Smart Connected Solution Improves Business Margins and Increases Market Share

TEGO
Powering Assets with Intelligence

Smart Connected Solutions Using Industry 4.0 Technology

Introduction

Heavy manufacturing, automotive and aerospace organizations have increasingly sought to realize the efficiency and productivity that can be achieved through the application of smart connected solutions supported by Industry 4.0 technology. Typical Lean Manufacturing solutions aim to raise machine utilization, shorten lead times, reduce waste and lower inventories. Smart connected solutions foster automation and real-time track and trace capabilities that more accurately integrate production floor activities with their supply chains for data driven decision making. Market competition and diminishing margins force manufacturers to adopt new solutions to maintain profitability.

The Challenge: Minimize Waste, Reduce Costs, Improve Performance

Discrete manufacturing often consists of multi-step, complex processes, with safety and quality requirements that must be well managed to maintain consistent throughput levels and to hit planned shipped dates. Smart connected solutions automate the manufacturing processes, provide real-time visibility of production floor activities, and integrate operational data with back-end systems information, such as Manufacturing Execution Systems (MES) and Enterprise Resource Planning (ERP) applications. The favored smart connected solutions add value by providing a single platform to view and report business data, which must span across dozens of siloed business systems, applications, and complex IT infrastructure.

Waste and Loss is "Normal"

Companies lose 20 to 30 percent in revenue every year due to inefficiencies. On average most production facilities experience a 20% loss due to downtime. Nearly half of manufacturers still rely on manual data collection from multiple sources using spreadsheets which leads to scheduling dysfunction and labor inefficiencies. Others rely on hand-written labels, or some form of rudimentary bar code to track and manage inventory, to process WIP and to generate production plans from shift to shift. The costliest waste any organization experiences, however, is unplanned downtime, followed by scrap/rework, and missed delivery dates. Operational waste manifests itself in many ways, but forms of it exist in every company willing to report an honest assessment. The effect of waste equates to erosion of profit margin and reduction of the organization's ability to remain competitive.

Here are some of the most common complaints made by manufacturing organizations, which are sure signs of waste:

- No one has good visibility to the status of orders in progress

- Product mix and volume fluctuations result in shifting bottlenecks that are difficult to predict
- Too often we are expediting due to surprises on the shop floor
- We have no electronic record of the production events of each order's performance
- Changes in resource availability result in fire drills or delayed shipments
- The schedule is always wrong, so people do what they think is right based on no or limited data

Smart connected solutions deploy automation of inventory and parts through the supply chain, automate shop floor process flows, and deliver real-time location reporting capability to support improved throughput and finished goods levels.

One Organization's Need

Consider the actual case of an industrial organization that tracks every work order from the time it is received until the time it rolls off as finished goods. Each work order requires itemization of thousands of individual parts, components, and sub-components, down to individual nuts and bolts used in the finished good. To manage the physical scale of this process, all work order items are kitted on carts and in totes, which are then tracked, traced, and reported as they progress through dozens of different work cells spanning more than a quarter million square-feet of shop floor. Eventually all the parts come together as finished goods before being shipped out to the customer. The enterprise solution, SAP, has the capability to report WIP across the production floor, but the timing and accuracy of this reporting is reliant on manual entry and worker compliance.

Often the production environment requires shifting attention to deal with problems that arise in the moment. This means that WIP can sit at one workstation waiting to be checked in while other WIP is completed but not progressed to the next production cell. The reason for the pile up may be staff waiting for inventory or it may be waiting for a skilled team member to perform work. Either way, workers spend an inordinate amount of time in unplanned downtime and reacting to dynamic problems that arise. Frustration mounts when the timing of receipt of warehoused parts becomes unpredictable, either from internal warehouses, or external third-party vendors. Lastly, predicting one's own inventory levels is tricky when cycle counts are manual and SAP rightsizing occurs only one time per month. All activities to manage WIP and physical goods is labor intensive, non-value add, and costly.

Other production floor waste occurs daily in the form of data analysis. Before each shift a cross functional team led by managers must report the latest production team's activity and work status updates, all of which must be communicated for the next shift to perform work. The bulk of the work entails data extraction from siloed software programs, then combining it with additional information in spreadsheets or a 'homegrown' database, before it is then ready for sharing with the rest of the production team. This

manual integration of reports occurs once per shift and totals three hours each day. That is three hours the organization spends compiling and communicating production planning activities. Three hours that the organization could be using differently if data and information were automated, synced, and available via the cloud. Daily efforts and activities that add no value and tie up staff bring these wasteful operations into sharp focus.

One Platform Delivering Real-time Visibility, Traceability and Integrated Reporting

We consider a manufacturer that already has a lean production environment with a continuous improvement staff and digital transformation specialists managing one to two Kaizen events each month. Despite this, the manufacturing floor continues with significant operational waste. Senior management realizes that to hit its forecasted throughput rate for the next twenty-four months, the organization needs to adopt a smart connected solution to address multiple operational challenges and improve efficiency of its current facility. Critical solution features include the automated visibility and reporting of WIP, the digitalization of manufacturing process and data flows, and real-time data with integrated reporting.

The underpinning of this solution starts with the digitization and automated visibility of all physical items, including both incoming from their own off-site distribution facility and WIP moving from their on-site warehouse onto the production floor. Real-time visibility of WIP continues throughout the shop floor as parts, components and carts are received into work cells. In a smart connected solution, the entire production value chain becomes automated and connected in real-time for identification, tracking and automated reporting purposes. This provides highly accurate and reliable performance metrics and reduces unplanned downtime due to lack of visibility. Empowered with real-time data, the visibility of where physical items actually are in the value chain allows the team to plan, act and execute on or below budget.

A viable smart connected solution is flexible but robust enough to monitor the customer's complex production process. The solution provides both the hardware and software necessary to automate parts coming into shipping and leaving receiving, track WIP, and kit and bin inventory too. Production floor data and information is created, collected, pushed and pulled from manufacturing execution solutions and enterprise resource planning systems. An enterprise-wide Cloud (or internal network) allows those with the right privileges to have performance oversight, access to reports, and visibility to monitor processes in real-time. Digital signage boards on the shop floor allow staff to visualize how well processes are or aren't being maintained and tip off staff as to what actions need attention to maintain on-time throughput. Automated business performance metrics from the production floor feed continuous improvement initiatives, allowing managers to gain greater insights into inventory turnover, capital management, and staffing.

Return on Investment

Once management agreed upon the scope and budget required for a smart connected solution, it took six weeks for the solution to be deployed. At no time during the process were production floor activities interrupted as hardware was installed and software tested in parallel with the operating environment. Eight weeks after installation, the continuous improvement team requested an expansion of the solution to include a four-story warehouse supporting the production floor. The solution paid itself back within ten months.