering, production, quality, and leadership.
- Each team only sees the data they are approved to use.

5

SECURE PILOT BEFORE SCALING



- Begin with one limited pilot area.
- Confirm safety and compliance, then expand only after cybersecurity approval and proven value.

PLANT FLOOR & DATA SOURCES



PLCs & Machines



Sensors & IoT Devices



MES Platform



Maintenance Logs



Quality Records



Production Reports



NO DIRECT WRITE ACCESS
READ-ONLY CONNECTIONS ONLY

SECURE CONNECTION LAYER



INDUSTRIAL
FIREWALL

- ✓ Encrypted Connections (TLS)
- ✓ Network Segmentation
- ✓ Intrusion Detection
- ✓ Continuous Monitoring

DATA PLATFORM (ISOLATED ENVIRONMENT)



Data Ingestion
(Read-Only)



Data Storage
(Secure)



AI & Analytics
Engine



Data Validation | Access Control | Audit Logging

SECURE USER ACCESS



Maintenance



Engineering



Production



Quality



Leadership

ROLE-BASED ACCESS
LEAST PRIVILEGE PRINCIPLE

USER INTERFACE & OUTPUTS



Dashboards



Alerts & Notifications



Reports & Analytics



Knowledge Base



SECURE. MONITORED.
CONTROLLED.

CYBERSECURITY PRINCIPLES



CONFIDENTIALITY

Protect sensitive
plant information



INTEGRITY

Ensure accurate
and reliable data



AVAILABILITY

Keep systems available
and operational



COMPLIANCE

Follow company policies
and industry standards



MONITOR & IMPROVE

Continuously monitor,
assess, and improve



TAKEAWAY: Secure first. Connect carefully. Scale only after approval.

✓ Protect the Plant

✓ Protect the Data

✓ Protect the People

✓ Build Trust