THE PREMIER ONLINE COMMUNITY FOR GLOBAL SUPPLY CHAIN PROFESSIONALS

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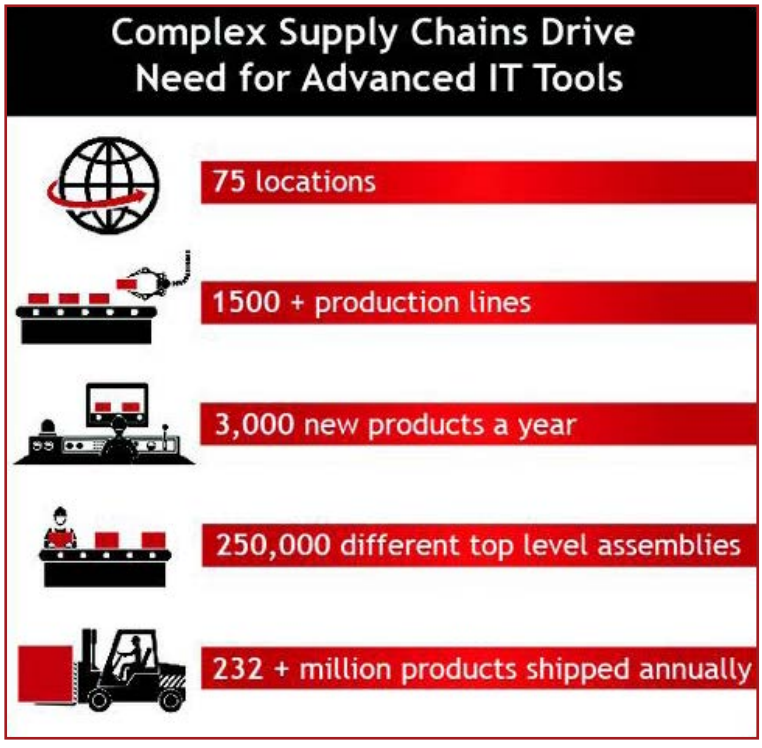
How Industry 4.0 & IIoT Impact Supply Chain Management: Hype vs. Reality

When people think of Industry 4.0 or the Industrial Internet of Things (IIoT), they may think of robots whizzing around factory floors assembling products at super human speed. While automation is the most visible aspect of Industry 4.0 and IIoT, these initiatives are also beginning to make a significant impact on supply chain management and provide real value by increasing global component visibility and improving demand management flexibility.

Changing customer needs is a fact of life in manufacturing. As demand increases or decreases, forecasts are changed, which creates a complex ripple effect across global supply chains. In addition, products often have multiple configurations along with varying regional considerations, and require thousands of different components. When factoring in all the possible variations, managing supply chains across global geographies has become so complex customers want to have real-time visibility throughout the supply chain to ensure that products will be manufactured on time. Although there is a tremendous amount of hype around Industry 4.0 and IIoT, here are real-world examples of how these new technologies are making a difference in global supply chain management.



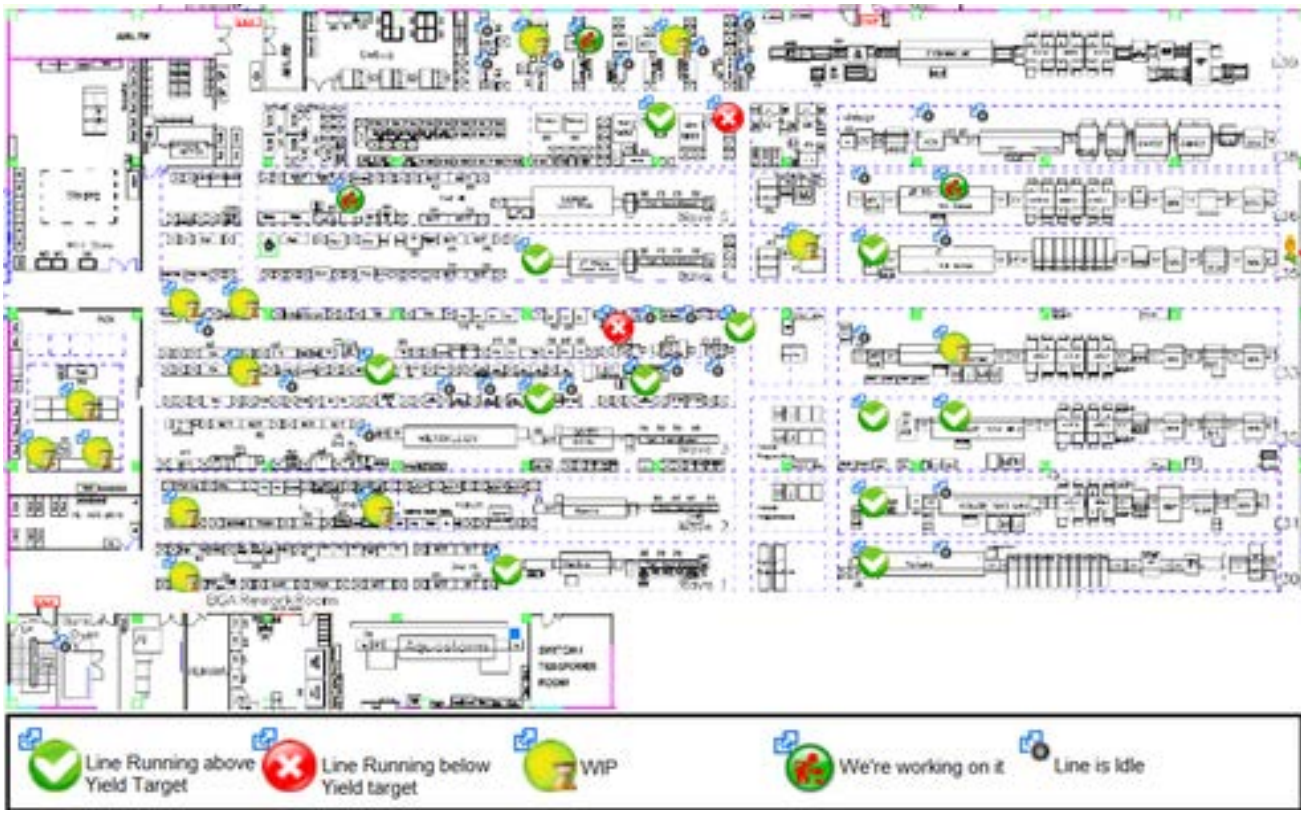
Real-time factory floor visualization & "line down" escalation

Industry 4.0 and IIoT use cloud technology, interoperability, and machine-to-machine communication to automate manufacturing, quality control, supply chain traceability and efficiency. Supply chain visibility is enhanced by artificial intelligence systems, advanced analytics, cloud-based systems and automated integration across the shop floor. This integration ties together each aspect of the manufacturing process, including computer-aided design (CAD) modeling and visualization tools, design for manufacturability (DFM) analysis software, computer-aided manufacturing (CAM), computer-integrated manufacturing (CIM) and shop floor data collection systems, eliminating human error and providing real-time visibility into production lines and supply chain dynamics. There are now real implementations in place for advanced supply chain management, applying IIoT and Industry 4.0 technology.

One such implementation is a global supply chain visualization tool Sanmina has developed for customers called Sanmina Operations Management System (SOMS), which converts data from the Manufacturing Execution System (MES) into a factory visualization superimposed on an actual map of the factory. Supply chain managers and operations executives can access these "virtual factory floors" anywhere from a browser to see the status of component inventory, production problems and delivery schedules.

Consider a typical electronics instrument manufacturing plant with 300,000 square feet of space spread across three buildings. Larger plants may have upwards of 25 surface mount technology (SMT) lines, instrument assembly lines and hundreds of different products. Each of these processes could potentially have eight to 12 different build and test stations. Each test station generates pass/fail results and provides an error code based on the test that failed. In complex electronics products, there may be hundreds or thousands of failure codes and multiple root causes that could generate a particular failure code. Data generated throughout the manufacturing and test process is used to measure and manage yield, throughput, work in progress (WIP) aging, labor efficiency and productivity against goals. However, in a large plant with thousands of employees operating 24 hours a day, seven days a week, the management of data can be complex.

SOMS converts the MES data into a visualization tool superimposed on a map of the factory, which provides real-time views at the corporate, regional, plant, shop floor and workstation level. Customers can see detailed views down to the workstation, individual product and serial number level. Also, the system sends real time alerts to technicians and manufacturing engineers when there are line-down situations, or when yields fall below a certain level. There are automatic email and text message escalation processes if a problem is not solved within a defined time period. The result is real time, more efficient and cost-effective management of complex production processes, with real time data visibility anywhere in the world. SOMS is currently deployed in 40 factories worldwide at Sanmina.



Saving $50K/week by minimizing component shortages

In a traditional manufacturing enterprise, production floor supervisors physically manage components, work-in-process and finished sub-assemblies. The material requirements planning system (MRP) provides the data about quantity and location of components, WIP and finished sub-assemblies needed by production planners, component buyers and customer service personnel.

Production personnel monitor and complete transactions as the MRP system "consumes" or decrements inventory at discreet points in a manufacturing process. In a batch manufacturing environment, components are issued to production and are consumed as products are manufactured. The warehouse operators provide individual components to the production team for specific work orders. As the work order progresses through the sub-assembly build, the production planners consume the components and integrate their value into the built sub-assemblies and finished products. The entire process is dependent upon the input of a significant number of people, resulting in potential data entry delays and errors.

As the production process consumes components, an operator, supervisor, or scheduler has to "consume" them in the online MRP system. This consumption is part of a process called "back flushing." It is a critical step in the management of inventory and in the conversion of component value and labor value into the price of the finished product. Production and materials teams depend on this information to manage the production and material supply process.

The roadblock caused by these "back flush" transactions has to do with timing – frequently delayed, because of the number of people involved in the transactions. Consider a factory with a thousand employees and 25 production lines: communications are complex. A common and significant problem resulting from this complexity is that production schedulers and planners may think they have enough components to meet production schedules that day, but they are looking at "pre-backflush" data. This can result in dozens of production operators idled for the day, and production lines stopped because production planners don't have real-time inventory numbers.

By incorporating Industry 4.0 concepts and technologies, Sanmina's factories have for the most part automated these back flushing operations, moving to a real-time data consumption and reporting model. Under the new system, when the product (e.g. a printed circuit board assembly or PCBA) completes automatic optical inspection (AOI), the AOI machine sends its serial number to the MRP for immediate back flushing. Manual communication from the shop floor to the planner is eliminated along with the associated delay and inevitable human errors.

The new system has turned a manual, reactive system dependent on effective human communication to an automated predictive system with real-time accuracy.

Many recent articles that discuss the barriers to deploying Industry 4.0 and IIoT in factories are correct in saying that implementing this technology in high-volume factories is complex. However, there are some very forward thinking manufacturing organizations who have made investments over the past four or five years, transforming their operations into smart, digital factories with superior supply chain predictability, agility, and visibility.