3DEXPERIENCE® Works

HOW REAL-WORLD MANUFACTURERS ARE SUCCESSFULLY USING IIOT TODAY

Learn the best practices of companies optimizing manufacturing operations with IoT

DASSAULT SYSTEMES

INTRODUCTION

There is a lot of talk about the promise of the industrial Internet of Things (IIoT) and the related concept of Industry 4.0. It refers to the use of Internet-connected devices, sensors, and machines to gather data that can be used to identify production bottlenecks, reduce machine downtime, and improve efficiencies. The benefits to being able to make decisions based on real-time data from your shop floor include reduction of downtime, increase in quality of products and reduced costs.

While the hype sounds quite promising, many small to midsized businesses (SMBs) in manufacturing might be questioning whether the tools to implement such widespread enterprise initiatives are practical for them. Questions might include: Will it require steep IT investments to get started? Will there be major disruptions to our production? Where and how do we get started?

Even once buy-in is established, manufacturing operations managers and executives have very little real-world guidance on how to put IoT or Industry 4.0 initiatives in place. This eBook will provide some best practices from companies already implementing IoT and the benefits they are reaping, but first let's talk about how to get started.

ESTABLISHING A ROADMAP TO IOT

The roadmap to applying IIoT and Industry 4.0 concepts can be daunting. For one, there's a plethora of smart shop floor devices to consider in processing data and digitally communicating it to applications for further analysis.

Then manufacturers need to understand the structured approach of applying Industry 4.0 concepts to a system of data capture, aggregation, application processing, and high-level analytics. Also central is the concept of connected manufacturing that leverages the internal and cloud-based exchange, storage, and analysis of data from these smart devices.

Then there are several data management considerations manufacturers face. Historian database repositories are needed to manage structured, long-term historical data, and increasingly these are complemented by "data lakes" of loosely-structured historical data stored on a cloud platform.

Business intelligence (BI) tools are important for the delivery of reports and dashboards of key performance indicators (KPIs) summarized from transactional data for use by management. Finally, diagnostic, predictive, and prescriptive analytics, which increasingly incorporate machine learning and even artificial intelligence (AI), are being implemented to study classic structured data and unstructured data streams.

A LOOK AT IOT IN PRACTICE BY THREE REAL-WORLD COMPANIES

With all of these concepts being used in so many conversations, it can be difficult for manufacturing personnel, managers and executives to sort out if and how any of these should be applied to their businesses. However, when we studied successful early adopters of manufacturing IoT who are now enjoying the benefits, we found some common characteristics in their approaches.

- They innovated with a purpose—starting with a specific problem and a fix in mind.
- They focused on how specific technologies could address their need, helping to save time and money.
- They piloted one process or cell at first to gain experience with IIoT.
- They kept the initial scope simple and then scaled it to become more sophisticated over time in an iterative fashion.
- They created an investment and roll-out plan in phases and analyzed the return on investment (ROI) from each project phase.

FOLLOW THE LEADERS

Here are three examples of manufacturers that have taken a practical approach to IIoT and Industry 4.0 innovation by starting modestly and growing thoughtfully into large-scale deployments that are delivering a strong ROI. Their experiences can provide useful insights on how other companies can apply these concepts to their own manufacturing operations.

1. Lights-out Production Becomes a Reality Plastics Components Inc. (PCI) has applied the concept of smart, connected manufacturing through its use of a comprehensive enterprise resource planning (ERP) system with production and process monitoring. The business now runs fully automated facilities where no direct labor is involved in the manufacturing process. In fact, the newest facility literally runs "lights out" and has received a U.S. patent for its process design.

The company originally relied on a potpourri of Excel spreadsheets, Access databases, and legal pads—leaving it without a clear picture of production scheduling, inventory, and true manufacturing costs. Now with its DELMIAWorks ERP system in place, this innovator has 60 fully automated cells, including over a dozen in a remote facility that can run 24 hours a day, seven days a week.

The manufacturer's head of production observes, "That level of automation allows us to set up the process and the job, then run for prolonged periods of time. We're able to consolidate the scheduling function into a single role, in which one person is able to schedule 60 machines, 10 to 15 setups per day, as well as all the raw material requirements needed for the day, week, or month for that run."

The process is automated from the minute a sales order is generated, typically by an electronic data interchange (EDI) transaction from a customer's ERP system directly into the demand system. Once the

order is received, the schedule runs updates on a single scheduling function that recalculates demand. The system builds the buckets and work orders for every job and determines when raw material is needed based on run times and required ship dates from the customers. Then, all the functions are scheduled on the floor.

The DELMIAWorks ERP system knows exactly how many hours a work order will need, and the real-time scheduling module can schedule out several weeks or more, including forecasts from customers for material demands. On a day-to-day activity basis, it is clear what needs to be running, what's going to be scheduled tomorrow, and what materials need to be available for that schedule to function appropriately.

Even though the complexity ratio in the manufacturer's products is high—with some 300 active individual part numbers, 120 raw materials, and 60 machines—the comprehensive functionality, monitoring, and planning logic manage this complexity with very limited input from managers. Typically, in a company of its size, these functions would be handled by four to six people. However, in this automated mode of operation, only one person manages it all.

FOLLOW THE LEADERS

2. Up-to-the-Moment Production Visibility for Smarter, Efficient Use of Resources

Tessy Plastics is an injection molding company that produces high-volume medical, disposable medical, and consumer products in 24/7 operations. Previously, the company maintained paper folders with static product and process information at work centers on the plant floor. However, with challenges in taking timely action when after-the-fact performance data analysis indicated quality inconsistency, the leadership team identified continuous improvement of quality and delivery through process and information automation as the business' most pressing need.

The solution was to implement a comprehensive ERP and manufacturing operating system from DELMIAWorks, which was integrated with Tessy Plastics' equipment to enable real-time monitoring and reporting.

The company also used real-time work center tablets to create information podiums at each work center. To make key information available to all employees, the team also deployed large-screen information centers on the plant floor.

Today, managers see colorized, up-to-the-second status updates on work center job schedules and KPIs along with a layout view of the entire shop floor. All team members have real-time work center status and performance information at a glance. This clarity and accuracy mean fewer man-hours are needed to capture and analyze production data. Team members can confirm that the correct components are being used as specified every time, and technology placed in key areas along the assembly automation line verifies that the components are produced without defects.

The insights and production efficiencies gained at Tessy Plastics have translated into savings of between $1.2 million and $2.5 million annually.

FOLLOW THE LEADERS

3. Mistake Proofing with Synchronized Production and Just-in-Time Barcode Labels

Nissen Chemitec is a manufacturer and assembler of components that require individual vehicle part sequencing and just-in-time (JIT) shipping to its automotive customers. Six years ago, the company printed barcode labels in batch from a central location that were then carried to the production line and manually applied to product containers, which opened risks of mislabeling product containers.

The team sought a new process for ensuring the delivery of the correct product in the correct container with the correct label in the correct order and quantity at the correct time, just in time—with 100% consistency. Its approach was to connect floor devices, including real-time computer tablets, wired fixed-location and handheld barcode scanners, and line-side label printers, to ensure that floor process execution and packaging would always stay in sync with the master production schedule.

Now, at job setup, the solution conducts automatic mistake-proofing to confirm that the raw materials, components, containers, and tools are the ones specified for the run. It then prints a test label, which is scanned to verify that the format and content match specifications. Only then can the production job start. As a result, Nissen Chemitec's deliveries are now virtually 100% accurate, leading to high customer satisfaction.

The company's solution also automatically updates the job status for right and left side product processes in the DELMIAWorks ERP and MES systems, and it automatically calculates and refreshes overall equipment effectiveness (OEE) stats and KPIs—all in real time.

ROADMAP FOR SUCCESS

These three manufacturers demonstrate that Industry 4.0 and IIoT have moved far beyond conceptual discussions to practical implementations, which are enabling manufacturers to realize significant business gains. Industry 4.0 is here, and IIoT is seeing rapid adoption.

In fact, the Aberdeen Group research firm reports that 38% of manufacturers plan to implement IoT technology in the next 12 months, and 72% plan to do so within the next three years. Clearly, it is time for all companies to start looking how they can take their manufacturing operations to the next level by applying these approaches.

By using ERP as a foundation, your organization can integrate key technologies to revolutionize the way it operates. To begin this journey, technology analysts from the Aberdeen Group offer the following recommendations:

- **Don't wait.** Your competitors have already begun their journeys and are benefiting every day from the innovation of Industry 4.0. Inaction will only cost you in the long run.
- **Identify opportunities.** Where are your processes lacking? Is it taking too long to get products to market? Are you unable to react to demand trends? Are your resources overburdened? Prioritize the biggest challenges that your organization faces, and think about how cloud, analytics, and the Internet of Things can fit into a new business reality.
- **Start small.** Wholesale change is disruptive. Many manufacturers begin their journeys with something small, such as deploying sensors on their machinery and seeing what type of intelligence they can derive. (For example, how does temperature impact your ability to perform predictive maintenance?)

- **Work with your ERP vendor.** Your vendor interacts with industry peers and works to incorporate best practices in its solution. This business partner can be a valuable resource in organizational innovation.
- **Continuously improve.** Industry 4.0 is just the next segment of your journey. Ensure that your employees, processes, and technology are flexible enough to integrate industry change as it happens. With the right tools and project plans in place, Industry 4.0 and IIoT Initiatives are within your reach. The path of thoughtful innovation will lead to higher customer satisfaction, smarter and more efficient use of resources, and measurable boosts to the bottom line.

Are you ready to learn more? Be sure to download **How to Gain the Smart Manufacturing Advantage**

Leverage the power of **3D**EXPERIENCE Works to lead the next generation of product development.
To learn more, visit www.3dexperienceworks.com or
contact your local SOLIDWORKS reseller.

Our 3DEXPERIENCE® platform powers our brand applications, serving 11 industries, and provides a rich portfolio of industry solution experiences.

Dassault Systèmes, the **3DEXPERIENCE** Company, is a catalyst for human progress. We provide business and people with collaborative virtual environments to imagine sustainable innovations. By creating 'virtual experience twins' of the real world with our **3DEXPERIENCE** platform and applications, our customers push the boundaries of innovation, learning and production.

Dassault Systèmes' 20,000 employees are bringing value to more than 270,000 customers of all sizes, in all industries, in more than 140 countries. For more information, visit **www.3ds.com**.

3DEXPERIENCE®

DASSAULT SYSTEMES | The 3DEXPERIENCE® Company

Europe/Middle East/Africa
Dassault Systèmes
10, rue Marcel Dassault
CS 40501
78946 Vélizy-Villacoublay Cedex
France

Asia-Pacific
Dassault Systèmes K.K.
ThinkPark Tower
2-1-1 Osaki, Shinagawa-ku,
Tokyo 141-6020
Japan

Americas
Dassault Systèmes
175 Wyman Street
Waltham, Massachusetts
02451-1223
USA