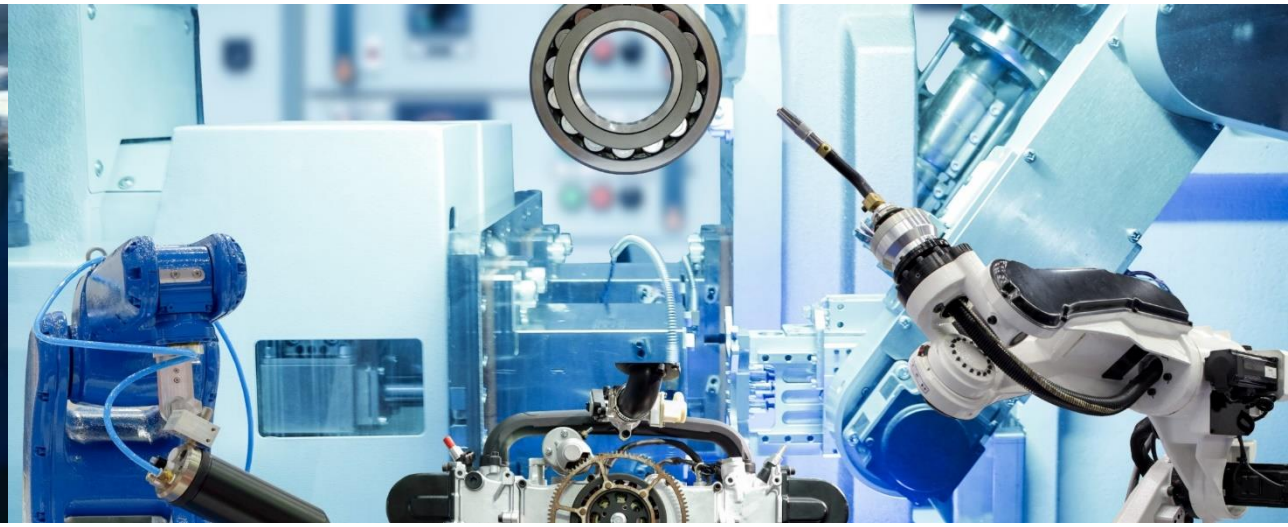


## Manufacturing Use Cases

# Chessboard Business Outcomes Guide

### Drive to solution scale with recommendations for:

- Intel Partner Led Sales
- Intel Account Executives and Sales Teams

intel®

# Reference This Guide to Learn How to...

**1**

Identify manufacturing end customers, their personas, desired business outcomes, and how they measure success.

**2**

Connect your end customers' manufacturing business outcomes with use cases that solve for those outcomes.

**3**

Show how a given solution's business outcomes, technologies, use cases, etc. provide opportunities for one-to-many scale.

## Principles of Intel's Chessboard Solution Selling Approach:

Lead with language that is relevant and easily understood by end customers.

Position yourself as a trusted advisor, rather than just a transactional seller.

Show, rather than tell, how ingredients and technologies as key enablers of scale.

# Table of Contents

## Business Outcomes Introduction:

Learn about the outcomes-focused sales journey and access key resources to learn more



## Chessboard Scale Approach: Manufacturing

See how Intel's Chessboard Scale Approach guides the sales journey



## Manufacturing Use Case Scenarios

Access sales journey intelligence on each Chessboard Manufacturing Use Case Scenario

# Anatomy of a Customer-Centric Sales Journey

This approach begins by focusing on what your customer cares about: Who they are, what they do, and their goals. Only then does it introduce the language of use cases and advise a customer around solutions and ingredients.

## Customer Business Practices

- **What they do:** Those practices that make up their business
- **How they use tech to do it:** Technologies and their current state of digital transformation
- **Who does it:** Key personas

## Corresponding Business Outcomes and Measurement

- **Outcomes for improving business practices**
  - **Revenue:** Increase revenue and identify new revenue streams
  - **Risk:** Overcome challenges/pain-points
  - **Cost:** Increase margin and reduce operating expenses (OpEx)
- **Outcomes measurement and attainment:** Objectives and Key Results (OKRs), Key Performance Indicators (KPIs), Attainment Thresholds

## Corresponding Use Cases and Scenarios

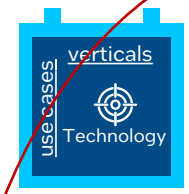
- **Use cases:** Ways of using technologies and services to solve for customer business outcomes
- **Use case scenarios:** A specific use case (e.g. in-line quality control, streamlining the inspection of goods throughout their journey with real-time insights)


## Corresponding Ingredients for Solution Scale

- **Solution:** Vendor and provider technology ingredients coming together to best fit a solution blueprint
- **Capabilities:** What a solution does that enables it to solve for business outcomes.
- **Chessboard Scale:** How a solution's technologies enable it to solve for multiple business outcomes by enable multiple use cases on one platform

**Lead with...** **Then introduce...**

# The Formula for Solution Scale




**Corresponding Ingredients for Solution Scale**

- **Solution:** Vendor and provider technology ingredients coming together to best fit a solution blueprint
- **Capabilities:** What a solution does that enables it to solve for business outcomes.
- **Chessboard Scale:** How a solution's technologies enable it to solve for multiple business outcomes by enable multiple use cases on one platform

## The formula for scale is:

**A solution** in one use case that solves for business outcomes,

...can solve for multiple other business outcomes by enabling multiple other use cases,

...because of **the underlying technology ingredients.**

The right applications of technology can lead to more empowered decision-making; new opportunities for upskilling, reskilling, and cross-functional collaboration; better talent attraction and retention; and improved workplace safety and employee satisfaction.

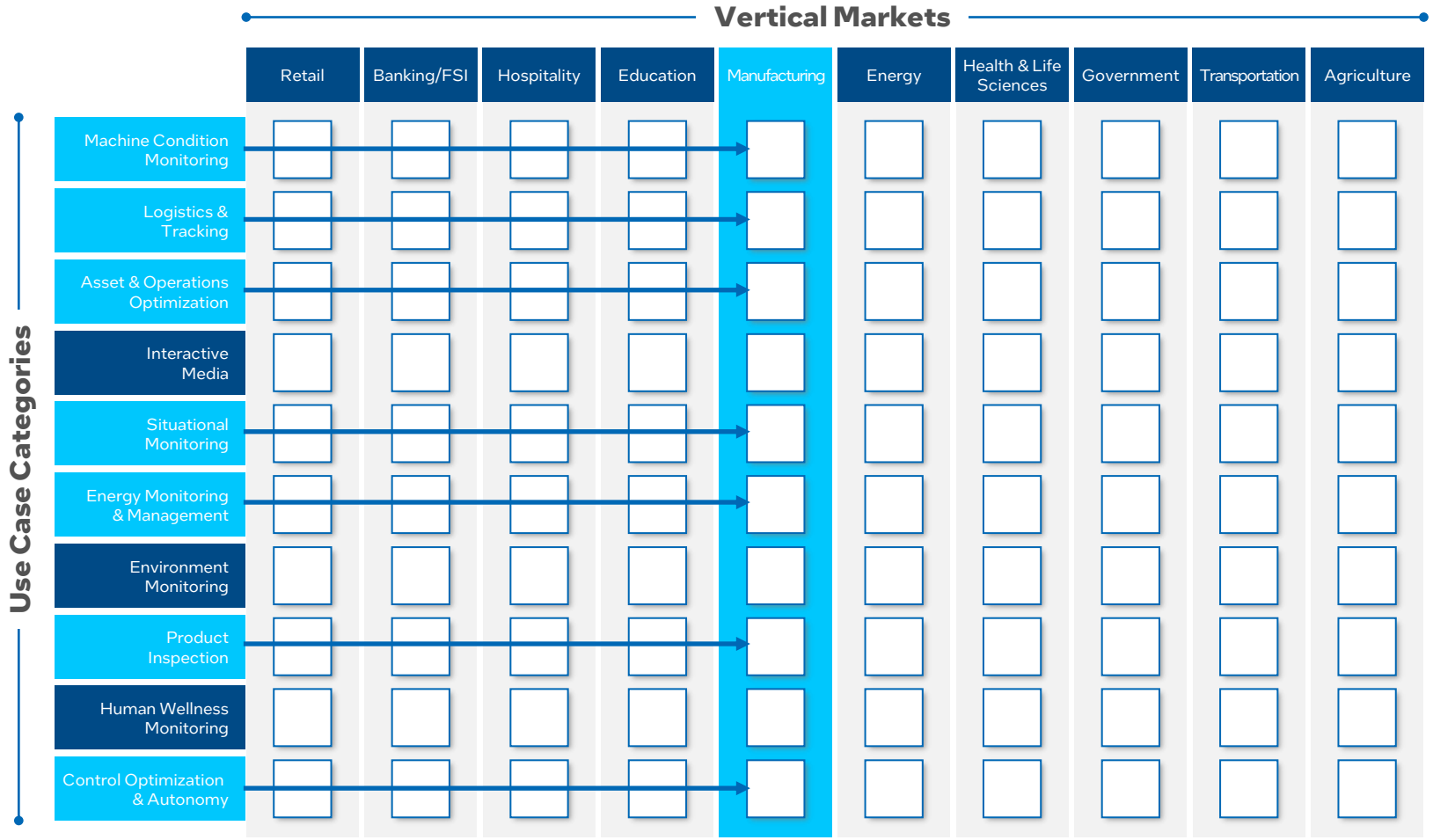
Source: "Capturing the true value of Industry 4.0" McKinsey & Company, 2022

# What is Chessboard?

1. Each square represents use case scenarios where verticals and use cases intersect.
2. Solutions in each square can scale one-to-many within a square or to adjacent squares.

## A use case acceleration tool to:

- Determine how customers map out their key competencies and focus areas
- Separate use cases from the market they serve
- Support market segment prioritization
- Provide structure to drive repeatability
- Inform get to market build strategies for your customers



# Chessboard Scale Example:

## While each use case can be solved in silos – they all work together .

| | | |
|---|---|---|
| **Product Inspection** | AI identifies the defect | Quality Assurance |
| **Control Optimization & Autonomy** | Then you add a Robot to move the part out of the line | Industrial Autonomy |
| **Machine Condition Monitoring** | ***Simultaneously:*** Machines are monitored to machine is working properly | Asset Optimization |
| **Control Optimization & Autonomy** | ***Using wireless connectivity:*** One can now oversee the how each use case solution is working?<br>▪ Pro-actively manage from the insights<br>▪ Plan for any concerns to solve | Production Process Automation |

**Addresses Multiple Business Outcomes**

- Reduce scrap + increase yield
- Reduce worker injuries
- Shorten downtime
- Extend machine life
- Increase visibility
- Increase delivery throughput
- Reduce maintenance hours
- Unlock production of high-accuracy specification designs
- Mitigate labor shortages
- Increase customer fulfillment satisfaction
- Optimize warehouse processes

...and more

**Transforms Business Practices**

- Assembly line production
- Packaging
- Shipping and logistics
- Plant operations
- High-end machine requisition
- Safety monitoring
- Specification design
- Regulatory compliance/auditing

...and more

# Use Case Scenario Drill-Downs

Each Use Case Scenario Drill-Down below provides intelligence on the same sales journey indicated on slide 4, above—plus use case scenario-specific resources where you can learn more. Click the use case categories on the left sidebar to get started.

- Machine Condition Monitoring
- Logistics & Tracking
- Asset & Operations Optimization
- Situational Monitoring
- Energy Monitoring & Mgmt.
- Product Inspection
- Control Optimization & Autonomy


| Customer Business Practices | Business Outcomes | Use Cases and Scenarios | Ingredients for Solution Scale | Resources to Learn More |
|---|---|---|---|---|
| ▪ What they do<br>▪ Who does it | ▪ Outcomes for improving business practices<br>– Revenue<br>– Risk<br>– Cost<br>▪ Outcomes measurement | ▪ Use cases<br>▪ Use case scenarios | ▪ Solution Ingredient Capabilities<br>▪ Chessboard Scale Potential | ▪ Landing Pages<br>▪ Partnerships<br>▪ Software-Defined Enablement |

# Machine Condition Monitoring: 1/3

Machine condition monitoring solutions collect operational data from physical equipment to facilitate operational analysis, drive more effective decision making, and expedite maintenance. These solutions are often used to monitor production equipment, engines, and other high-value assets.

Machine Condition Monitoring
Logistics & Tracking
Asset & Operations Optimization
Situational Monitoring
Energy Monitoring & Mgmt.
Product Inspection
Control Optimization & Autonomy

## Practices

- Assembly line, production line, extraction
- Equipment procurement
- Equipment maintenance
- Site assessment
- Design specification
- Warehouse/inventory management

### Personas

- Plant Manager
- Process Engineer
- Control Engineer
- Maintenance Technician
- Automation Engineer
- Shop Floor Control Manager
- Persons in charge of machine calibration, maintenance, failure analysis

## Business Outcomes

**Outcomes these personas are looking to achieve for their organizations may include:**

### Revenue

- Increase uptime
- Maximize machine outputs
- Increase overall equipment effectiveness (OEE)

### Risk

- Reduce damage to site, other machines
- Improve visibility into machine risk

### Cost

- Reduce unplanned downtime
- Reduce scrap
- Unlock visibility of asset performance, availability, and reliability
- Extend machine lifecycle
- Reduce initial capital cost: Option to lease (SaaS)
- Improve maintenance and management of all assets

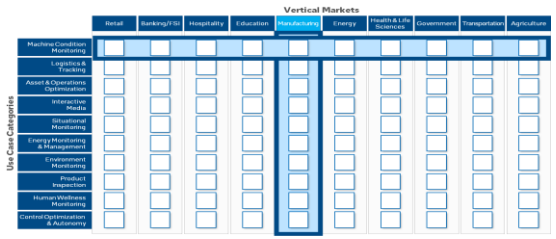
## Measurement

**Work with your customer to determine which metrics and values (#) would prove success against outcomes:**

- **#%** decrease in unscheduled equipment downtime year-over-year
- Status visibility into # heavy machinery deployments across # sites
- #% reduction in scrap due to machine miscalibration/ misalignment
- #% reduction of in-person maintenance calls
- #% accuracy in fault predictions, where stressors are identified prior to failure
- Time to solution ROI

## Corresponding Use Case Scenarios

- **Predictive Diagnostic Maintenance:** Predict future outages, failure, and requirements with machine learning models
- **Equipment Matching:** Speed up and increase precision of component matching analysis with an AI capabilities
- **Process Monitoring:** Perform autonomous monitoring for parameters like temperature, pressure, tilt, leaks, and more
- **Remote Monitoring/ Data Extraction:** Gain real-time consolidated visualization of machine sensor data




# Machine Condition Monitoring: Solution Scale 2/3

Machine Condition Monitoring
Logistics & Tracking
Asset & Operations Optimization
Situational Monitoring
Energy Monitoring & Mgmt.
Product Inspection
Control Optimization & Autonomy


## Ingredients + Capabilities

- **5G Multi-Edge Compute:** Connected edge nodes that increase solution flexibility and enact multiple workloads simultaneously
- **Intel Geti™** and Intel OpenVINO™ Computer Vision toolkits to accelerate development of predictive visual algorithms
- Workload-consolidated **Industrial PCs** and **Edge Datacenters** featuring multi-edge compute for near-real time processing
  - Intel® Core™ and Intel® Xeon® Processors deliver scalable performance; including formerly known as code-name: Sapphire Rapids with built-in AI workload acceleration
  - **Intel® Iris iGPU** and **Intel® Arc™ Graphics** to enable vision and AI processing capabilities at varying price, power, and form factor needs
  - **Intel® IoT Gateways** to enable gathering and streaming data from sensors and datacenter
- **Edge Insights for Industrial** a free, open platform for machine vision and time series data

## Manufacturing Scale Scenarios

**Here are adjacent scenarios in manufacturing that may pose immediate scale opportunities across your customer's organization:**

- Smart Buildings (Energy Monitoring & Management)
- Field Services Optimization (Asset & Operations Optimization)
- Dimensional Weight Detection (Logistics & Tracking)
- Hazard Detection (Situational Monitoring)
- Welding Quality (Product Inspection)

## Software-Defined Resources

- Industrial IoT Overview
- Industrial IoT Workload Consolidation Whitepaper

# Machine Condition Monitoring Case Studies: 3/3

An overwhelming 82% of companies have experienced at least one unplanned downtime incident over the past three years. Overall, unplanned downtime costs industrial manufacturers as much as $50 billion a year
source: Forbes



**Audi** cuts labor costs by **30 to 50%** + boosted weld inspections to **100%**

**Solution enacts predictive maintenance** for **real-time monitoring, SAP Intelligent Edge Services** and **work order management**

**Digital Twin solution** enables single-pane-of-glass **view** into operational states **to reduce costs, maintenance, and improve processes**

# Logistics & Tracking: 1/3

Logistics & tracking solutions use connected technology to help organizations locate, track, and manage a wide range of physical assets. These solutions are often used to help track vehicles, equipment, packages, and products. In some cases, they can also help locate personnel.

Machine Condition Monitoring
Logistics & Tracking
Asset & Operations Optimization
Situational Monitoring
Energy Monitoring & Mgmt.
Product Inspection
Control Optimization & Autonomy

## Business Practices

- Warehouse/inventory management, auditing
- Assembly line, production line, extraction QA, process analysis
- Procurement, logistics, shipping, transportation, fulfillment

### Personas

- Logistics Manager
- Supply Chain Manager
- Production Line Manager
- Persons in charge of monitoring, auditing, and accounting for resources and products throughout the line and through customer fulfillment

## Business Outcomes

**Outcomes these personas are looking to achieve for their organizations may include:**

### Revenue

- Improve brand loyalty
- Increase yield
- Improve perception across supply chain

### Risk

- Reduce theft, losses due to lack of visibility
- Ensure adequate capacity to receive/transport materials and products
- Meet customer, shipment, and procurement agreements
- Offset fluctuations, especially for just-in-time manufacturing

### Cost

- Optimize resource and product stockholding
- Simplify and streamline production management
- Reduce labor costs associated with manual tracking
- Reduce scrap
- Optimize warehouse, stock spaces

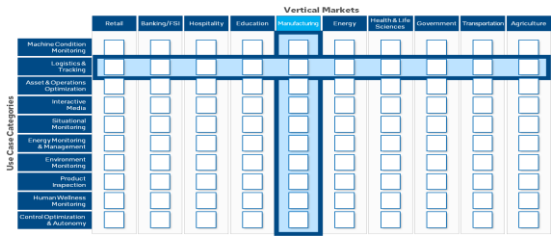
## Measurement

**Work with your customer to determine which metrics and values (#) would prove success against outcomes:**

- Improved supply chain partner ratings
- #% reduced scrap due to loss, misplacement, theft
- $# saved in warehouse space optimized/increased efficiency of just-in-time procurement/delivery

## Use Case Scenarios

- **Dimensional/Weight Detection:** Automate critical inspection processes, reduce labor costs and optimize storage
- **Barcode/QR/RFID Readers:** Enable AI-powered item tracking throughout the premises and increase inventory accuracy
- **Indoor Navigation:** Ensure people, AMRs, and products are in the right locations with real-time tracking and reporting
- **Automatic Sorting Systems:** Increase production efficiency with an automatic product identification system and leverage machine vision for inbound and outbound quality assurance




# Logistics & Tracking: Solution Scale

2/3

Machine Condition Monitoring
Logistics & Tracking
Asset & Operations Optimization
Situational Monitoring
Energy Monitoring & Mgmt.
Product Inspection
Control Optimization & Autonomy


## Ingredients + Capabilities

- Private Networks: Provide dedicated secure wireless connectivity with high capacity and low latency
- 5G Multi-Edge Compute: Connected edge nodes that increase solution flexibility and enact multiple workloads simultaneously
- Intel Geti™ and Intel OpenVINO™ Computer Vision toolkits to accelerate development of predictive visual algorithms
- Workload-consolidated Industrial PCs and Edge Datacenters featuring multi-edge compute for near-real time processing
  - Intel® Core™ and Intel® Xeon® Processors deliver scalable performance
  - Intel® Iris iGPU and Intel® Arc™ Graphics to enable vision and AI processing capabilities at varying price, power, and form factor needs

## Manufacturing Scale Scenarios

**Here are adjacent scenarios in manufacturing that may pose immediate scale opportunities across your customer's organization:**

- Process Monitoring (Machine Condition Monitoring)
- Shipment Scheduling (Asset & Operations Optimization)
- Personnel Location Safety Monitoring (Human Wellness Monitoring)
- Environmental Impact Quantification (Environment Monitoring)

## Software-Defined Resources

- Strategic Warehouse Management Brief
- Edge Insights for Industrial

# Logistics & Tracking Case Studies: 3/3

According to the 2022 Third-Party Logistics Warehouse Benchmark Report, 3PLs implemented an average of 3.8 systems with high and medium profitability warehouses usually having more than 4 highlighting the need for a stack versus a single software solution.
Source: Extensive

Machine Condition Monitoring
Logistics & Tracking
Asset & Operations Optimization
Situational Monitoring
Energy Monitoring & Mgmt.
Product Inspection
Control Optimization & Autonomy

**Actionable Insights through AI image Analysis and Automated Volume Measurement**

**Manufacturers can automate troubleshooting tasks, automate alerts, track and trace, and improve consistency on a single platform**

**Coldtrace: Approximately 16,450 ColdTrace units are protecting vaccines and enhancing immunization distribution programs in 26 countries.**

# Asset & Operations Optimization: 1/3

Asset & operations optimization solutions help organizations streamline processes and manage resources effectively. They often focus on streamlining production processes, optimizing vehicle routes, regulating building systems, and improving network operations or business processes.

Machine Condition Monitoring
Logistics & Tracking
Asset & Operations Optimization
Situational Monitoring
Energy Monitoring & Mgmt.
Product Inspection
Control Optimization & Autonomy

## Customer Business Practices

Asset and operations optimization potentially touches all business practices, including operational, IT, real time, and non-real time business practices.

### Personas

- Business Analyst
- Process Engineer
- Chief Innovation Officer
- Asset Manager
- Chief Financial Officer
- Persons in charge of cross-process or process/practice-wide optimization

## Business Outcomes

### Outcomes these personas are looking to achieve for their organizations may include:

**Revenue**

- Unlock new, high-value data-driven use cases
- Increase customer reach and scale
- Gain ROI-driving insights from long-term prediction leveraging historical data + real-time analytics

**Risk**

- Reduce production downtime and losses due to shift mis-matches, over/underproduction
- Gain greater visibility into how resource capacity, inventories, production schedules interconnect

**Cost**

- Set accurate production targets
- Reduce labor costs, especially around maintenance and oversight

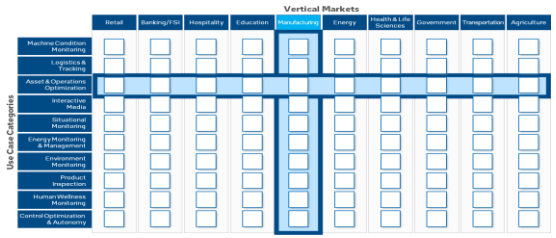
## Measurement

### Work with your customer to determine which metrics and values (#) would prove success against outcomes:

- # increase in return-on-assets connected to manufacturing outcomes
- # cost savings connected with predictive models, digital twins
- #% reduction in downtime, delays due to shift and logistics conflicts/shortages
- #% increase in labor productivity

## Corresponding Use Case Scenarios

- **Scheduling:** Maximize manufacturing resource utilization and increase overall production efficiency with dynamic software systems that leverage data from edge equipment and processes to create dynamic and optimal schedules
- **Shift Management:** Improve productivity and streamline people management workflows by leveraging intelligent software to predict and respond to production demand and employee availability
- **Field Services:** Streamline customer satisfaction by enabling faster dispatching of field services, such as installation, repair, or maintenance and more
- **Process Simulation:** Simulate assets and operations with digital twins to reduce risk and make long-term predictions




# Asset & Operations Optimization: 2/3 Solution Scale

Machine Condition Monitoring
Logistics & Tracking
Asset & Operations Optimization
Situational Monitoring
Energy Monitoring & Mgmt.
Product Inspection
Control Optimization & Autonomy


## Ingredients + Capabilities

- Intel® Xeon® Processors and Intel® Core™ Processors deliver scalable performance for connected use cases
- **Intel® Data Center Manager (DCM) Console** software collects real-time industrial info to help with capacity planning and scheduling
- **Intel® FPGAs** allow for the rapid implementation of machine learning algorithms to support advanced industrial applications
- **Edge Insights for Industrial** a free, open platform for machine vision and time series data

## Manufacturing Scale Scenarios

**Here are adjacent scenarios in manufacturing that may pose immediate scale opportunities across your customer's organization:**

- Statistical/Advanced Process Control (Control Optimization and Autonomy)
- Process Monitoring (Machine Condition Monitoring)
- Predictive Diagnostic Maintenance (Machine Condition Monitoring)

## Software-Defined Resources

- Manufacturing Overview
- Network Builders Connected Factory
- Smart Manufacturing Optimization
- Optimizing Asset Management
- Virtualized Industrial PCs Brief

# Asset & Operations Optimization Case Studies: 3/3

The right applications of technology can lead to more empowered decision-making; new opportunities for upskilling, reskilling, and cross-functional collaboration; better talent attraction and retention; and improved workplace safety and employee satisfaction.

Source: "Capturing the true value of Industry 4.0" McKinsey & Company, 2022

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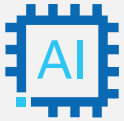
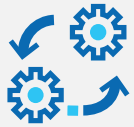



**BMW is exploring how process simulation using AI tools can significantly speed up the search for the optimal solution**

**Manufacturers** that have deployed are **mitigating the risk of defects, reducing waste and equipment downtime, and realizing hundreds of thousands of dollars in savings per line annually**



**Digital Twin solution** enables single-pane-of-glass view into operational states **to reduce costs, maintenance, and improve processes**

# Situational Monitoring: 1/3

Situational monitoring solutions use artificial intelligence to analyze audio, video, and sensor data from connected devices so organizations can classify objects, identify people, and recognize situations. Organizations often use these solutions to help improve security and promote safety in crowded spaces.

Machine Condition Monitoring
Logistics & Tracking
Asset & Operations Optimization
Situational Monitoring
Energy Monitoring & Mgmt.
Product Inspection
Control Optimization & Autonomy

## Customer Business Practices

Physical Safety and Security (PSS) Practices, including...

- Assembly line, production line, extraction
- Physical security/access control across adjacent facilities (offices, parking lots, streetside, employee areas)
- Shipping/logistics
- Safety & security for transport, production

### Personas

- CISO
- Chief Security Officer
- CIO
- Plant Manager
- Plant Safety Manager
- Persons in charge of access control, worker safety, hazard detection, theft control

## Business Outcomes

**Outcomes these personas are looking to achieve for their organizations may include:**

**Outcomes**

Revenue

- Drive improved brand/safety reputation
- Increase appeal to workers

Risk

- Ensure employee safety
- Reduce risk of theft of IP, technical specifications, status of productive capacity/precision
- Safeguard customer/shipping IP, trade secrets
- Ensure proper handling of volatile materials, detection of breaches/issues

Cost

- Reduce equipment, product loss due to physical damage, theft
- Reduce stoppages due to health/safety compliance risks
- Reduce losses due to liability, insurance premium increases, compliance violations

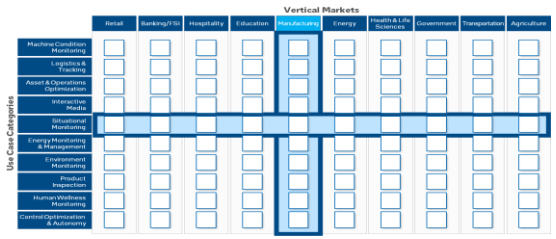
## Measurement

**Work with your customer to determine which metrics and values (#) would prove success against outcomes:**

- % Reduction in safety violations
- % reduced injuries
- Qualitative increase in public perception
- % reduction in total costs related to health and safety compliance
- % reduction in unwanted access to facilities, equipment, etc.

## Corresponding Use Case Scenarios

- **Worker Safety:** Reduce injuries by monitoring behavior and compliance with procedures
- **Plant & Site Safety:** Enhance safety by managing access and identifying hazardous situations
- **Fire & Explosion Detection:** Reduce response time by rapidly identifying fires and explosions
- **Hazard & Leak Detection:** Help protect workers by quickly identifying environmental hazards




# Situational Monitoring: Solution Scale

2/3

Machine Condition Monitoring
Logistics & Tracking
Asset & Operations Optimization
Situational Monitoring
Energy Monitoring & Mgmt.
Product Inspection
Control Optimization & Autonomy


## Ingredients + Capabilities

- Intel® Core™ Processor-based Industrial PCs provide low-latency processing along with connected edge compute-centric features
- **Intel Geti™** and Intel OpenVINO™ Computer Vision toolkits to accelerate development of predictive visual algorithms
- **5G** for wireless infrastructure, AR/VR connectivity
- **Edge Insights for Industrial** a free, open platform for machine vision and time series data

## Manufacturing Scale Scenarios

**Here are adjacent scenarios in manufacturing that may pose immediate scale opportunities across your customer's organization:**

- Defect Detection (Product Inspection)
- Worker Safety Monitoring (Human Wellness Monitoring)
- Asset Location Placement (Asset & Operations Optimization, Logistics & Tracking)

## Software-Defined Resources

- Intel's Security Vision
- Intel's Portfolio of Computer Vision Products
- Edge Insights for Industrial

# Situational Monitoring Case Studies 3/3

Workplace injuries are an abnormally high cost center for the manufacturing industry. According to the 2019 Liberty Mutual Safety Index, injuries cost the manufacturing industry more than $7.62 billion last year.
source: Occupational Health & Safety

Machine Condition Monitoring
Logistics & Tracking
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Product Inspection
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**Printed Circuit Board company reduced costs, increased compliance and improved safety results**

**Digital Twin solution** enables single-pane-of-glass **view** into operational states **to reduce costs, maintenance, and improve processes**

**Beverage Bottler reduced manual workloads by 80% and compliance costs by 60%**

# Energy Monitoring & Management: 1/3

Energy monitoring & management solutions use technology to track energy usage and help organizations manage energy more efficiently. These solutions can be used to track energy usage by devices, equipment, machines, vehicles, buildings, energy resources, and microgrids.

Machine Condition Monitoring
Logistics & Tracking
Asset & Operations Optimization
Situational Monitoring
Energy Monitoring & Mgmt.
Product Inspection
Control Optimization & Autonomy

## Customer Business Practices

- Assembly line, production line, extraction
- Corporate-wide sustainability initiatives
- On-site energy production and storage (microgrids)
- Factory energy usage monitoring
- Carbon credits/carbon capture
- Energy procurement

### Personas

- Chief Information Officer, Chief Innovation Officer
- Factory manager, Facility manager
- Sustainability/Energy Manager
- Resource Management department
- Protection and Control Engineer
- Persons in charge of reducing reliance on non-renewable energy, optimizing energy, accommodating for changes/fluctuation in energy provided to factory and adjacent processes and sites

## Business Outcomes

**Outcomes these personas are looking to achieve for their organizations may include:**

**Outcomes**

### Revenue

- Increase public perception, brand recognition, unlock new partnerships
- Acquire government/regulatory/industrial group subsidies, funding
- Attract new generational talent, demonstrate thought leadership
- (In rare cases) receive rebates from energy grid itself

### Risk

- Reduce downtime, slowdown, instability due to energy availability issues
- Reduce negative publicity

### Cost

- Reduce losses associated with energy storage, acquisition, transmission
- Increase margin by lowering power draw from heavy equipment, facilities
- Reduce costs associated with overall monitoring/management processes
- Reduce costs associated with HVAC, building monitoring/management/operations

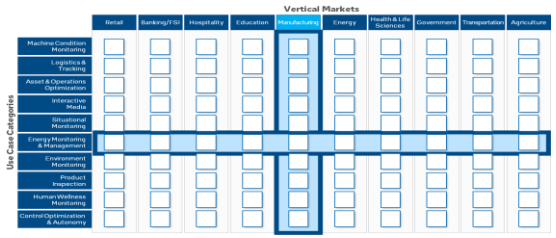
## Measurement

**Work with your customer to determine which metrics and values (#) would prove success against outcomes:**

- #% net reduction or targeted reduction in energy consumption
- #% increased reliance on on-site microgrid production/storage
- Improved public perception
- $# Reduction in policy/regulatory violations associated with energy production, consumption, waste, utilization

## Corresponding Use Case Scenarios

- **Factory Smart Buildings:** Optimize building systems and plant operations
- **Energy Load Management:** Enable demand response (DR) and peak shaving with real-time usage data
- **Predictive Maintenance:** Add energy usage data to intelligent asset management tools




# Energy Monitoring & Management: Solution Scale 2/3

Machine Condition Monitoring
Logistics & Tracking
Asset & Operations Optimization
Situational Monitoring
Energy Monitoring & Mgmt.
Product Inspection
Control Optimization & Autonomy


## Ingredients + Capabilities

- Industrial PCs based on Intel® architecture offer high performance in rugged environments
- Intel® Core™ and Intel® Xeon® Processors deliver scalable performance for connected edge use cases Intel vPro® Platform Technology provides hardware-enhanced security features
- **Intel® IoT Gateways** to enable gathering and streaming data from sensors and datacenter

## Manufacturing Scale Scenarios

**Here are adjacent scenarios in manufacturing that may pose immediate scale opportunities across your customer's organization:**

- Predictive Diagnostic Maintenance (Machine Condition Monitoring)
- Field Services (Asset & Operations Optimization)
- Process Simulation (Asset & Operations Optimization)

## Software-Defined Resources

- Intel, Dell and VMWare's Collaborative Future-Facing Grid Video with WIRED

# Energy Monitoring & Management Case Studies





**Beverage manufacturer reduced production optimization simulation** requirements from **15000 to 99**

**Digital Twin solution enables single-pane-of-glass view** into operational states **to reduce costs, maintenance, and improve processes**

**Edge-of-the-Grid automation solution promises to increase grid resiliency, cost savings, and lengthen asset lifecycle**

# Product Inspection: 1/3

Product inspection solutions use sensor data and AI to ensure objects meet established specs. These solutions are used for a wide range of scenarios including product classification, defect detection, product health recognition, package quality inspection, and vehicle damage recognition.

Machine Condition Monitoring
Logistics & Tracking
Asset & Operations Optimization
Situational Monitoring
Energy Monitoring & Mgmt.
Product Inspection
Control Optimization & Autonomy

## Customer Business Practices

- Assembly line, production line, extraction
- Pre-production inspection
- Production inspection
- Pre-shipment inspection
- Container loading/ unloading inspections

### Personas

- Chief Technology Officer
- Plant Manager
- Quality Control Manager
- Director of Manufacturing
- Production Line Manager
- Persons in charge of quality engineering, process engineering, automation engineering

## Business Outcomes

**Outcomes these personas are looking to achieve for their organizations may include:**

**Outcomes**

Revenue

- Increase customer satisfaction
- Increased quality vs. yield
- Get as much value from operational data as possible
- Meet standards for reliability, durability, and functionality

Risk

- Reduce re-work, scrap
- Keep pace with tightening industry standards, consumer expectations
- Reduce the rate of human errors during inspections

Cost

- Unlock visibility into cross-plant production
- Reduce labor costs and mitigate shortages, especially skilled labor

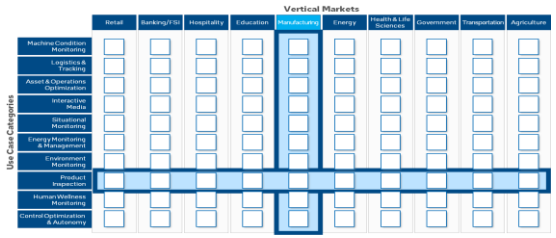
## Measurement

**Work with your customer to determine which metrics and values (#) would prove success against outcomes:**

- #% reduction in production line scrap
- #% deviation from tolerances
- #% YoY reduction in time-to-calibration
- #% increase in yield per line per quarter
- #% new specification wins
- #% compliance with regulatory agencies

## Corresponding Use Case Scenarios

- **In-line Quality Control:** Streamline the inspection of goods throughout their journey with real-time insights
- **Packaging:** Improve customer satisfaction by verifying packaged goods are secure and correct prior to shipment
- **Welding Quality:** Enhance product durability by equipping welders with intelligent tools to detect flaws
- **Damage & Material Inspection:** Mitigate issues prior to production with tools for inspecting received materials




# Product Inspection: Solution Scale

2/3

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## Ingredients +Capabilities

- **5G Multi-Edge Compute**: Connected edge nodes that increase solution flexibility and enact multiple workloads simultaneously
- **Intel® Virtualization Technology**: Multiple workloads on a single software-defined platform
- **Intel for 5G Connectivity**: Intel + Partner for software-defined connectivity
- **Intel for Computer Vision Technology**: Hardware acceleration and software support to enhance vision use cases and reduce time to inference
- **Intel RealSense™ for Computer Vision**: Augment existing solutions with computer vision
- **Edge Insights for Industrial** a free, open platform for machine vision and time series data

## Manufacturing Scale Scenarios

**Here are adjacent scenarios in manufacturing that may pose immediate scale opportunities across your customer's organization:**

- Predictive Diagnostic Maintenance, Equipment Component Matching (Machine Condition Monitoring)
- Automated Worker Safety Detection (Human Wellness Monitoring)
- Automated Sorting (Logistics & Tracking)

## Software-Defined Resources

Intel Visual Product Inspection Page

- Weld Porosity Detection Reference Implementation
- Wireless Network-Ready PCB Defect Detection Reference Implementation
- Textile Defect Classifier Reference Implementation
- Industrial Surface Defect Detection Reference Implementation
- Rotor Bearing Defect Detector Reference Implementation

# Product Inspection Case Studies



Machine vision market is projected to grow from USD 12.0 billion in 2022 to USD 17.2 billion in 2027; it is expected to grow at a CAGR of 7.4% from 2022 to 2027

Source: Markets & Markets



- Audi cuts labor costs by **30 to 50%** + boosted weld inspections to **100%**
- **Biopharma: AI-as-a-Service** empowered **99% accuracy** + **catches <1mm defects**
- **John Deere** used AI neural nets to **log and/or stop defects in real-time**
- **Auto: Vitro Mariner** increased accuracy from **50% to 90%**
- A single **Axiomtek** unit can detect **4 types of defects out of the box**
- **Textile manufacturer** enacted self-updating model to **reduce waste and increase efficiency**
- **BMW Group** detects **100 quality evaluation images per component**
- **Hitachi** increases defect detection by **up to 90 percent** vs. human inspection

**Manufacturers** can **automate troubleshooting tasks, automate alerts, track and trace, and improve consistency** on a **single platform.**

- **Electrical: Bosch** decreases false rejects to 5% on **7,000 parts per day**
- **Circuitboards:** Rosemart enabled **5x more units/hour with $70k labor saved** per line per year
- **Tire manufacturer** increased **defect detection accuracy to 99%+** with **15% stronger design**
- **Beverage manufacturer** **reduced production optimization simulation** requirements from **15000 to 99**

# Control Optimization & Autonomy : 1/3

Control optimization & autonomy solutions leverage connected technologies, artificial intelligence, and machine learning to automate complex tasks. These solutions support autonomous vehicles, robotics, production equipment, autopilot systems, and more.

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## Customer Business Practices

- Assembly line, production line, extraction
- PLC (Programmable Logic Controllers)
- Human-Machine Interfaces (HMI)
- SCADA, MES
- Robotic/automated warehouse equipment
- Robotic/automated fabrication

### Personas

- CIO, Chief Innovation Officer
- Plant Manager
- Warehouse Manager
- Process Control Engineer
- PLC/SCADA Technician

## Business Outcomes

**Outcomes these personas are looking to achieve for their organizations may include:**

**Outcomes**

Revenue

- Operational scale due to automated efficiencies
- Optimize resource utilization by ensuring right tasks performed at right time
- Accelerated time-to-operation for new plants, factories, warehouses
- Increase factory, warehouse uptime, operational density
- Increase visibility into factory assets
- Drive appeal with younger workers looking for digitized/automated environments

Risk

- Reduce human injury, exposure to hazards which can be automated
- Mitigate labor shortages
- Reduce reliance on technical expertise for less critical systems

Cost

- Reduce labor costs
- Optimize warehouse spaces to reduce footprint

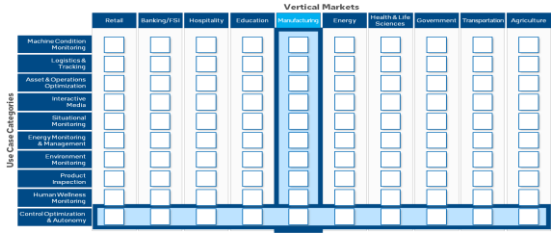
## Measurement

**Work with your customer to determine which metrics and values (#) would prove success against outcomes:**

- $# saved in warehouse space optimized/increased efficiency of just-in-time procurement/delivery
- #% reduction in worker injuries/incidents of exposure to hazardous conditions
- #% reduction in warehouse, factory labor costs

## Corresponding Use Case Scenarios

- **Automated Process/Execution Control:** Automate over-arching production tasks and processes
- **AGVs & AMRs:** Optimize productivity by using automated vehicles and robots for transport
- **Warehouse, Factory Vehicle Object Detection:** Help avoid collisions by automating object detection and avoidance
- **Driver Assistance:** Enhance safety by providing drivers with real-time assistance and feedback




# Control Optimization & Autonomy: Solution Scale 2/3

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## Ingredients +Capabilities

- **5G Multi-Edge Compute**: Connected edge nodes that increase solution flexibility and enact multiple workloads simultaneously
- **Intel Geti™** and Intel OpenVINO™ Computer Vision toolkits to accelerate development of predictive visual algorithms
- Workload-consolidated **Industrial PCs** and **Edge Datacenters** featuring multi-edge compute for near-real time processing
  - Intel® Core™ and Intel® Xeon® Processors deliver scalable performance
  - **Intel® Iris iGPU** and **Intel® Arc™ Graphics** to enable vision and AI processing capabilities at varying price, power, and form factor needs
- **Edge Insights for Industrial** a free, open platform for machine vision and time series data

## Manufacturing Scale Scenarios

**Here are adjacent scenarios in manufacturing that may pose immediate scale opportunities across your customer's organization:**

- In-line Quality Control (Product Inspection)
- Process Simulation (Asset & Operations Optimization)
- Software-Defined Displays for Equipment and Controllers (Interactive Media)
- Interactive Displays for Access Control (Interactive Media)

## Software-Defined Resources

- Robotics in Manufacturing and Warehouse Automation
- Enabling Innovation for Programmable Logic Control

# Control Optimization & Autonomy Case Studies 3/3

[Manufacturers can unlock a 30% uplift in productivity through digital collaboration in the factory]
source: "Digital collaboration for a connected manufacturing workforce. "McKinsey & Company 2022



**Agricultural Manufacturer Enterra** [leveraging unified software-defined platform to maximizing process efficiency and predictability]

**A Mechanized Farming Operation** [reduced downtime and consolidated IT to two operators]

**Edge-of-the-Grid automation solution promises to** [increase grid resiliency, cost savings, and lengthen asset lifecycle]

# Resources & Key Contacts



**MRS Playbook**
This self served playbook for Market Ready Solutions is designed to inform the field and Intel channel partners on the availability of each market ready solution

**Intel® IoT RFP Ready Kit Solutions Playbook**
Informs system integrators of the available Intel® IoT RFP Ready Kit solutions, with a one-page overview and resources for each.

**Intro to Chessboard and Chessboard Discovery Tool Webinar**
Find out what the Intel Chessboard is and the Chessboard Discovery Tool that can help you in opportunity finding conversations.

**Chessboard Overview Video**
10 minute video on overview of Chessboard. Learn how to use the Chessboard and how it works for partners.

**Intel Seller's Chessboard Testimonials**
Listen to 4 sellers from across the globe share their thoughts about how the Chessboard Tool has helped them in strategic partner conversations

**Blank Chessboard**
Chessboard template to be used with your partners

**AI Value Potential for Connected Manufacturing Use Cases**
This short video showcases trends in AI and Vision focused Business Outcomes that are driving connected technologies in Manufacturing.

**NEX-C Partner Strategy for Manufacturing, Energy, HLS, and Financial Services**
**Eleanor Sales**

**Global OTSI Strategy Manager**
**Lesek Demont**

**ADDS Assess Discover Design Scale One Page Reference**
The 4 stages of the ADDS methodology help sellers understand the anatomy of a sale through a customer-first focus and acts as a guide for finding, executing, and scaling customers sales opportunities

**AI Inference Software & Solutions**
Intel's ISV partners' solutions built on the Intel® Distribution of OpenVINO toolkit. This Excel document is designed to help you find a solution that best addresses your use case needs, organized into Vertical sections to help you navigate the solutions table easier.

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