
MES and ERP: Creating Synergy with Industry-Specific Solutions

By Ted McDermott

More and more, enterprise resources planning (ERP) vendors are expanding their enterprise business applications to encompass the supply chain and extend closer to the plant floor. At the same time, manufacturing execution system (MES) vendors are expanding their shop floor solutions to include front-end and back-end applications such as order fulfillment and warehouse management systems.

As a result of this convergence, the lines between MES and ERP have blurred. Subsequently, many manufacturers are making technology decisions that do not truly fulfill their needs. Faced with global competition and tight profit margins, many implement technology solutions as "quick fixes" to help ramp up capacity, produce more products per day, or resolve production bottlenecks to maximize labor and resource usage. While these are worthy goals, they don't focus on key business objectives, such as maximizing profitability while increasing customer satisfaction and retention.

MES: then and now

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In the manufacturing industries, MES grew out of a need to improve efficiency and provide return on capital equipment investments. Plant floor execution systems began with automated data acquisition, bar-code reading, and process optimization. As the market matured, MES vendors began to expand the scope of their product offerings, with some vendors attempting to provide more end-to-end supply chain solutions. As a result, the Manufacturing Execution System Association International (MESA) defines today's MES model as comprising 11 different functional areas (see "MES Defined" on page 43).

The greatest strength of MES lies in its ability to improve communication flow from the shop floor while collecting and analyzing process control information to improve manufacturing methods. Operational benefits derived from MES include acquisition of more reliable operational data for decision-making, less waste, and better resource usage.

Hitting the Limits of MES

While a few expanded MES solutions address a portion of supply chain integration, they fail to provide crucial integration of manufacturing and business processes across the enterprise. Despite expanded supply chain functionality, the ultimate value of MES is limited unless it is integrated with an enterprise-wide business solution.

Lacking this critical link, the ability of MES to add long-term, measurable business value is questionable. For a company to analyze its position solely from a plant floor perspective is inherently shortsighted. Even the best MES solutions offer a relatively narrow field of visibility and lack the breadth and depth of production execution data needed for decision support at the management level.

The solution is to integrate existing or new MES applications with an ERP system that provides a detailed view of plant floor activities. Such a combination can provide a powerful synergy of MES execution functionality with enterprise integration, leading to long-term business benefits and value.

Poor financial performance, tighter profit margins, and unsatisfactory return on capital in many industries have led leading manufacturers to rethink their approach to the business. As a result, most large manufacturers have already committed to ERP systems and an increasing number of small- to mid-size companies are following the trend as well. The latter are migrating to enterprise-wide solutions in the hope of attaining the same benefits realized by their larger competitors.

In most manufacturing segments—from automotive, aerospace, and electronics to packaged goods, pulp and paper, and fashion—integrating production planning, manufacturing, and customer order fulfillment across the enterprise is reaping measurable results, including lower operating costs, higher profitability, and significantly improved customer satisfaction. For those that have successfully implemented ERP, the integration of manufacturing and business information also has provided them with higher quality decision support information, leading to better return on capital investments.

Look Before you leap

Implementing an ERP system is not without its challenges, however. One major hurdle is integrating ERP software with MES to gain a return at the shop floor level where profits are determined and customer satisfaction is built into products. Also, poor fit of an ERP system can create problems for users, particularly in the areas of production planning, manufacturing, and customer order fulfillment, where individual ways of doing business are most evident.

The solution is to look for an ERP system designed for a specific business. Software that combines industry-specific functionality with the flexibility to accommodate each company's unique processes goes a long way toward improving the fit and reducing the pain. It also helps speed up implementation. This pragmatic approach helps companies close the gap between system performance expectations and final results achieved.

There are other advantages, too. Industry-specific, global enterprise solutions based on open architecture and proven technology standards facilitate faster integration of companies being acquired as part of a corporate growth strategy. Typically, as companies grow and want to compete globally, multi-language and multi-currency functionality become increasingly important.

What ERP can do

ERP applications are designed to optimize an organization's underlying business processes—primarily accounting/financial, manufacturing, and distribution. Today's ERP solutions must offer even more. Many vendors have begun to enhance their offerings with extended supply chain applications in an effort to create seamless, integrated information flow from suppliers, through manufacturing and through distribution. A core ERP system for manufacturers must include applications for:

- Financials, product costing, and other business functions
- Procurement (purchase orders, supply tracking, goods receipt and payment, etc.)
- Sales, marketing, and after sales (lead tracking, customer information, quote processing, etc.)
- Order fulfillment (order entry, order tracing and status reporting, pricing, invoicing, etc.)
- Operations management (forecasting, production scheduling, material planning, inventory control, warehouse management, etc.)
- Manufacturing (production orders, capacity planning, resource allocation, production tracking and reporting, inventory management, waste/reject tracking, etc.)
- Distribution (transportation planning and shipping, loading and shipping documents, etc.).

In addition to these core functions, integrated industry-specific applications can add significant value. For example, in mill industries such as pulp and paper, converting, and steel manufacturing, an enterprise solution must be based on product attributes and customer specifications being active throughout the production, inventory, and order fulfillment flow. These systems also must have an integral view of the plant floor for tracking work center level costs, quality of work in progress, customer order status, and roll/product movements.

Integrated trim management and rough-cut capacity planning are crucial elements for mill industry enterprise solutions in order to connect production activities to customer order fulfillment. Integrated advanced planning and scheduling (APS) and maintenance planning further optimize throughput, reduce costs, and eliminate the need for redundant systems or custom interfaces being developed between applications.

In the apparel industry, the ability to configure products and produce an accurate bill of material based on a multidimensional, user-defined matrix greatly simplifies the complexity of order entry and production. Also key is the ability to handle flexible pricing structures and customization of packaging, products, and shipping options.

In the food and beverage industry, one challenge is to provide rapid, timely information flow through global food and beverage manufacturing and distribution enterprises. Because of the volatile nature of the business, with consumer tastes and government regulations constantly changing, the enterprise system also must accommodate rapid product development, efficient replenishment, accurate forecasting, and customer quality demands.

Finally, in implementing an industry-specific application, it's important to ensure that the application provider's implementation team includes members with in-depth knowledge and experience in that industry. This will significantly streamline implementation time by eliminating a lengthy vendor or integrator learning curve.

e-business capabilities are key

Rapid implementation tools and industry-specific templates add value to the ERP investment by streamlining the process-modeling phase for fast implementation and time to return on investment. In fact, software implementation time reduction is a key element of success in any enterprise-wide technology project.

Likewise, enterprise systems must be equipped to accommodate the explosive growth of e-business. E-business solutions—whether business-to-business applications such as dealer networks and on-line sourcing and procurement, or business-to-consumer applications such as electronic storefront, customized product configuration, warranty registration, and on-line catalogs—already are saving millions of dollars for early adopters. For this reason, ERP vendors are beginning to enhance their ERP backbone with e-business capabilities and solutions.

The final key is to choose an ERP system built on open architecture and object technology to enable easier integration and/or interface with third-party shop floor systems. The ability to truly take advantage of the increasing use of all aspects of e-business also is essential.

Leveraging the synergy of MES and ERP

By combining an industry appropriate ERP system for managing the business and MES for plant floor execution, companies reap synergistic benefits that include:

- More reliable and accurate shop floor information being fed into the ERP system
- More efficient operations for improved profitability and customer satisfaction
- Superior business management and decision support, especially in regard to capital expenditures.

However, before making critical decisions that affect the company's financial health, management must determine what problems to resolve and what operational or business benefits the company hopes to gain. Integrated information flow is the key to simplifying complexity in any manufacturing enterprise. By implementing open, flexible ERP and MES solutions, companies can replace a host of legacy systems that provide less-than-optimal performance, transforming their IT expenditures from expenses to investments in the future.

Each manufacturer's business challenges may drive it to look at the shop floor or business systems first. In reality, future success depends on pursuing excellence in both arenas. Wherever you decide to begin, taking a multi-pronged approach is the surest path to increasing profitability and customer satisfaction—and ensuring your business has a future.

McDermott is a business / technology authority and information systems consultant. He has more than 20 years of experience in the IT, manufacturing, process technology and

corporate strategic planning. Comments on this article are encouraged to help the entire industry by generating more discussion on the business value of technology. He can be contacted at (847) 934-6386 or by e-mail at tedmcd@earthlink.net.

MES Defined (Article Side Bar)

The Manufacturing Execution System Association International (MESA) defines its MES model as comprising the following functional areas:

- Data acquisition
- Dispatching production units
- Document control
- Labor management
- Maintenance management
- Operations/detailed scheduling
- Performance analysis
- Process management
- Product tracking and genealogy
- Quality management
- Resource allocation and status

Generic ERP and MES Information Gap (Article Side Bar)

Enterprise Business View—Level 3 (Zone 3)

- Order Management, Inventory, Shipping and Invoicing
- Budgets, Forecasts, Financials & Costing

Information Gap filled by Industry-Specific Enterprise Solution

- Attribute Management for Mill Industries
- Configurable, Multidimensional Items
- Integrated Maintenance Planning
- Full Lot Traceability & Tracking
- Matrix Order Entry for Fashion
- Advanced Production Planning & Scheduling

Operations/MES—Level 2 (Zone 2)

- Process Data Historian
- Label printers, Bar Code, etc.
- Labor & Production Reporting
- Lab & Quality Data Systems, LIMS
- Roll/Product Movements Tracking & Inventory
- SCADA (Supervisory Control and Data Acquisition)

Process systems—Level 1 (Zone 1)

- Process Control/Measurement