



20 FACTORS TO CONSIDER WHEN SELECTING AN MES SOLUTION

Whitepaper



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Manufacturing Execution Systems (MES) enable supply chain networks and manufacturing to stay synchronized, scale and flex to fluctuations in demand. The best MES implementations bring greater accuracy, control, scale, and speed to shop floors and are one of the strongest growth catalysts any manufacturer can have.

Selecting the right MES improves product quality, on-time deliveries and make the most challenging new product launches a success. Compromising on an MES decision leads quickly to mediocre manufacturing performance, poor quality, and lost customers. In the hyper-transparent world of today with lightning fast responses on social networks, no one can afford to be mediocre at anything they're doing in manufacturing.

MES Isn't A Band-Aid, It's Powerade

It's time to quit looking at MES like it's a manufacturing Band-Aid applied to the many symptoms of an inefficiently-run production operation. That's a quick path to manufacturing mediocrity because it doesn't attack the core reasons why a given manufacturing operation isn't reaching its potential. Breaking out of that cycle needs to start by looking at MES as being an integral part of the broader business strategy of producing exceptional products at the highest quality levels possible. MES is powering new digital business models too, orchestrating supplier networks and production centers to deliver smart, connected products. DELMIAworks is defining MES as including planning & scheduling, production reporting including analytics & Business Intelligence (BI), Quality Management and Shop Floor Control System.

That Awkward Moment When You Realize 70% Of Factory Data Isn't Being Used

Legacy MES systems built and customized for mature products aren't scaling to support next-generation smart, connected products that are dominating global manufacturing. One needs to look at the exponential demand for voice-activated assistants including Apple Siri and Amazon Echo to see the crest of the coming digital wave of smart, connected products. MES systems and platforms need to be able to flex for this next generation of products now if manufacturers are going to be able to grow. In conversations with many of them, they're saying up to 70% of factory data isn't being used in their legacy MES systems for new products. That awkward moment often leads to a discussion of what factors need to be considered in selecting a new MES that can keep pace with next-generation smart, connected products.



The following twenty factors need to be considered when selecting an MES that will power growth, not just be a Band-Aid:

1. Domain expertise in your specific area of manufacturing is a must-have and insist on speaking with customers who are live.

There's no substitute for experience when it comes to any given MES providers' systems being able to meet the unique, complex needs of your specific area of manufacturing. Get beyond the PowerPoint slides stuffed full of logos and meet the companies relying on the MES to power their businesses today. Visit the manufacturers in your area running the MES systems you're interested and walk the production floor to see how the system is working out.

2. MES vendors vary on how well they understand new, emerging digital business models select one with a solid track record making them successful.

One lesson learned from visiting with many manufacturers running MES systems across their shop floors is that smart, connected products require an entirely different series of MES options and application customizations. Be sure to see how well any MES systems you're evaluating can flex to support smart, connected product production.

3. An analytics and BI series of applications that can quickly create new product and service taxonomies while being flexible enough to provide new metrics and KPIs.

MES vendors have in the past looked at analytics and BI as an afterthought, integrating into commonly used 3rd party reporting apps. Look for MES vendors who have analytics and BI applications that can scale for the massive amount of data manufacturing and IoT-enabled machinery and products produce. Forward-thinking MES vendors are providing support for Hadoop, MapReduce, and advanced machine learning algorithms to gain greater insights from massive datasets.

4. A broad base of data management options that can provide data to analytics and BI applications in real-time, enabling advanced reporting and predictive analytics.

MES systems in the past forced manufacturers into predefined and rigid data taxonomies that made support for complex new products a challenge. Look for an MES provider who can provide data management support at the platform level including integration APIs to enable legacy and 3rd party database support. All of these product areas need to be on the product and services roadmap of the MES vendors your company is the most interested in working with.

5. A proven integration technology stack and strategy that allows every manufacturer to scale production across the legacy supply chain, ERP, and CRM systems.

Cloud integration technologies need to be part of any MES vendors' integration technology stack as new digital business models require new suppliers, distribution channels and partners, and services providers. Look for an MES vendor who has delivered their technology stack to help manufacturers deliver smart, connected products or next generation IoT-enabled devices. As services and software revenue become more important to manufacturers, having a solid technology stack supporting MES systems is a must-have.

6. A must-have in any MES is the ability to expand the application suite to include new capabilities needed to support entirely new product lines and business models.

An MES needs to flex as your business grows. One of the best ways to make sure this happens is to ask for customer references who have successfully used integration strategies to expand the scale and scope of their MES applications. Ask to speak with customers who have successfully using APIs, SDKs or worked with 3rd party solutions providers to integrate new modules or applications into their MES application. Many vendors have software development kits (SDKs) that provide sample code and examples of product extensions that make expanding an existing MES more efficient. Nearly every MES vendor also has API libraries, and it's a good idea to speak with a customer who has used them to create a customized integration. Also look for database support that includes extensions to the database schema and support for customizing the user interface (UI). Manufacturers are finding they can increase adoption of an MES by more closely tailoring the user interface to the needs of those who most often use it.



7. Provides product component traceability, genealogy, and integration with process history, where required for regulatory compliance.

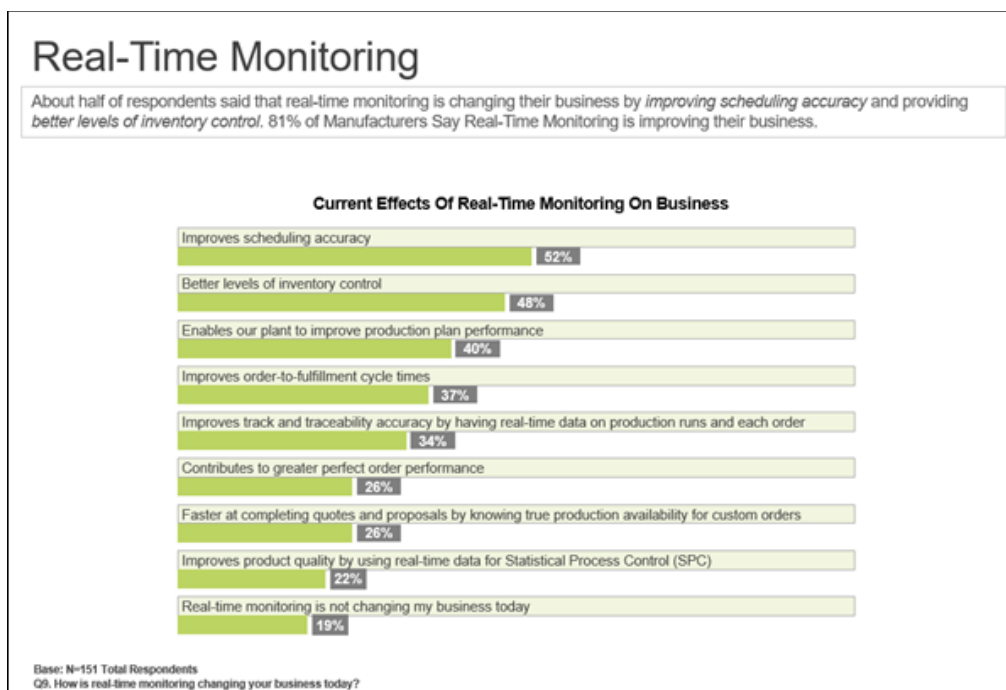
Any effective MES will be able to provide track-and-trace functionality, with those designed specifically for food & beverage, pharmaceuticals, and life sciences products have the most advanced track and traceability and product genealogy support as defined by government compliance requirements. Ask to see demonstrations of track and traceability, product genealogy and process history to see how well a given MES' application design fits with your company's specific needs.

8. Any MES available today needs to integrate with Supply Chain Management (SCM), Enterprise Resource Planning (ERP), and Customer Relationship Management (CRM) from the same database platform to enable faster revenue growth.

When an MES system shares the same database as the core applications, it relies on; manufacturers get a 360-degree, lifecycle-based view of product configurations. Manufacturers who are dominating the build-to-order, configure-to-order and engineer-to-order sectors of the manufacturing markets they serve are combining PLM, ERP, CRM, and MES to get a perfect view of product configurations as they progress from design to first customer delivery. Key to dominating any sector of the manufacturing market served is being able to flex fast and deliver customized product configurations before competitors can.

9. Proven expertise with automating data collection including real-time monitoring to the machine, plant floor and facility level.

Look for an MES vendor who can help you quickly progress away from the time-consuming tasks of manual data entry and progress to automated data acquisition using barcoding and Radio Frequency Identification (RFID). The most advanced MES vendors will be able to store data collected on a per machine, production line and plant level for use in more advanced analytics solutions including analyzing variations in production performance based on environmental factors and machinery condition. Look for the ability to provide exception driven and event-based alerts, prompts and automated data collection based on specific events and variation in workflows results DELMIAworks and TechValidate collaborated on a survey of 151 DELMIAworks customers and prospects interviewed in May 2018 and found that 81% of manufacturers say real-time monitoring is improving their business. Real-time monitoring is delivering the greatest contribution to revenue growth today in the areas of improving scheduling accuracy (52%), enabling better levels of inventory control (48%), enables plants to improve production plan performance (40%), and improve order-to-fulfillment cycle times (37%) and improving track and traceability accuracy by having real-time data on production runs for each order (34%).



10. An integrated quality management system designed to support a broad base of use cases, compliance and reporting requirements across production facilities.

Enabling greater control and visibility over compliance and quality is possible when an MES has a quality management module or system designed to flex and support as many use cases as possible. Every manufacturer will shift or modify their business model over time, and an effective quality management system will be able to flex and keep up with these shifts in business strategy. Look for vendors who at a minimum have integrated quality to manufacturing scheduling and execution all on the same platform. It's a great idea to ask if the MES and quality management system share the same code line as well, as that will be an indicator of how efficient the entire system operations. Production Management, support for inspection and quality procedures, Corrective Action/Preventative Action (CAPA), and nonconformance/corrective action (NC/CA) are essential.

Another aspect of an integrated quality management system you'll want to consider is how well the system can report beyond basic defects, and scrap reporting as every quality management module of an MES can do this today. Ask to see demos of Statistical Process Control (SPC) and Statistical Quality Control (SQC) reporting accessible both in the MES module and across all others as well. Advanced quality management systems are also able to define NC/CA workflows and quantify performance against plan. They're also able to initiate and track audit results across NC/CA and CAPA events and source data further providing insights into quality performance. The most advanced vendors also provide SPC analysis and integration directly to the quality management system. The most advanced MES quality management modules also can automate workflows and automatically detect non-conformances to quality standards and initiated recovery actions. Many that are designed for specific industries can track advanced product quality planning (APQP) and also production part approval process (PPAP), further enabling greater compliance to regulatory quality standards.

11. Look for an MES that provides support for managing production scheduling including rework routing and keeping all other ERP modules coordinated toward common production goals.

To do this, an MES needs to share the same database as all other ERP apps or modules to the data structure level. The most advanced MES applications that support production scheduling have automated factory control systems that are based on a real-time data feed of production asset availability, materials and production order updates. They also support fully automated scheduling from a predictive and prescriptive analytics framework and can also be configured to support real-time updates across manufacturing operations. The most advanced production scheduling applications also support end-to-end visibility across the shop floor and are configured to support real-time monitoring technologies including RFID and IoT sensors. At a minimum, any MES supporting production scheduling needs to include single-site basic sequencing based on a planning board, some form of integration of supply chain planning and management systems, and support for multisite execution and planning, with more advanced systems supporting optimization.



12. Tracking asset conditions is a requirement for any effective MES, and the most advanced ones are capable of also monitoring asset operating costs over time.

An MES needs to track asset conditions to determine the most optimal production workflow. Look for an MES that provides advanced alerts and notifications, while also providing the flexibility of asset performance metrics. Many include Overall Equipment Effectiveness (OEE), predictive forecasting and reliability-centered Maintenance. The most effective MES applications are integrated at the data model level, providing insights into asset conditions and their impact on overall financial performance.

13. When evaluating an MES, be sure also to consider how well the system can support maintenance management of equipment and tools.

An excellent MES will provide a module flexible enough to support maintenance orders, work orders while still keeping the maintenance schedules for machinery and tools organized. Look for maintenance management modules that also can create workflows that automatically generate maintenance orders to the machine level if needed. Maintenance and lower cost of ownership are becoming more essential to attaining profits in many manufacturing industries, so nearly all maintenance modules can track machine cycles and their relative costs, equipment performance and define preventative maintenance based on time intervals and usage data. Look for maintenance management applications to support extrapolation and prediction of maintenance schedules based on multi-attribute analysis using advanced analytics techniques as well.

14. Evaluate MES providers on their architectural maturity by evaluating how broad or narrow the integration scenarios they can support are.

The structure, speed, and scale of many MES implementations shift over time, forcing greater levels of integration with a 3rd party, legacy and homegrown systems. Architectural maturity is a key success factor that all MES applications and workflows you're evaluating the need to be compared on as it's future insurance the system will be usable if and when your business changes. The signs of strong architectural maturity include having a fully functioning, scalable services architecture that can flex to the specific needs of a business model as it changes. Also look for an MES that has an integration framework with a series of prepackaged or bundled solutions. The MES vendors who only offer an integrated framework or stand alone configuration tools need to be removed from your list of potential vendors.

15. At a minimum, any MES you're evaluating needs to support configurable workflows with the most fundamental ones supporting event handling and e-mail alerts.

All MES applications and suites support workflows, the question is how advanced they are and how well the fit how your business operates today. The most advanced workflow modules are tightly integrated into an MES and can be configured to manage vents and even orchestrate events across diverse, integrated systems. Don't settle for an MES that supports a few manual processes supports manual processes or can only track production events that generate the greatest variation in data trending and SPC analysis. The majority of MES applications support basic to intermediate process interlocking and conditional workflow branching, which is very useful when attempting to get an optimal production run completing with a limited set of machines or production assets.

16. Years of experience with production equipment and process automation systems integration and insight beyond Supervisory Control And Data Acquisition (SCADA) are key to ensuring the future of your MES system can deliver useful insights from the shop floor.

Integrating with production equipment and being adept at process automation system integration is a learned skill best learned through continual practice. All MES vendors will claim to support integration with basic, easily connected to measurement systems. That's great if you're going to keep your operations the same as they are today. For the majority of manufacturers, their business is changing fast, making the introduction of next-generation production equipment essential to their growth. You can find the MES vendors who excel in this aspect of systems performance by seeing if they have created API-based libraries of connectors for a wide spectrum of production equipment. All of the MES vendors today have a baseline series of applications that include support for SCADA. Get beyond that functionality to find the ones with deeper production equipment and process automation expertise.



17. Ask for an overview of the dominant or most common deployment scenarios for your industry or type of manufacturing and arrange visits to see how they are working.

It's worth the time to meet with manufacturers who are in comparable industries and see how the MES you're considering implementing is working for them today. Procurement and strategic sourcing at a major A&D manufacturer benchmark a series of vendors for every major software purchase and make a recommendation based on their criteria. The best site references reflect an MES' providers ability to sale and support a multisite production environment.

18. Labor Management is another factor to consider when selecting an MES, and the functionality needs to extend beyond use time and attendance tracking.

One of the differentiating elements in evaluating any MES is the availability of a signal database unifying every aspect of the application. Labor Management is an area that benefits from a single, unified database. The best MES applications also support certification and validation of training, so only the employees who have been properly trained on machinery and tools are completing work instructions. Labor Management also needs to track overtime by the specific manufacturing plant, region, and country. State-of-the-art MES is also supporting advanced labor management functions including Earned Value Management (EVM) a critical metric in all government contracting and project management workflows.

19. How extensive the partner ecosystem is for a given MES vendor shows their depth of industry expertise and the ability to successfully collaborate across the industry.

Look for MES vendors who have a solid track record of working with implementation partners and have enough experience on a given MES to be able to scale their implementation framework to your specific needs. Nearly all MES vendors have implementation partners, and a few have certification programs. The gold standard in this area is finding an MES vendor who has several certified partners with deep expertise integrating ERP, PLM, CAD, Pricing and SCM systems into a single unified IT strategy that enables business objectives to be accomplished.

20. How easily a given MES can be configured for international use is another key factor to consider as many can scale to support multicurrency and multilingual operations.

Selecting an MES that can scale to support multiple locations needs to start with localization fo screens and progress to currencies, units of measure and dialects within countries as well. The best MES applications provide configurable options for multi-language and multi-currency configuration and support changing workflows to more accurately match how a given foreign subsidiary needs to operate in their region.

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