REAL-TIME SHOP FLOOR INTEGRATION, SIMPLIFIED

Whitepaper

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As a manufacturer, you know where your money is made – on the shop floor, day-in and day-out. But in a report titled, "Bridging the ERP and Shop Floor Divide," the Aberdeen Group notes that there is a disconnect between ERP (Enterprise Resource Planning) software and the shop floor that hinders manufacturing performance. But you already know this. You've seen it in data collected from the shop floor with pen and paper on spreadsheets and charts, then uploaded in batches or re-keyed manually to multiple databases that aren't readily connected to each other. Very often the data is uploaded long after it is needed, creating problematic situations.

In the realm of demand-driven manufacturing, where you must consistently do more with less, real-time information from the shop floor is imperative to prevent problems, drive quality and enable the flexibility your customers require. Left unchecked, issues like downtime, poor machine performance, rejects and overruns can quickly erode your profits. But without an enterprise system that works in unison with real-time shop floor data, these issues can remain hidden and change any seemingly lean progress into nothing more than a mirage.

Manufacturers face many challenges in eliminating the disconnect between ERP and the shop floor. Existing systems are hard to integrate. Companies have no unifying manufacturing architecture. There are too many applications to support and aging or proprietary systems to consider. It's also difficult to get the right information to the people who need it in time for them to make critical business decisions. What's more, the Aberdeen Group says effective integration cannot be accomplished simply by collecting shop floor data and passing it on to the ERP software. Rather, the ERP system must be active in pushing orders to the shop floor. It must keep constant track and provide access to current and planned inventory requirements.

Your shop floor operates in real-time. It moves fast and so must you. Information today about last week's overrun will not let you prevent the overrun that's about to occur now. Beyond the collection and integration of shop floor data, the real challenge is to make that data actionable – in an instant – to everyone, at every level within your organization and across your entire supply chain. Only by doing so will you achieve the visibility and control you need to be competitive in today's demand-driven economy. While this challenge may seem complex, with the right solution, you can attack it head-on, intelligently and more cost-effectively than you might think. This white paper will show you how.

SHOP FLOOR INTEGRATION – MYTH VS. REALITY

Manufacturers approach shop floor integration through various means and some methods are more complicated, and thereby more expensive, than others. A common myth concludes that ERP cannot handle shop floor integration in complex manufacturing environments. As a result, Manufacturing Execution Systems (MES) and, more recently, Manufacturing Intelligence (MI) dashboard applications have come to the forefront as go betweens, extra layers designed to connect the shop floor to the ERP. Yet in reality, because these "bolt-on" solutions are not inherent to the ERP system, they require higher levels of customization and architectural changes before they can perform as intended. Once installed, these solutions may also require greater ongoing support from IT staff. And even with the extra cost and effort, they may not provide immediate, accurate or automated results because they have no execution capabilities or they rely on batch transfers instead of real-time communication.

Demand-driven manufacturing mandates flexibility to respond automatically in an instant to changes in areas such as inventory, production status, customer requests and compliance mandates. Batch communication does not happen frequently enough to support this level of flexibility, and worse, batch transfers perpetuate time lags and inaccuracies across your supply chain, resulting in problems such as excess inventory, carrying costs and lost productivity.

Manufacturers might also believe that the more complex a solution, the better it will be in solving shop floor integration issues. An MES package, for example, may be complex with feature-rich process monitoring tools, but do you need a separate system to monitor processes when the machines you're running have extensive process monitors onboard? While an MES package offers information on product properties, that information is not the most relevant to profit. Rather, it's your production output that more directly affects your bottom line, and the data derived from that output that is more actionable to your ERP system.

Today's reality also demands real-time communication that flows automatically across your supply chain. A single database ERP system that knits ERP and native shop floor capabilities into one comprehensive weave may deliver better results with less effort and cost than batch-oriented, third-party solutions. For example, an ERP solution from DELMIAworks can deliver real-time shop floor integration across a globally distributed network and fulfill many of the same functions normally performed by MES programs. DELMIAworks removes the complexity of real-time shop floor integration through two innovative, embedded programs: RealTime™ Production Monitoring and RealTime™ Process Monitoring. With DELMIAworks' powerful shop floor tools, actionable, real-time shop floor data is utilized anytime, anywhere, by anyone within your organization to drive up quality, boost performance and improve your bottom line. Let's learn a bit more about these two products:

REALTIME™ PRODUCTION MONITORING

Think of a contact closure as the flip of a switch, up then down for every part produced or even scrapped. By counting these flips as they occur on individual machines, DELMIAworks' production monitoring module can determine how long it takes to make a part and how many parts are produced in each shift. Because production monitoring works in tandem with the ERP core, there is always instantaneous communication between the shop floor and various aspects of the ERP system. DELMIAworks pushes schedules to the machines based on demand and the production monitoring module automatically provides feedback as production occurs.

DELMIAworks then manages the complexity of the data by comparing it instantly to predetermined parameters such as average cycle time, scheduled production, inventory on hand and more to automatically update the finite schedule. Because this information is shared across the ERP, inventory control is also highly incorporated. By recognizing which part or parts the machine made, the communication of raw material, labor and overhead consumption are compared to the bill of manufacture (BOM). The result is current and accurate information is pushed across your entire supply chain.

The RealTime™ Production Monitoring system includes the option to use easy-to- read, color-coded LightSticks, or an audible enunciator, to convey machine performance to those who work on the shop floor. LightSticks allow shop floor operators to quickly identify late, slow and fast running machines. Machines that are running to standard indicate green or lean status, while machines that are slow light up red (See Image 1). LightSticks glow yellow when a machine is down, turn blue when a machine is running fast and, most importantly, flash red when your job is finished, eliminating costly overruns to keep your business lean.

REALTIME™ PROCESS MONITORING

In contrast to the production monitoring module, which requires a trigger to measure a unit of production, DELMIAworks' RealTime™ Process Monitoring module captures data through any device or machine with data communication capability such as a programmable logic controller (PLC). Through two modes of communication, an unlimited number of critical process data parameters are automatically collected by a data historian as parts are being produced. Capture, view, and analyze data that is either pulled into the DELMIAworks database at timed intervals or cycles, or alternatively push data automatically into DELMIAworks upon capture (See Diagram A). This two-way communication between devices and DELMIAworks results in unprecedented visibility and traceability.
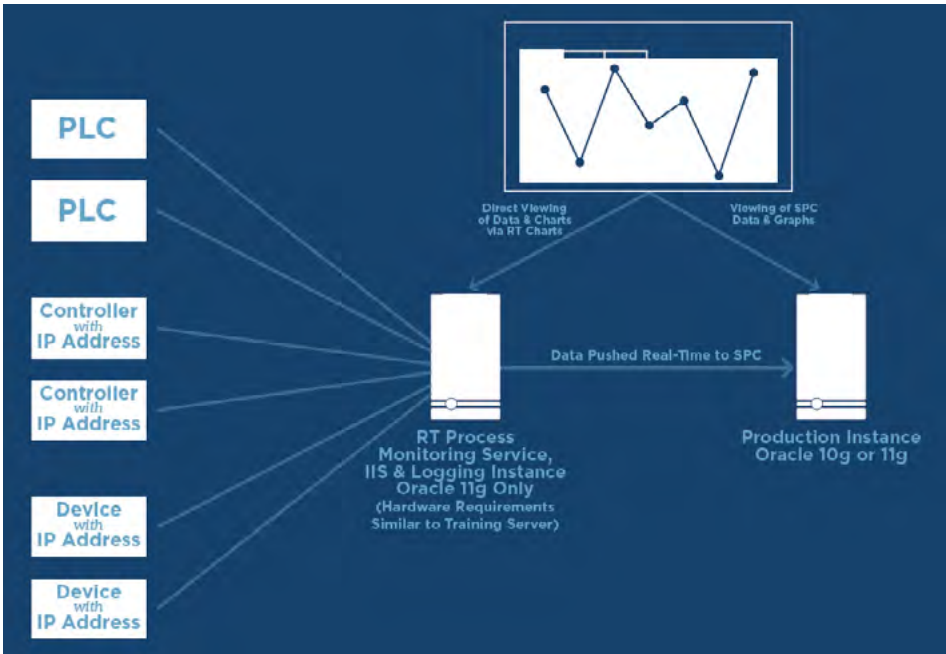

Diagram A

Image 1

The process monitoring module has the invaluable ability to maintain critical data required for accurate traceability. Through dynamic reporting tools, manufacturers can view the overall finished goods number and then drill down to the process details and parameters such as item number, work order details, manufacturing number, date and time, lot number and any other user defined measurement parameters (fill time, fill pressure, back pressure, injection pressure, temperature, flow rates, etc).

Take analysis one step further and automatically view the collected data in DELMIAworks' Statistical Process Control (SPC) module, complete with incorporated run rules to alert you if anything is trending out of specification. Automatically print labels at the work centers with a barcode and process parameter details to affix to a part or a box while the parts are being produced. In addition to monitoring specific parameters based on work centers, the process monitoring system also allows for collection from all nonscheduled, high-value equipment.

REAL-TIME SUPPLY CHAIN

According to the Aberdeen Group, best-performing manufacturers operate with real-time intelligence that encompasses process, organization, knowledge and technology. Based on a survey in Aberdeen's report, these leading manufacturers do a number of things, including: utilize real-time sensing and analytics to proactively avoid schedule interruptions; allow management a real-time view of the shop floor; and make real-time data accessible across the supply chain to include decision makers, operators, customer service, logistics, and delivery.

DELMIAworks' production and process monitoring enable a real-time supply chain by giving you the tools you need to capture, monitor, manage and track discrete, cyclical and continuous operations as they occur. Supply chain automation is supported with capabilities such as activity monitoring and alerts, embedded workflow, label printing, barcoding, automated shift reports and the ability to correlate shop floor activity automatically to every interaction with customers and suppliers alike, from initiation to resolution.

A multitude of dynamic reports provide accurate and timely information including good and bad parts, downtime, rejects and more (See Image 2). Functional RTCharts can be viewed through a web browser, various DELMIAworks modules, or through your smartphone or hand-held tablet. Mouse over data points on the interactive graphs to pop up details, such as the value of the data point, the cycle ID, and date and time stamp. Or take analysis one step further and push the information from your data historian directly into DELMIAworks' Statistical Process Control (SPC) module, allowing for further calculations and analysis of your data.

Because the data you receive is immediate and in one central location, it provides true power at every point in the production cycle over factors such as labor and supplies, overruns, rejects, quality and on-time delivery. It also supports adherence to industry standards and quality compliance regulations such as TS13485, ISO 9001 standards and CFR and FDA requirements.

With accurate, real-time data, gain an overall idea of how well or poorly machines are operating to target standards within an individual work center or across an array of plant operations (See Images 3 and 4). Historical data is referenced when making the finite schedule and is used to automatically indicate what jobs will run best on what machines based on data such as reject and cycle-time records. Any variances to standard that occur on the shop floor are instantly taken into account, allowing you to leverage advantages such as betterthan-average runs, or prevent situations such as having to reset a tool after a job has run. DELMIAworks' realtime business activity monitoring system will issue voice alerts or email/text warnings if a part is trending out of specification, allowing you to be proactive, rather than reactive.
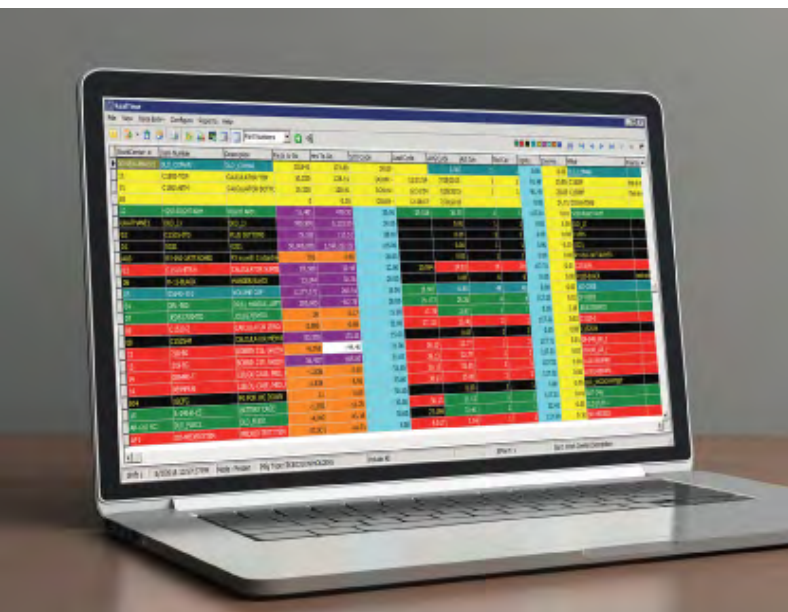

Image 2

MAKING A DIFFERENCE

Manufacturers that are using DELMIAworks' production and process monitoring modules have seen many benefits. For example, before implementing DELMIAworks, one manufacturer assumed his utilization rate was at 75 to 80 percent. DELMIAworks allowed him to see that his true utilization was closer to 50 percent. Now with real-time updates every second, he's dramatically increased shop floor efficiency and reduced scrap by 37 percent. For this manufacturer, the true benefit is best seen in the bottom line: "We now know our true costs, and as a result, we've exponentially increased our profits. Any enterprise not exploiting the power of real-time shop floor data is already falling below the curve."

A SINGLE CONCLUSION

Real-time shopfloor integration is possible without the complications and added costs of integrated third-party solutions. The right ERP system can make it happen, even in complex manufacturing environments and across globally distributed supply chains. DELMIAworks is designed from the ground up to support 24/7, realtime shop floor integration in today's demand-driven, manufacturing environments.

The key to achieving cost-effective savings in the supply chain is to exchange information accurately and quickly in real-time (see Image 5). DELMIAworks is the only manufacturing ERP solution that actively monitors the shop floor as production occurs, and automatically enables the exacting exchange of real-time shop floor data. In the pursuit to connect your shop floor to your ERP software, DELMIAworks may be the best choice. It's that simple.

Image 3

Image 4

For more information, please visit www.3ds.com/delmiaworks or call 1.866.367.3772

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

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