



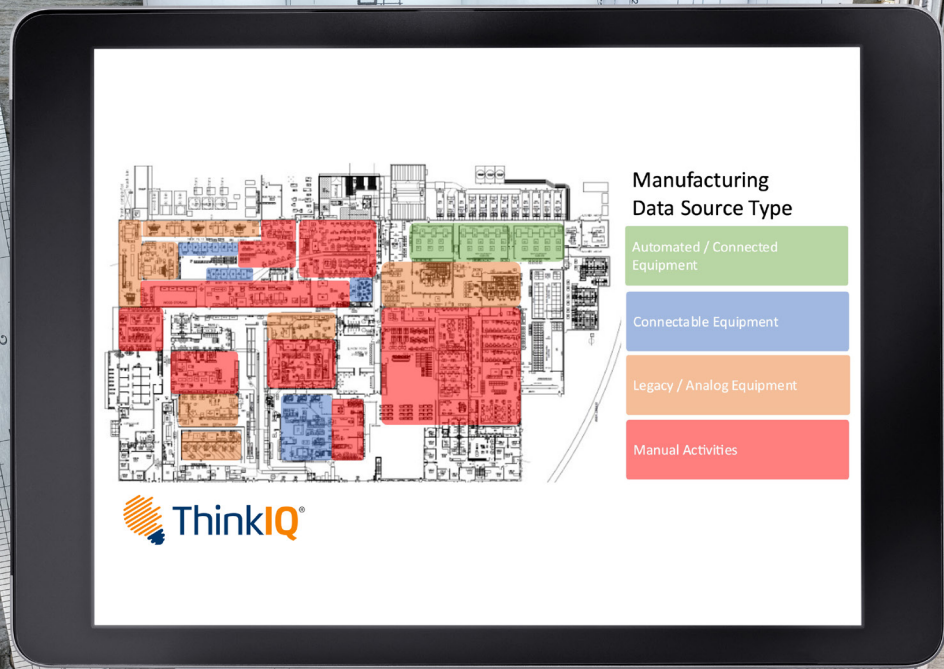
The **Smart Factory's** Goal Of **End-To-End** Supply Chain **Visibility**



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Executive Summary

The dream of a Smart Factory for most companies is just that, a dream. A Smart Factory would ideally mean all equipment, vehicle, and worker activities are monitored on a 24x7 basis providing data sets that digitize all physical operations. Many factories look more like the example below. With equipment ranging from manual, unconnected equipment to fully automated and connected equipment.

Even with fully connected equipment, there are major blind spots in operations especially in how people are

interacting with equipment and vehicles. Historically, it was the role of managers and supervisors to discover blind spots, but it is impractical or impossible to watch every critical area on a continuous basis. Continuous monitoring and analysis are an ideal application for computer vision and continuous intelligence solutions such as ThinkIQ. Filling in blind spots leads to greater productivity, shorter lead times, and improved safety. ROI's of three to six months are realistic goals.



Blind Spots Across The Supply Chain

The fragile nature of today's global supply chains became obvious to even the most casual observer during the Covid-19 pandemic. Critical shortages for even the most common household items became a harsh reality in virtually every region and country. Chronic manufacturing supply chain shortages occurred even in major organizations with advanced modeling capabilities.

The problems have been compounded by global labor arbitrage, the practice of chasing the lowest labor cost regardless of the risks inherent in dealing in areas without strong infrastructure, the rule of law, or control of corruption. America's decoupling from China is translating into a major move to areas closer to and more friendly to the United States.

The effect of all these issues is the need for greater visibility in manufacturing supply chains that will facilitate more informed decision making. Relying on inputs from Smart equipment will not provide the needed visibility because the great majority of processes will not be covered, and Smart Equipment cannot monitor how people interact with equipment, vehicles, and materials.

ThinkIQ's computer vision addresses critical operational blind spots:

- Truck monitoring within yards
- Forklift monitoring in warehouses, receiving and shipping
- Material movements along manufacturing lines
- Worker presence, activity, and idle times
- Equipment activity levels, and idle times
- Andon light status as to machine activity
- Safety violations and hazardous conditions
- Reading values from legacy analog and disconnected digital displays

In addition, ThinkIQ now offers edge hardware that includes cameras, sensors, wireless networking, an edge computer, and cellular back-haul equipment. This allows for rapid deployment requiring little or no effort from the customer. When using the cellular option, the solution is effectively air-gapped from the customer network alleviating any security concerns.

These hardware kits are shipped pre-configured allowing manufacturers to have cameras as IoT sensors that can be connected and functioning in just a matter of hours.



“Many manufacturers are still effectively blind to a staggering percentage of events on the factory floor. With these latest enhancements, we’re eliminating their blind spots and giving them the full picture by measuring machines for utilization, materials and products for status, and people for efficiency,” said Doug Lawson, CEO of ThinkIQ. “We’re constantly adding new detection and visibility capabilities to give manufacturers more context and meaning to their data.”

ThinkIQ’s SaaS Manufacturing cloud-based platform simplifies the creation of web-based applications and leverages the strengths of the Internet of Things, Big Data, Data Science, Semantic Modeling and Machine Learning. The platform collects data across the operation (existing and IIoT sensors) to provide actionable real time insights (e.g., identify correlations and root causes, traceability, and yield issues, etc.). It creates a new level of capability beyond what independent disconnected operating environments can provide today. ■





CESMII and **Industry 4.0**

CESMII (sez-ME) stands for the Clean Energy and Smart Manufacturing Innovation Initiative. CESMII is the United States' national institute on Smart Manufacturing, driving cultural and technological transformation and secure industrial technologies as national imperatives. By enabling frictionless movement of information—raw and contextualized data—between real-time Operations and the people and systems that create value in and across Manufacturing organizations, CESMII is ensuring the power of information and innovation is at the fingertips of everyone who touches manufacturing.

CESMII's goal is to help US manufacturers as their primary source for industry networking, education and workforce development, funded research projects and a Smart Manufacturing Innovation Platform to enable digital transformation. CESMII Members are on the leading edge of Digital Transformation in the US and leveraging Industry 4.0 for Smart Manufacturing (SM). Membership is open to all types and sizes of manufacturers, system integrators, machine builders, technology providers, and members of academia. CESMII provides an important standard that defines

the major components of Smart Manufacturing (IIoT, Computer Vision, Robotics, 3D Printing, Big Data Analytics, Mobile, Edge, and Cloud Computing.)

ThinkIQ is a proud member of CESMII. In an August 2022 news release, it was announced that CESMII was licensing ThinkIQ's Smart Manufacturing capabilities as the underlying framework powering the CESMII Smart Manufacturing Innovation Platform, to accelerate the Industry 4.0 journey for U.S. manufacturers of all shapes and sizes.¹

¹ PR Newswire, ThinkIQ and CESMII Partner to Drive Adoption of Smart Manufacturing Technology, <https://www.prnewswire.com/news-releases/thinkiq-and-cesmii-partner-to-drive-adoption-of-smart-manufacturing-technology-301610553.html>



Steps to Become a Smart Factory

Step One: People.

Any successful Smart Manufacturing initiative must start with top management support which includes providing the needed human and financial resources. Smart Manufacturing is much more than implementing new hardware and software. It is creating a new business strategy that impacts an entire organization, not just manufacturing and distribution.

The goal of Smart Manufacturing is not to replace people but to empower them to learn and use the optimal combination of Smart technologies to improve their organization. It is inevitable that Smart Factories will require less workers than in the past. But most of the jobs eliminated tend to be those that are boring, dull, or dangerous – ones that no one wants to do.

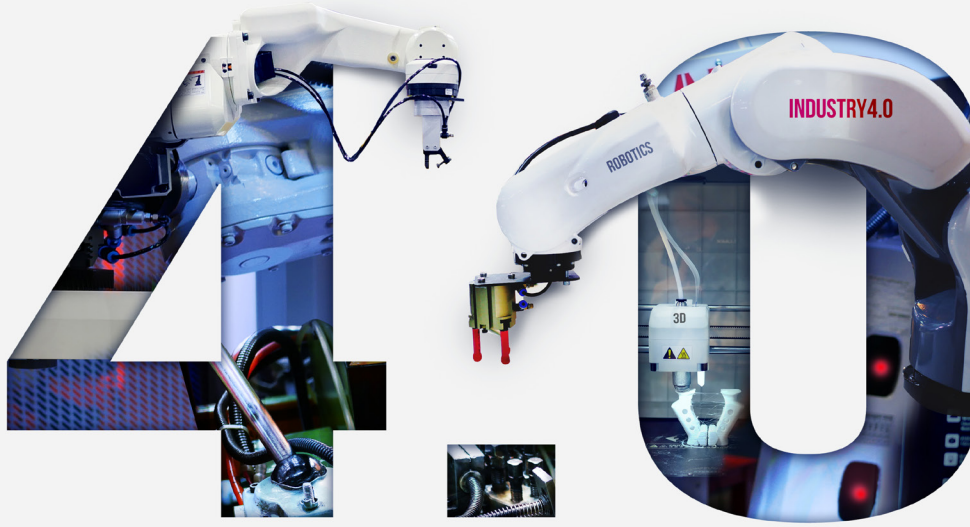
Step Two: Smart Technology.

It is not likely that an organization will be successful using only one Smart Technology. In most cases a combination of technologies work together to create a Smart Factory. For example, computer vision can monitor equipment, materials, vehicles, and people. Computer Vision typically uses mobile, edge, and cloud computing for the processing of images along with Big Data Analytics to visualize the data.

Selecting the right combination of technologies can be challenging, but the good news is that you can start small, and the cost of many Smart Technologies is affordable for even smaller organizations. Many IoT devices cost less than \$100, simple robots cost as little as a few thousand dollars, and computer vision monitoring is available on a software-as-a-service (SaaS) basis that has generated ROI's in less than three months.

Step Three: Implementation.

When evaluating how best to proceed, a simple ROI analysis can guide your choices. The key is to get started with one or more pilot programs that show tangible results within a short timeframe. If the initiatives require a large degree of complexity and coordination across functions and departments, it may make sense to use an external system integrator and program manager.



Qualifying and Quantifying Industry 4.0 Smart Manufacturing

There are a variety of ways to justify an investment in Smart Technologies. There are quantifiable measures, often referred to as hard saving metrics, and qualitative measures, often referred to as soft saving metrics. ThinkIQ can help to solve both your hard and soft measures of success:

Throughput Yield

OEE or Operational Equipment Effectiveness, is a popular way to measure throughput yield. OEE measures how well a manufacturing operation is utilized as measured against its standard, but only when it is scheduled to run. OEE identifies the percentage of manufacturing time that is truly productive.

Increase OEE, the quantity of good components fabricated, machined, and assembled using ThinkIQ vision to identify best practices, inconsistency adherence to work instructions, areas for additional training, and the need to relocate resources and equipment. The critical labor shortage of workers and managers makes adding more supervisors and inspectors on the floor an unrealistic alternative. Regardless of the number of people they cannot watch all the action on the floor on a continuous basis.

Computer vision is the only viable and most cost-effective means to improve throughput yield.

Safety

The number of days between safety incidents and near misses is a widespread way to measure safety on shop and warehouse floors.

Increase safety with ThinkIQ's 24x7 monitoring which flags violations of safety policies and procedures. Even with the most diligent human supervision, there are many blind spots in operations that are often the cause of accidents and injuries. Computer vision is an ideal solution to eliminate these blind spots to achieve a safer workplace.

Quality and Compliance

The percentage of good and compliant parts produced, the percent of parts with wide variations within tolerances, the amount of rework costs, the number of customer complaints, and the time to resolve customer complaints are all good ways to measure quality.

Increase quality levels and compliance adherence using ThinkIQ vision to validate that all process steps,



work instructions, compliance standards, and testing procedures are followed on a consistent basis, from operator to operator, from shift to shift, and from facility to facility.

Worker Satisfaction

Employee turnover rates, absentee rates, Net Promoter Scores, and employee complaints are all used to measure worker satisfaction levels.

Workers want to work in facilities that are comfortable and safe. They also want to be proud of the products they produce. ThinkIQ vision can help by flagging safety issues, eliminating waste in processes, identifying areas to improve factory and yard layouts, and to capture opportunities to improve worker ergonomics.





About ThinkIQ

ThinkIQ is the leader in Transformational Intelligence for Manufacturers, contextualizing data — both in-plant and across your supply chain — to improve yield, safety, quality, and compliance. Simply put, actionable end-to-end data insights lead to safer products and improved key metrics.

With ThinkIQ's Transformational Intelligence platform, you'll finally have a complete overview of all manufacturing operations. Changes in any variable are intelligently linked to both actual and predictive outcomes. This data may help one manufacturer avoid recalls from a temperature spike or assembly line slow down. It may help another manufacturer spot a weakness in their product that could become a major safety concern. And it may help another find that a small change in raw ingredients or suppliers can significantly increase their bottom line.

We do this by transforming your process through the five steps required to reach Industry 4.0 Manufacturing (aka Smart Manufacturing): Data Capture; Visualization & Integration; Insight; Continuous Improvement; leading to fully autonomous Smart Manufacturing.

At ThinkIQ, we don't just gather data. We don't just analyze data. We make sense of the data, and suggest actions that enhance safety, reliability, and efficiency. Contact us today to discuss the five stages of becoming an Industry 4.0 Smart Manufacturer.

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