



An ERTechnologies® White Paper

Manufacturing Agility Through MES Excellence

AT A GLANCE

This white paper outlines how manufacturing agility is important in today's world of fluctuating demand, short product cycles and constant change.

Learn how:

- True agility is the ability to change while still controlling costs and quality.
- Gaining visibility on the shop floor is one of the fundamental dilemmas of manufacturing systems and lean manufacturing.
- MES acts as the conduit to the shop floor, providing immediate distribution of the information and directions to where they are needed.

Manufacturing agility is increasingly important in today's world of wildly fluctuating demand, short product cycles and constant change. Successful manufacturers don't just grudgingly react to change, however, they embrace change as an opportunity to proactively outmaneuver the competition and gain market share. And yes, the difference is that dramatic, creating an increased level of urgency for digital transformation. The most successful manufacturers have learned to expect the unexpected. They have learned how to be agile. They have learned how to be connected.

Agility is being able to adapt quickly to changing conditions. But it's not just about changing production quickly to meet new requirements – any manufacturer can expedite, change lot sizes, postpone completion of ongoing work and engage in other reactive practices. But those are expensive and disruptive actions and not a sustainable operational strategy.

“True Agility is the Ability to Change while controlling costs and quality...”

According to the APICS Dictionary, “Agility merges the four distinctive competencies of cost, quality, dependability and flexibility.” It's easy to focus on the flexibility alone but true agility is elegant and controlled. And true agility can only be achieved with good internal controls and superior information management and communications.

Manufacturing, by its very nature, is a complex process that harnesses the contributions of people, equipment and resources (inventory, maintenance, finance, etc.) within the enterprise, along with external partners like customers, suppliers and service providers. Effective

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management of this broad array of resources demands accurate real-time data, available across the enterprise, and a robust communications vehicle to relay plans and instructions efficiently and effectively. In the manufacturing systems world, those functions are typically addressed by Manufacturing Execution Systems (MES).

Interestingly, many of the same factors that drive manufacturing efficiency and process improvement programs like Lean Manufacturing also support agility. Becoming agile, like becoming Lean, is accomplished by focusing on what's important (value-adding in Lean terms), eliminating waste, and streamlining processes. Lean and agility both benefit from flexibility through reduced

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change-over time which supports smaller lot sizes and shorter lead times. But those flexible processes must be properly managed and directed. And that's where the data and communications come in as enablers of agility.

MES is most widely recognized as the shop-floor system, responsible for:

- detailed scheduling and dispatching;
- data collection through direct machine connections, touch screens and barcode scans;
- quality data collection and quality management including statistical process control (SPC) calculations and displays;
- messaging and data recording for historical record, regulatory certification and traceability.

Before moving on, it may be helpful to note that the boundary between MES and ERP is not clearly defined, as many of the functions can exist in either or both – quality, scheduling and data collection, for example. Some distinctions can be drawn. For example MRP/ERP systems typically schedule only to the day (start date, due date) and do not address intra-day scheduling beyond priority indicators or sequencing considerations in some cases. MES scheduling can potentially be more precise, projecting start time/stop time within the day or shift.

No matter how the functions are packaged or labelled, strong links from the shop floor to and from the management systems in ERP are essential for agility. While there are often separate systems for ERP and MES, from different developers, integration between the two is of utmost importance. The ideal situation is for a single supplier to develop a single, comprehensive solution from the shop floor to the executive suite on a single platform with a unified database.



The term MES is used in this paper to discuss the shop floor functions and links, but consider that this information must be tightly tied to ERP to complete the closed loop business planning and management system and deliver the benefits.

“..Gaining visibility on the shop floor is one of the fundamental dilemmas of manufacturing systems and Lean Manufacturing”

VISIBILITY

Visibility is essential to agility. As new or changed requirements are recognized, the first step to addressing those changes is to understand current activities and status so that the impact of the change can be assessed. What ongoing work is impacted by this change? What is the current location and state of completion of each of these? Are there enough parts and materials to support new or changed production and if not, when can they be obtained?

Systems function best, and give the best information and recommendations, only when they have timely and accurate underlying data to work with. Data collection on the shop floor, however, requires production workers to perform reporting tasks that do not add value to the product and are therefore waste according to the Lean way of looking at things. A Lean initiative and value stream mapping would quickly identify reporting as something to be eliminated. Doing so however would effectively blind the ERP system and greatly reduce its ability to direct shop floor activities as well as determining the effect of pending changes on ongoing activity.

The solution, of course, is to make data collection less intrusive on the plant workforce through automation. Direct connection to machine controls and SCADA2 devices through the plant network is one of the basic functions of MES in support of quality, scheduling and documentation (lot/serial number capture, processing conditions and equipment/worker identification, electronic signatures for regulatory compliance). Tie the MES to ERP and the same data satisfies the real-time visibility requirement that is essential to increased agility.

In addition to direct machine control connections, automated data collection is accomplished through barcode scanning and badge reading as well as entry through shop-floor terminals including touch screens, portable devices (tablets, smart-phones and dedicated special-purpose devices), and increasingly through emerging technologies like voice recognition, machine vision

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and wearable technology. Admittedly, most of these devices and methods don't completely eliminate operator involvement in data collection but they do greatly reduce the amount of distraction and the time required to collect and input the data. At least as importantly, the data is more accurate, more granular (detailed), and more complete through real-time computer verification and enforcement. It is also much more timely (real-time or near real-time) especially compared to manual recording and key entry.

COMMUNICATIONS

So far, we've only addressed one side of the equation – data collection for enhanced visibility. Once the system is made aware of the changed requirements, and has compared that to what's in the warehouse and what's going on in the plant, ERP and MES work together to develop new schedules and instructions to lay out the most effective response to the change, minimizing waste and outlining the speediest and most efficient response.

Then the new instructions must be relayed to every work center, supervisor, manager, procurement specialist, planner, warehouse employee and perhaps vendor affected by the change in direction. Once again, MES acts as the conduit to the shop floor, providing immediate distribution of the information and directions to where they are needed. MES may also provide direct links to other areas of the business – the warehouse, material handlers, suppliers, etc. On the shop floor, MES typically manages the dispatching function, for example, displaying the backlog of work with priorities and instructions directly to the individual work centers. New instructions are immediately updated in that dispatching function and new work instructions, machine programs, priorities, etc. made available to production workers without delay.

In both cases – visibility (up) and communications (down), time is of the essence. By removing delays and uncertainty from both upstream and downstream processes, managers are given the earliest possible notification and the most time to react, while ensuring the fastest response and also one that is considered and coordinated with efficiency and quality requirements.

Response to the changes is not a knee-jerk reaction; it is fully planned and executed within the framework of the company's position, resources, priorities and capabilities.

A MANUFACTURER IN CONTROL

The ability of a manufacturer to increase quality and optimize production is critical in keeping up with ever-changing demand and price pressure from customers. Business systems must

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provide the capability to collect real-time data on all aspects of manufacturing and the supply chain, and have ready access to data for traceability or quality audits. In addition to insight into the impact of pending changes, increased visibility also opens up the opportunity to identify otherwise hidden opportunities for process improvement and cost reduction. Managers and executives use the insight provided by MES and ERP to develop the best strategy before distributing new instructions to all areas of the company.

Response to changing demand cannot be haphazard or rash. Company leaders need the tools to help them make informed decisions that are timely enough to get ahead of runaway costs, quality issues, or even recalls to deliver great customer service while preserving the organization's quality, productivity and cost control.

MES and ERP working together, or ideally, combined into a single unified solution, provide those tools and allow manufacturers to deliver controlled agility. As listed in the APICS definition, "Agility merges the four distinctive competencies of cost, quality, dependability and flexibility." And all four are required for true success as an agile and responsive manufacturer.

About ERTechnologies

ERTechnologies is the leading Oracle NetSuite partner delivering The Oracle NetSuite Manufacturing Cloud for manufacturers. ERT has pioneered cloud solutions for the shop floor, connecting suppliers, machines, people, systems, and customers with capabilities that are easy to configure, deliver continuous innovation, and reduce IT costs. With insight that starts on the production floor, we help manufacturers see, understand and uncover the value hidden in their Oracle NetSuite technology investments by capturing unexpected opportunities to fuel growth and profitability in every aspect of their business ecosystems, enabling them to lead in ever-changing markets using Oracle NetSuite technologies.

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