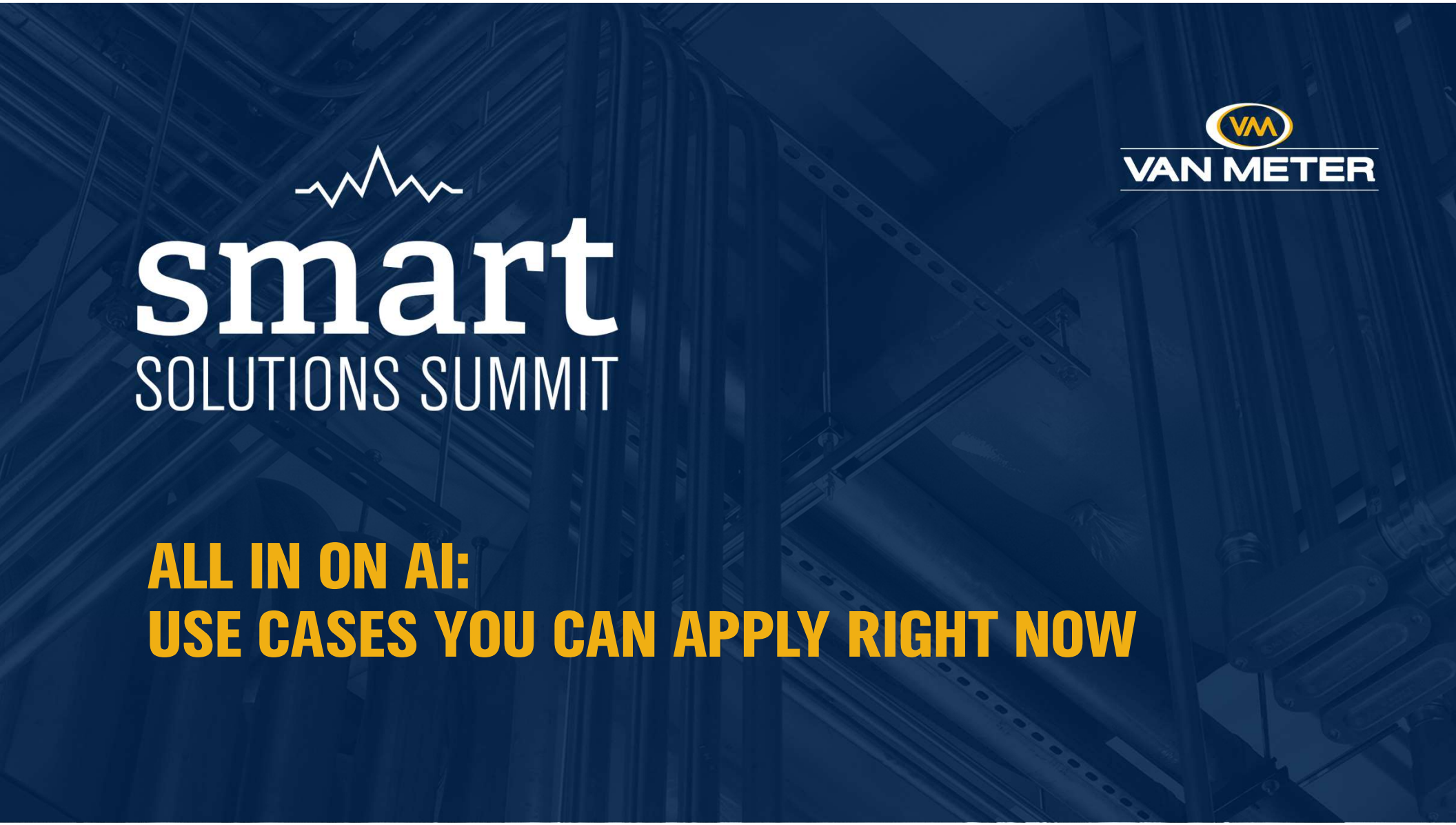
smart
SOLUTIONS SUMMIT
VAN METER
ALL IN ON AI:
USE CASES YOU CAN APPLY RIGHT NOW

smart
SOLUTIONS SUMMIT

VAN METER

# WELCOME


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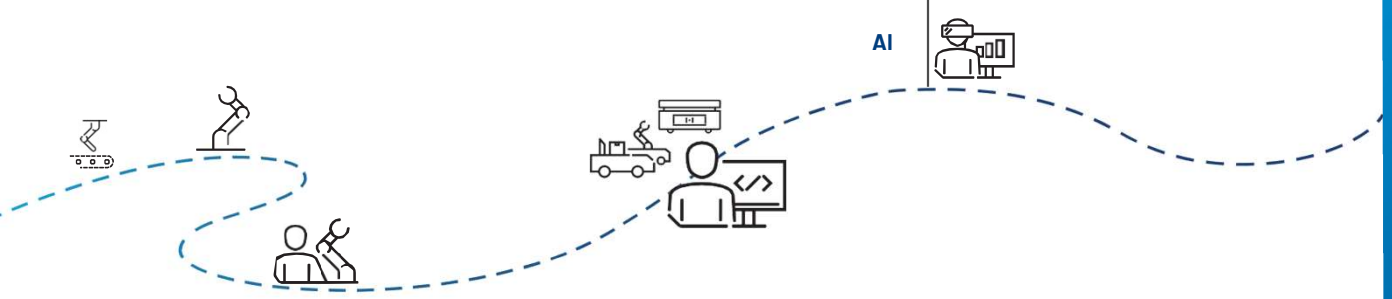
# THE RACE TO CAPITALIZE ON AI

GenAI and causal AI, cobots and AMRs have already been adopted by manufacturers to enhance and complement the workforce, while reducing errors, increasing speed to value and improving quality.

**85%** have already invested or plan to invest in **AI / ML** this year.




## TOP 10 INVESTMENT AREAS OVER NEXT 12 MONTHS

1. **GenAI or causal AI**
2. **Cobots (Collaborative Robots)**
3. **Autonomous Mobile Robots (AMRs) and Automated Guided Vehicles (AGVs)**
4. **Zero trust architecture**
5. **Generative design**
6. **AI / ML**
7. **Industrial metaverse**
8. **RFID / geotagging**
9. **Voice recognition / Natural Language Processing (NLP) technology**
10. **Digital thread**

**Q.** Which of the following technologies has your company invested in? Respondents selected: Plan to invest in the next 12 months from four options. Base: 1567

# QUALITY #1 FOCUS FOR AI

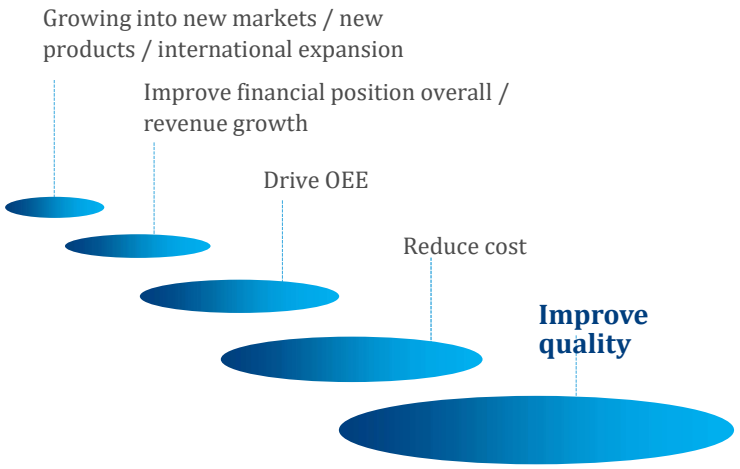
## CUSTOMERS SURVEYED ABOUT QUALITY SAID:

### #1 ACCELERANT

**Quality** was named the top accelerant for digital transformation by Rockwell Automation's enterprise customers.

### #1 AI IMPACT

**Closed Loop Quality** was rated the #1 impact area for AI in manufacturing by enterprise customers.




**Q.** What positive business outcomes are you looking to achieve from your smart manufacturing technology? Select all that apply. Base:1567

**Quality control** tops the chart for planned AI / ML use cases in 2024.

**45% Quality control**

40% Cybersecurity

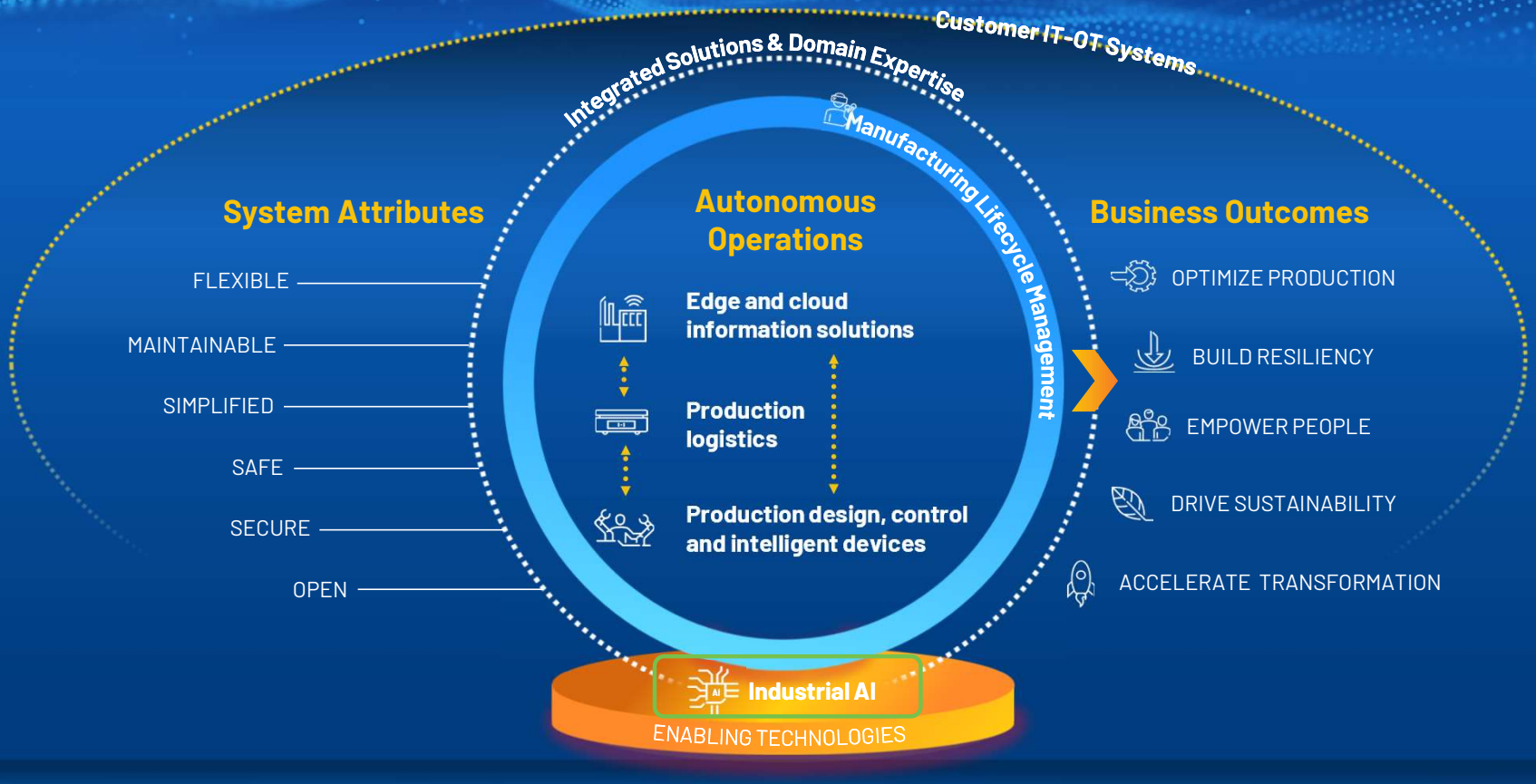
39% Process optimization

34% Supply chain management

33% Robotics

**Q.** Where do you plan to use AI / ML in 2024? Select all that apply. Base:1567

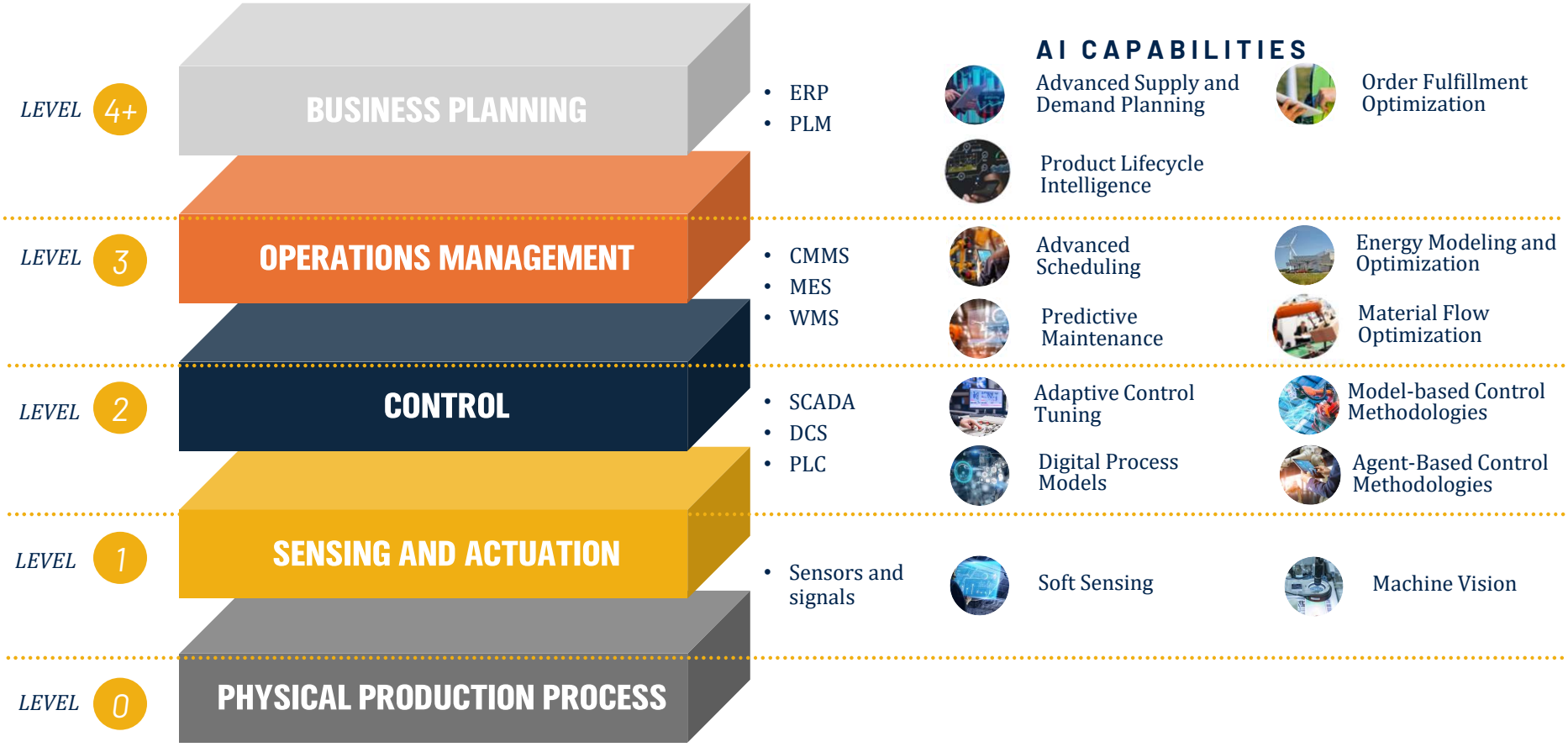
# THE FUTURE OF INDUSTRIAL OPERATIONS




DESIGN ⟷ OPERATE ⟷ MAINTAIN

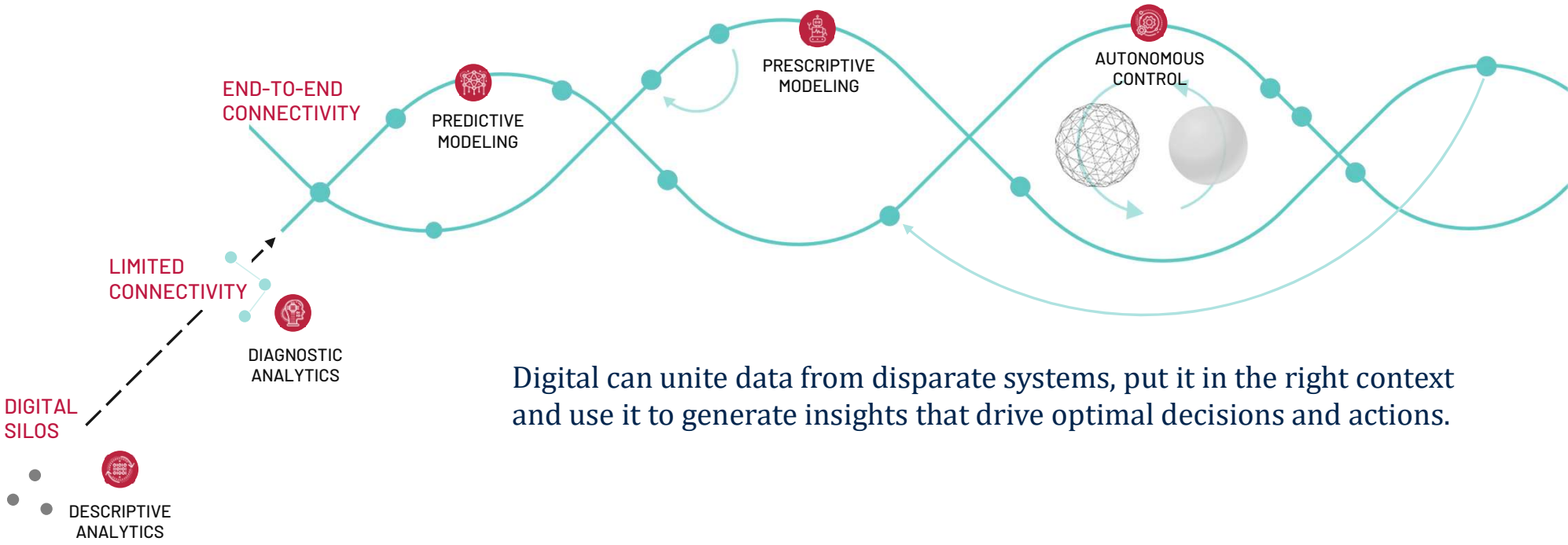
# MANUFACTURERS ARE NOW IMPLEMENTING ADVANCED AI/ML USE CASES

## AUTONOMY AND CLOSED LOOP OPTIMIZATION CAN BE ACHIEVED AT VARIOUS LEVELS THROUGH VERTICAL INTEGRATION.



# OUR FOCUS IS ON TRANSFORMING THE VALUE CHAIN WITH DIGITAL.

Increase connectivity and achieve autonomous operations by using technology advances like new software capabilities, AI, connected devices, computing power and interconnecting them with processes and people.




Digital can unite data from disparate systems, put it in the right context and use it to generate insights that drive optimal decisions and actions.

# DATA SCIENCE PROCESS

## CRISP-DM MODEL


- Define data science objects
- Set success criteria

- Break business problems into data science problems

- Perform data analysis
- Discover outliers

- Understand data points
- Formulate data science strategy
- Perform required Data Transformations

- Experiment with multiple ML Models
- Tune Hyperparameters

- Choose the optimal model

- Operationalize your ML Model
- Data Transformations
- **Maximum value realized**

# AI FOR PREDICTIVE MAINTENANCE AND OPERATIONAL EFFICIENCY

# FT Analytics™ GuardianAI™

## MACHINE LEARNING FOR PREDICTIVE MAINTENANCE AT THE EDGE

### USE DEVICES AS SENSORS

Get more insights out of your existing equipment data

### NO DATA SCIENCE REQUIRED

Empower your OT professionals with easy-to-use machine learning

### ADVANCE FROM ANOMALY DETECTION TO ANOMALY IDENTIFICATION

Minimize investigation time with context about the type of failure that is going to occur

### ANALYZE AT THE EDGE

Train and run right at the edge for near real time predictions

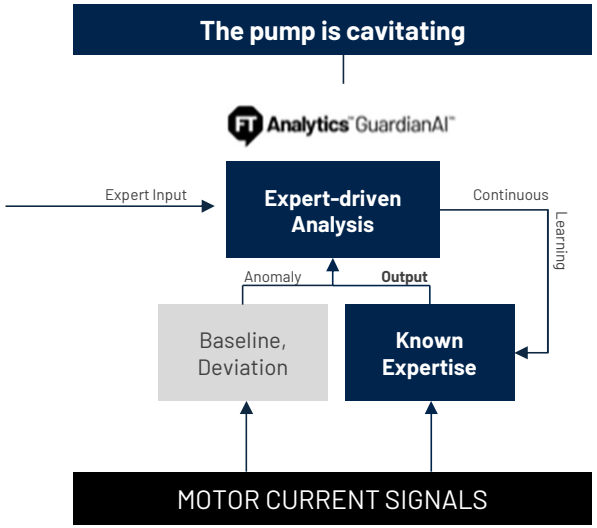
# GUARDIAN AI - EMBEDDED EXPERTISE

FT Analytics GuardianAI™

Anomaly detection to anomaly identification

## EMBEDDED EXPERTISE

FactoryTalk® Analytics™ GuardianAI™ recommends causes of faults




## FIRST PRINCIPLE FAULTS DETECTED OUT OF THE BOX

### Pumps

- ✓ Impeller Unbalance
- ✓ Blade Fault
- ✓ Cavitation
- ✓ Viscosity Changes
- ✓ Shaft Misalignment
- ✓ Change in Fluid Dynamics

### Fans and Blowers

- ✓ Blade Misalignment
- ✓ Blade Unbalance
- ✓ Blade Wear
- ✓ Loose Blade
- ✓ Electrical Fault
- ✓ Motor Fault
- ✓ Shaft Misalignment
- ✓ Fan Bearing Fault

### Motor Analytics

- ✓ Unbalance
- ✓ Shaft Misalignment
- ✓ Loose Structural Mounting (Soft foot)
- ✓ Mechanical Looseness
- ✓ Rotor Rub
- ✓ Ball Bearing Fault
- ✓ Inner Race Bearing Fault
- ✓ Outer Race Bearing Fault
- ✓ Bearing Cage Fault

## THE FUTURE OF FACTORYTALK ANALYTICS GUARDIANAI

### Controller Connection

Add production contextualization and operator notifications

### Rockwell Portfolio Integration

Surface insights for higher level analytics

FT DataMosaix™

FT Optix™

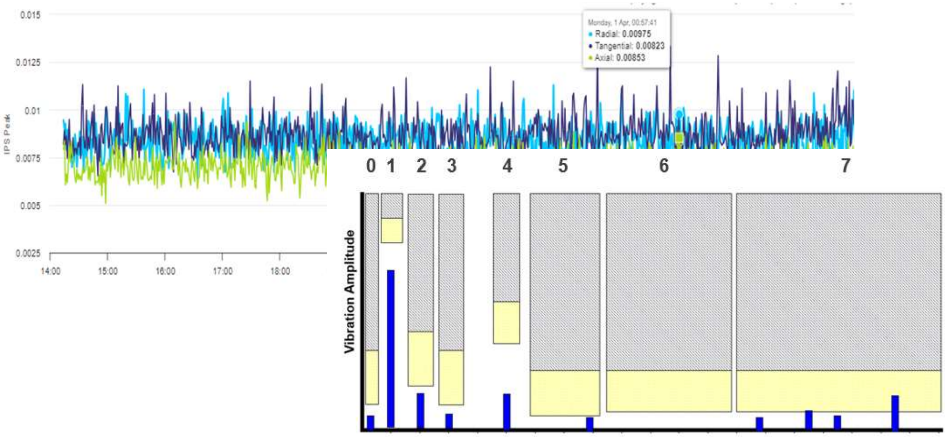
### Vibration Monitoring

Expand supported applications

# 1445 NEXT GEN CONDITION MONITORING SYSTEM

## 1445 WIRELESS CONDITION MONITORING

A cost-effective balance of plant solution to help prevent costly machine repairs, replacement and downtime.


## IDEAL APPLICATIONS

**Monitoring of industrial:**

- Pumps
- Motors
- Fans
- Blowers

## TECH SPECS

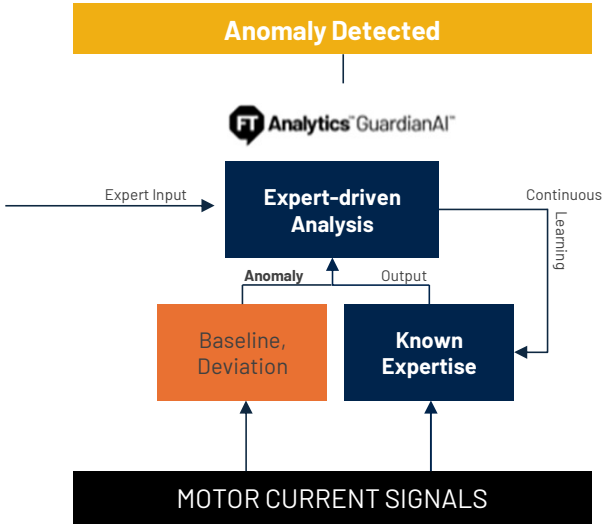
- **Triaxial vibration** and ambient **temperature** monitoring
- **1445 Thermoelectric Generator (TEG) Energy Harvester**
- Provides energy to sensor via temperature differential between machine surface and ambient temperature
- Requires just 8°C (15°F) temperature differential
- **1445 Photovoltaic Energy Harvester**
- Powers sensor via light (indoor/outdoor options
- Requires 66 lux ~ 6.2 ft candles
- -40…85°C operating temperature, IP66, Class 1 Div 2 hazardous location

**June 2025**

# GUARDIAN AI - EMBEDDED EXPERTISE

## USER CLASSIFICATION

Train FactoryTalk Analytics GuardianAI
to identify anomalies specific to your operation




## CONTINUOUS LEARNING

Enhance FactoryTalk Analytics GuardianAI with AI by **labeling** and **training new failure modes**

**Contextualize new faults** that occur by incorporating feedback directly from maintenance engineers

Contextualized signature is **automatically embedded**

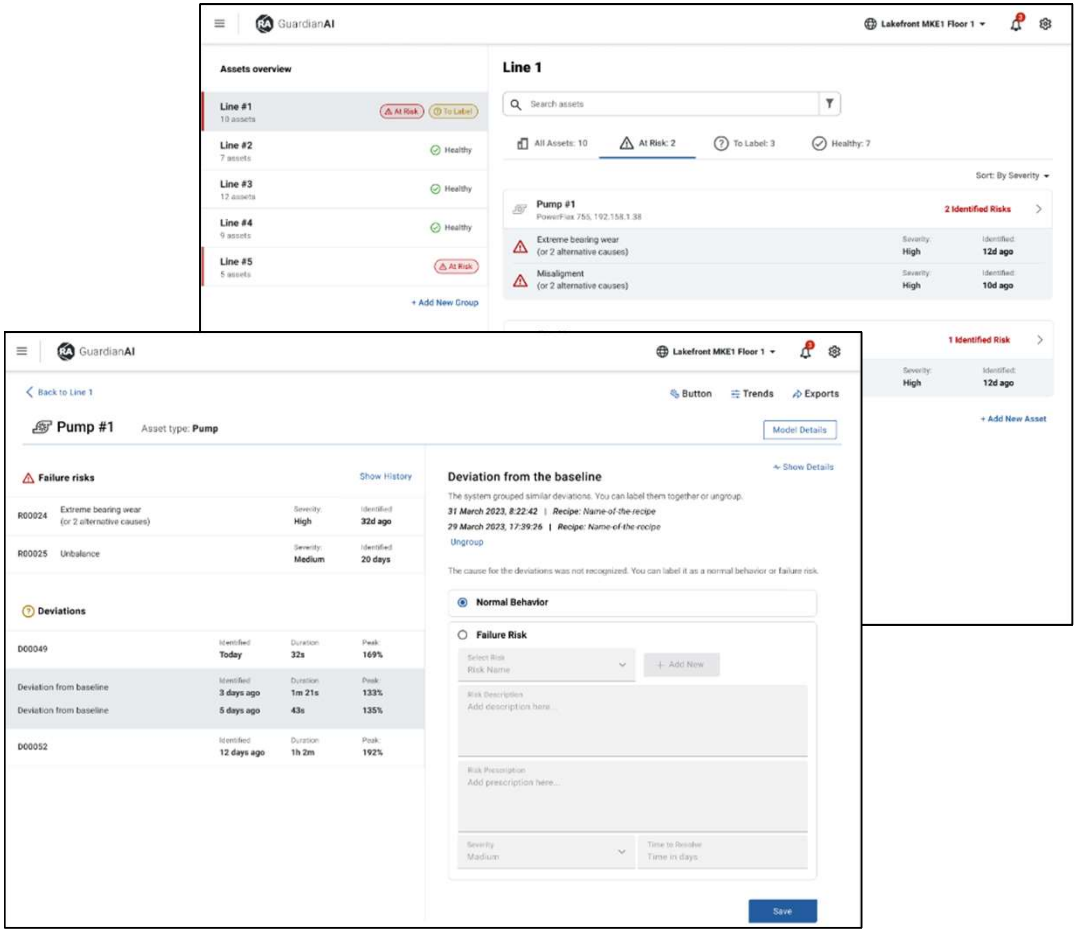
Analytics GuardianAI

Anomaly detection to anomaly identification

# GUARDIANAI APPLICATION WORKFLOW

## NO CODE MACHINE LEARNING

1. Establish baseline asset behavior under normal conditions
2. AI automatically monitors deviation from baseline behavior
3. Flag and notify user when an anomaly is detected
4. Leverage embedded expertise or label the detected anomaly



CUSTOMER SUCCESS:
MINING

# IMPROVE WORKER SAFETY WITH PREDICTIONS ABOUT EQUIPMENT FAILURES

## CHALLENGE

Ventilation systems are essential to mining operations. They help to deliver the safety and well-being of the miners by circulating fresh air and removing stale air, hazardous gases and dust from the mine.

Any unplanned downtime of a mine's ventilation system endangers miners and results in substantial lost revenue.

## APPROACH

PowerFlex® 6000T medium voltage drives are used to drive the ventilation system fans.

FactoryTalk® Analytics™ GuardianAI™ leverages data from drives to identify anomalies in the ventilation system operation.

The maintenance team is alerted when anomalies occur so they can perform the required maintenance on the system and correct the issue.

## RESULTS

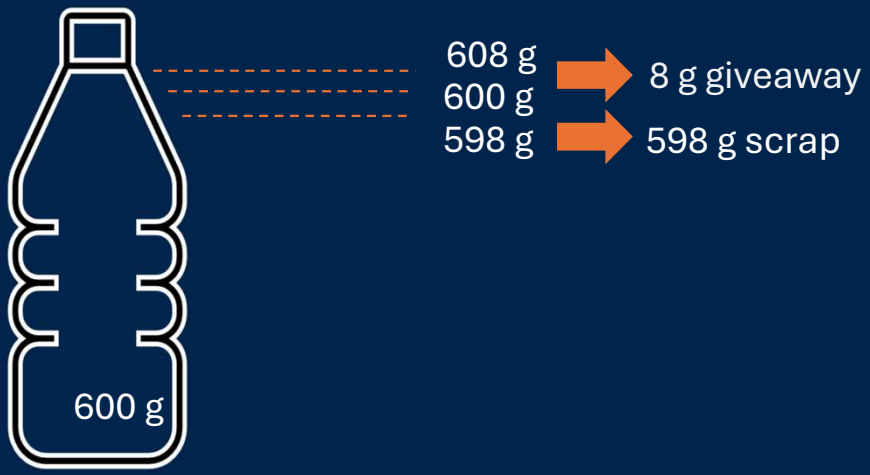
- Helped prevent unplanned downtime by detecting fan blade alignment issues
- Increased miner safety by predicting equipment failures before they occur

# ENHANCING INDUSTRIAL AUTOMATION WITH AN AI SOLUTION

CUSTOMER SUCCESS:

## CONSUMER PACKAGED GOODS, FOOD AND BEVERAGE

# PERFECT FILL REDUCES GIVE AWAY




## PROBLEM STATEMENT

- Over Fills add up to significant yearly giveaway expense.
- Underfills cause scrapped product

.

## APPROACH

FactoryTalk® Analytics™ LogixAI® was implemented in the form of a soft sensor to predict fill amount.

The machine learning model was deployed at the edge where it both trains using real process data and then runs during operation to make high speed predictions of the fill amount based on current operating conditions.

The predictions were integrated with the automation system in a closed loop to improve control of moisture content

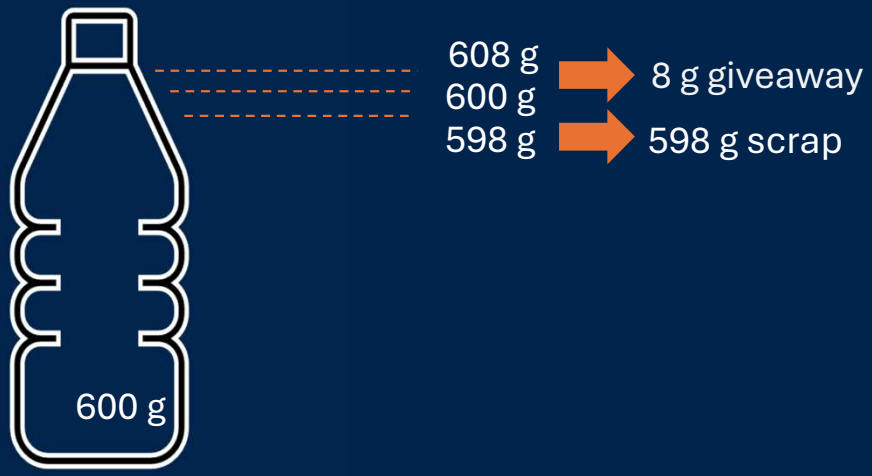
## RESULTS

- Reduced giveaways, more revenue.
- Reduced scrap from underfilled, more revenue.

CUSTOMER SUCCESS:

## CONSUMER PACKAGED GOODS, FOOD AND BEVERAGE

# PERFECT FILL REDUCES GIVE AWAY




## CHALLENGE

During the packaging process, a filling machine is used to insert the liquid product into its container.

The filling machine is a high-speed piece of equipment which, over time, loses accuracy.

The machine has a strict lower limit setpoint to confirm legal requirements are met.

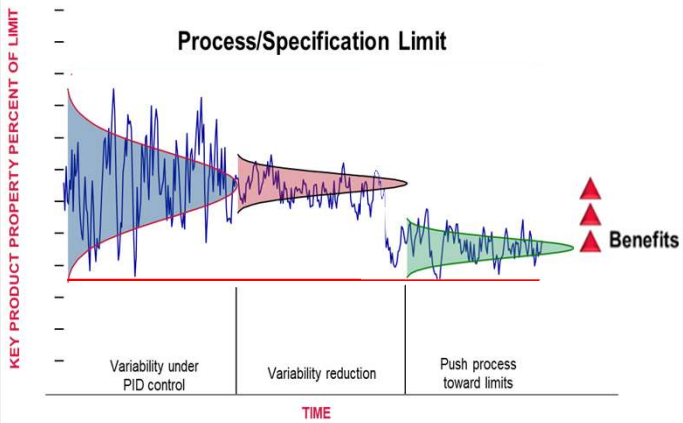
As a result, inaccuracies result in over filling containers with product or “giving away” product.

Frequent adjustments by operators are required to keep the fill level as close to design as possible.

## GOALS

Operations teams aim to improve their filling machine performance to:

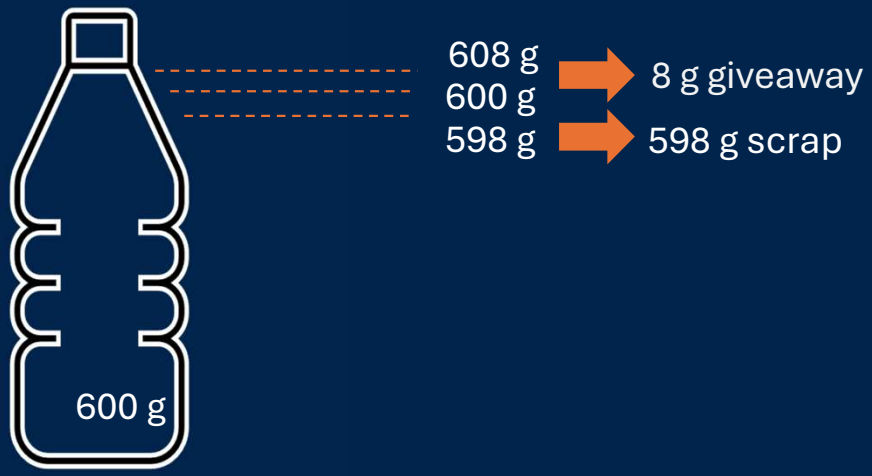
- Reduce giveaway
- Increase plant profitability



CUSTOMER SUCCESS:

## CONSUMER PACKAGED GOODS, FOOD AND BEVERAGE

# PERFECT FILL REDUCES GIVE AWAY




## SOLUTION

FactoryTalk® Analytics™ LogixAI® is implemented in the form of a soft sensor at the edge:

- **Identify the variable of interest**
  - Product dosed weight
- **Identify controlling process variables**
  - System pressures
  - System temperatures
  - System speeds
  - Level of the buffer tank
- **Develop a soft sensor that predicts** the variable of interest based on process variables
- **Train the model using real process data**
- **Deploy the model to make real time predictions** of the dose weight based on current operating conditions
- **Integrate the prediction in a closed loop to improve control of the fill level.**

# FACTORYTALK ANALYTICS LOGIXAI USE CASES

### AUTOMOTIVE & TIRE

**Predict:** Tire splice location

**Value:** Decreased out- of -tolerance events

### BOILER/DRYER

**Predict:** Steam pressure/Humidity

**Value:** Reduce operator interaction and energy use

### FILLING/PACKAGING

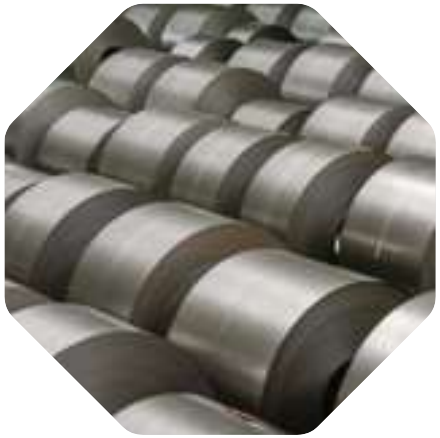
**Predict:** Fill weight of product in the container

**Value:** Reduce product giveaway

### ROLLED PRODUCTS

**Predict:** Positioning for cuts perforation

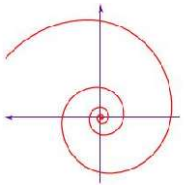
**Value:** Increased product consistency and throughput



# LOGIXAI® AUTOMATED MODELING

## AUTOMATED MODELING EXAMPLE

$$r = ae^{\theta \cot b}$$



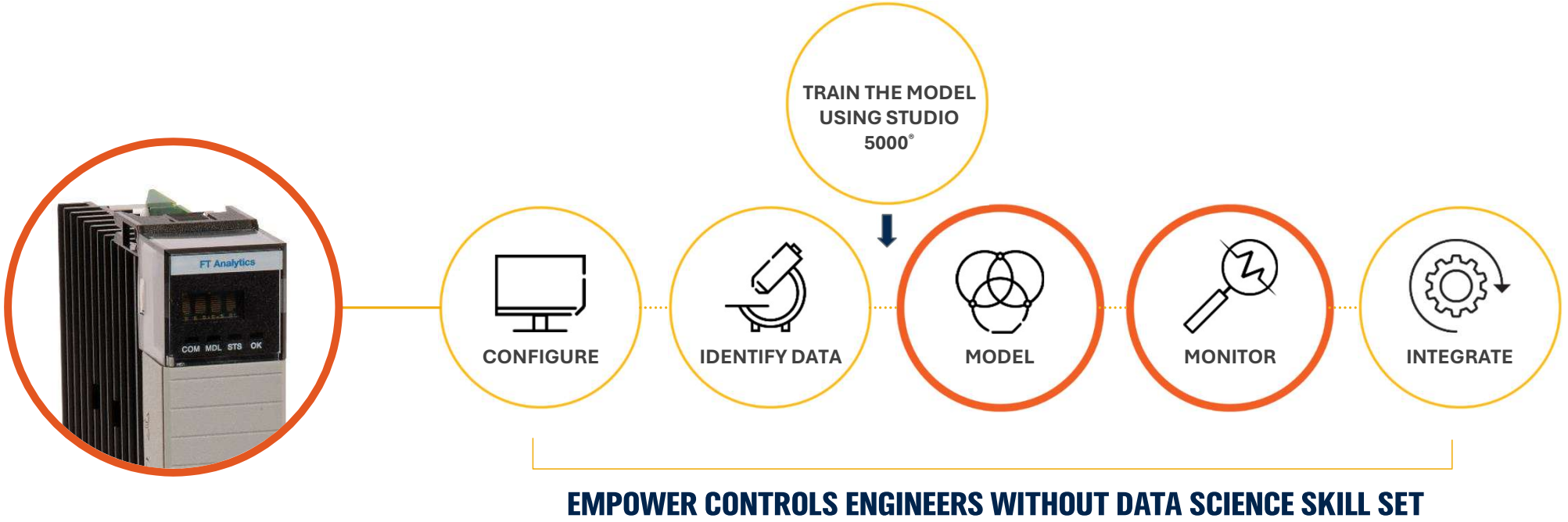
A spiral is a plane curve that, in general, winds around a point while moving ever farther from the point.

*https://www.britannica.com/science/spiral-mathematics*

- Data modeling is different than object modeling
- LogixAI® models operational behavior by creating a mathematical equation
- Other algorithms may build models based on clusters, decision trees, etc.
- Applications that follow the laws of physics can be modeled by LogixAI®
- Example: winder applications

# FACTORYTALK® ANALYTICS™ LOGIXAI®

**DESCRIPTIVE | DIAGNOSTIC | PREDICTIVE | PRESCRIPTIVE**




**EMPOWER CONTROLS ENGINEERS WITHOUT DATA SCIENCE SKILL SET**

**AUTOMATED MACHINE LEARNING MODELING FOR CONTROLLOGIX® TAGS AS PRIMARY DATA SOURCE**

# FACTORYTALK® ANALYTICS™ LOGIXAI®
# CONTRIBUTING VARIABLES

Variable Summary

| Variable Type | Name | Contribution Status | Lower Bound | Upper Bound |
|---|---|---|---|---|
| Variable of Interest | VoI | | 40.5 | 88.0440011 |
| Input | Input11 | Contributing | 47.7540009 | 75.5920010999999 |
| Input | Input2 | Contributing | 134.135993699999 | 164.053998899999 |
| Input | Input7 | Contributing | 185.940005400000 | 232.8369978 |
| Input | Input1 | Not Contributing | 104.3279982 | 131.802 |
| Input | Input10 | Not Contributing | 81 | 99 |
| Input | Input3 | Not Contributing | 48.9149982 | 73.4469967 |

After a model has been generated, you can view which of the input variables were selected by LogixAI® as contributing to the Variable of Interest. The Contribution Status indicates whether or not an input variable is currently influencing the Variable of Interest. Contributing and Non-Contributing inputs are labeled in the Variable Summary window.
Select the Information icon ⓘ next to each model and prediction to view the Variable Summary.

Note: State Variables do not contribute to the Variable of Interest.

# ADVANCED AI VISION TECHNOLOGY

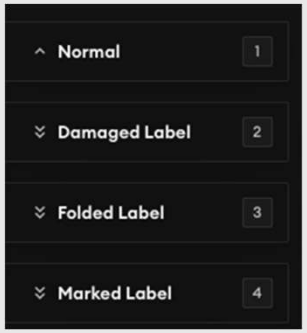
# FACTORYTALK® ANALYTICS™ VISIONAI™ WORKFLOW ENABLES MANUFACTURERS TO EASILY DEPLOY SHARED ML MODELS ACROSS THEIR MANUFACTURING FACILITIES

## CAPTURE

### INSPECT

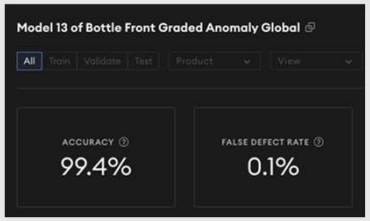

## LABEL

### CREATE - LABELING GALLERY



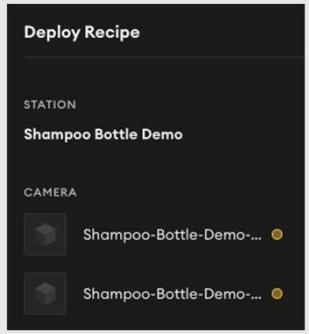

## TRAIN

### CREATE - TRAINING MANAGEMENT



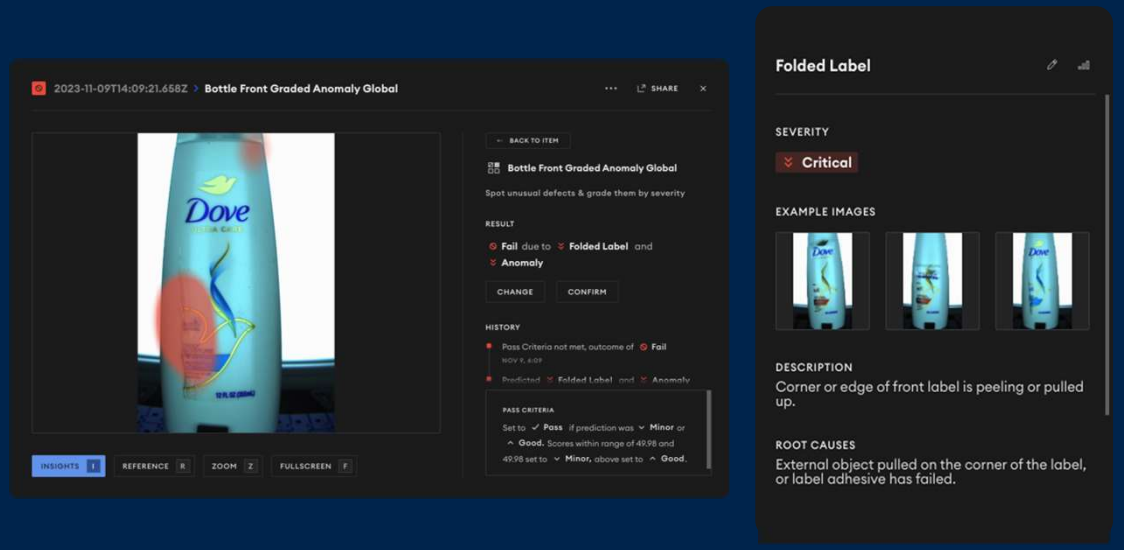

## DEPLOY

### CREATE - RECIPE MANAGEMENT




REPEAT

# VISIONAI™ FINDS ANOMALIES PREVIOUSLY UNDETECTED, DRIVING INSIGHTS AND ACTIONS PREVIOUSLY IMPOSSIBLE




## ADVANCED ANOMALY DETECTION

Train a **specialized AI model for your product** with FactoryTalk® Analytics™ VisionAI™, delivering a lightweight yet highly effective solution for detecting even the subtlest and rarest anomalies in production.

## CLASSIFICATION AND ROOT CAUSE ANALYSIS

Go **beyond simple pass/fail** judgments with the Rockwell Automation cloud-essential platform, offering detailed anomaly analysis and immediate corrective action suggestions.

## EDGE AND CLOUD INTEGRATIONS FOR CONTROLS

Once your anomalies are detected, classified and associated with a root cause, you're now able to **share that data natively at the edge** with control systems and in the cloud via API to any MES/QMS.

# ROCKWELL AUTOMATION COMBINES HARDWARE, SOFTWARE AND DOMAIN EXPERTISE TO SIMPLIFY QUALITY INSPECTION

## HARDWARE

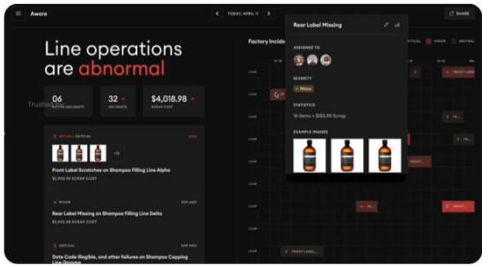
- **Real-time inspections** in high speed manufacturing will an integrated solution
- **Essential automation integration** via standard industrial protocols
- **Scalable hardware** using off-the-shelf components to fit any inspection application

## SOFTWARE

- **Essential analytics stores** all image data, exposes through APIs and AI-driven insights.
- **Remote operations** allows the production line to be updated from the cloud in real-time.
- **ML Model management** means that AI scales for enterprise customers.


## DOMAIN EXPERTISE

- **Integrations** to allow alerting and management from anywhere.
- **Enterprise manageability** scale the ROI on your deployments.
- **Cybersecurity** is a core principle and FactoryTalk® Analytics™ VisionAI™ is built on SOC 2 compliant technology.

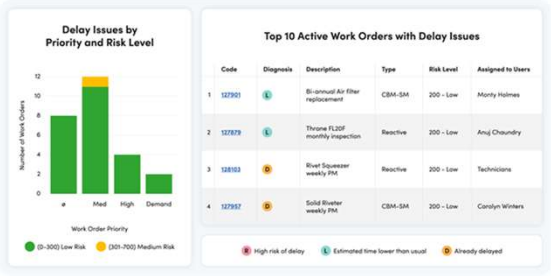


# AI-DRIVEN MAINTENANCE MANAGEMENT SOLUTIONS

# THE TOOLS OF FIIX FORESIGHT

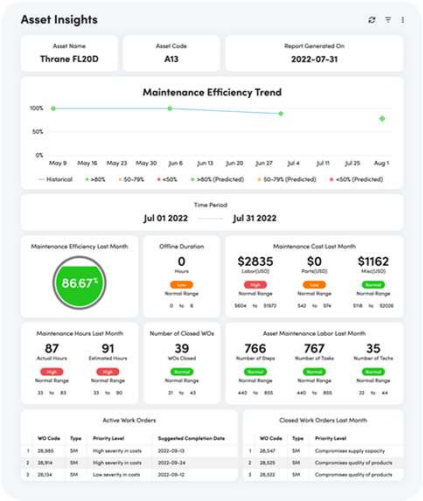
## WORK ORDER INSIGHTS

Automatically analyze 1000s of work orders to see which ones are causing breakdowns, delays, and compliance issues.



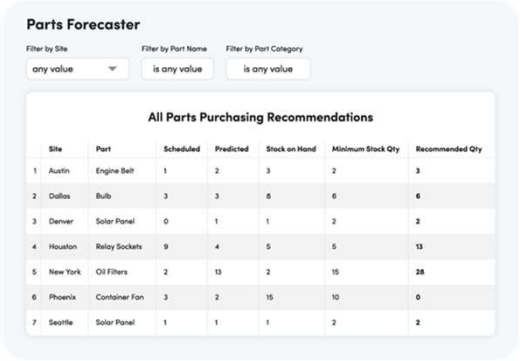

## ASSET INSIGHTS

Get alerted if you're overspending on maintenance, consuming too many parts, or doing too much reactive work.




## PARTS FORECASTER

Predict the parts you'll need for upcoming work so you can avoid stockouts and reduce working capital in your storeroom.




Fiix BY ROCKWELL AUTOMATION

# ASSET RISK PREDICTOR AUTOMATICALLY SPOTS MACHINE ISSUES BEFORE THEY OCCUR

**How it works**

- AI engine monitors machine sensor data and lets you know when the machine is operating abnormally
- Multi-variable prediction model incorporates data from sensors, machine status and production recipe to achieve high prediction accuracy
- Does not require Fiix® CMMS

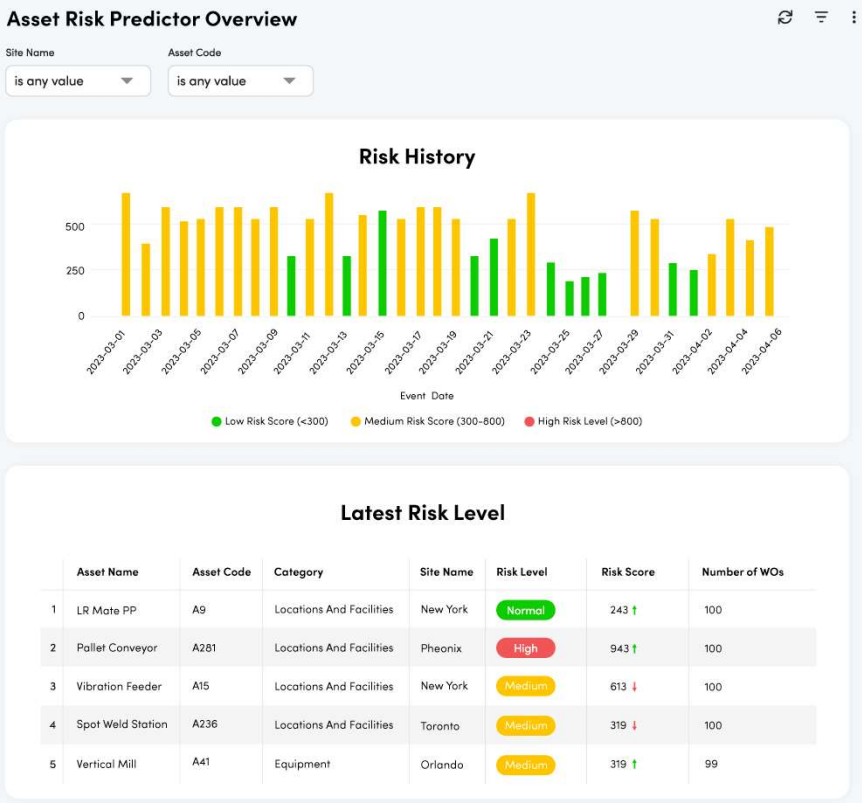
**Set up process – get up and running in as little as two weeks**

- Establish connectivity to OT network (~1 week)
- Automatic data model training (1 week)

**Requirements**

- Machine sensor data available from PLC or via any standard industrial protocol (OPC UA, etc.)
- Edge to cloud connectivity – Fiix provided or via API

*Patent Pending




"Asset Risk Predictor gives us an early warning of potential machine issues, reducing the risk of unplanned downtime. Being able to auto-generate work orders when risks are detected is a huge plus."

*– Michael Thomas*
*Plant and Commissioning Engineer, Dunlop Aircraft Tyres*

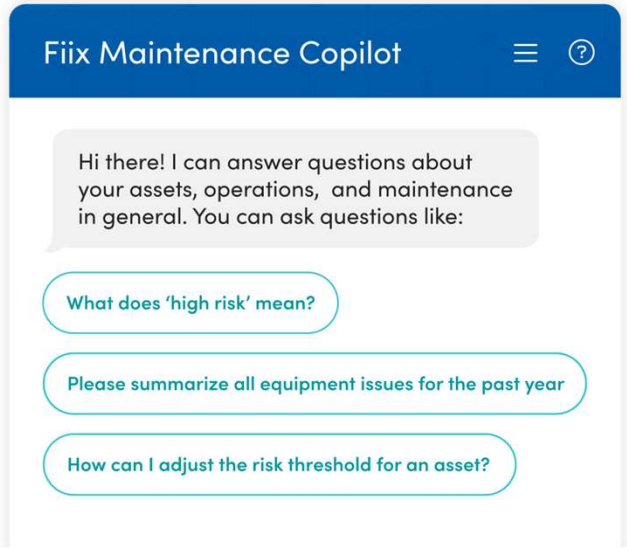
# FIIX MAINTENANCE COPILOT: AI CHATBOT

Get instant answers to your maintenance questions with Fiix® Maintenance Copilot, an AI chatbot specially trained on your Fiix Asset Risk Predictor (ARP) data.

**What it does:**
It accesses a maintenance knowledgebase built from your work orders, manuals, and more. Fiix Maintenance Copilot shares best practices, historical data, and lessons learned from previous maintenance tasks to provide answers about an asset or maintenance procedures.

**Benefits:**

- Get quick answers about your assets
- Search all your maintenance knowledge, in one place
- Fix and find problems faster




**Here are some examples of questions that the copilot can help answer:**

- What does a high-risk score mean?
- How can I check for software updates?
- Can the system generate automatic work orders?
- Can risk thresholds be customized for ARP dashboards?
- What does the predicted risk level mean on the ARP dashboard?
- Can I set up alerts for risks?
- Which maintenance procedures have been performed recently?
- Are there trends in my recent work orders?
- How is ARP different from condition-based maintenance?

# SO WHERE DO YOU START?

# OUR APPROACH

| | |
|---|---|
| Alignment to Initiatives | ■ ■ ■ |
| Value Impact | ■ ■ ■ |
| Complexity | ■ ■ □ |

## IMPACT

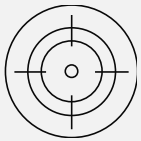
Identify your most pressing problems and clarify the improvements required for resolution.

WE ARE HERE

## VALUE

Calculate the positive financial impact of the change both today, and at scale.

## JOURNEY



Prioritize and detail the solutions that will create the desired impact and clearly achieve the identified value.

FEEDBACK & REFINE

## PROVE

Iterate to confirm and achieve single-source value.

## SCALE

Use strong partnerships to amplify the value across the entire business.

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# QUESTIONS?