BUYING A MANUFACTURING EXECUTION SYSTEM (MES) SOLUTION

BY MIKE LEROY

PAPER-LESS
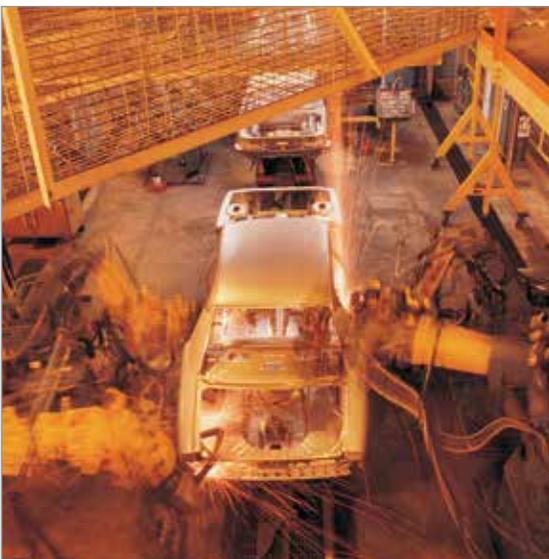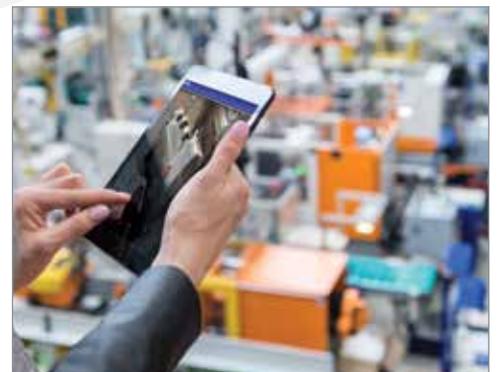
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OVERVIEW

Procuring an MES solution is difficult. There are several steps on the journey of choosing one.

1. Recognizing the opportunity and benefits an MES solution can have in your organization.

2. The process of defining requirements.

3. The process of evaluating and choosing a vendor.

4. The success in winning the endorsement of your peers and your superiors.

It is our belief that the last of these becomes the biggest impediment when trying to establish a new MES solution within an organization, and it is for that reason we wrote this e-book. Too often we see very good efforts of evaluation teams who are trying to act on true opportunities for process improvements wane due to the lack of proper preparation, positioning and sponsorship before the project began.

This e-book explores the influences that render the best evaluation efforts dead in the water in an attempt to enable the most enthusiastic MES project sponsors to succeed within their company.

Topics discussed include.....

• The Hurdles - like opposition, bias, confidence, consensus, budget and clutter in the industry.
• An explanation of THE DIFFERENCES in various MES products.
• The evolution of MES and how that might affect the attitudes of others.
• Understanding the business objectives and the goals of executive management.
• Knowing how the proposed solution serves management goals.
• Strive for enterprise efficiencies versus localized efficiencies
• Having fewer systems in place – whether they be automated or manual systems.

Our goal is to prepare an MES project sponsor for the typical pitfalls that are encountered in far too many new opportunities, and enabling their success. We also hope the e-book will bring focus on the importance of covering all the bases when initiating a project the magnitude of MES. There is far too much time invested and too little time available to invest in the project if it will not be approved in the end. Reading, accepting and internalizing what is shared and allowing it to affect your evaluation and buying process is critical to your success. We hope it makes that contribution for you.

VISION

INTRODUCTION

The opportunity to implement a comprehensive manufacturing execution (MES) begins and ends with you. Have you ever listened to someone justifying their endorsement of a product or service they want by touting its strengths versus competitive offerings, and then see those competitive products that were previously cast aside be enthusiastically sponsored by others? Some of this is "beauty is in the eye of the beholder" but the reality is that no matter what, the success of a project is dependent upon the enthusiasm and abilities of the primary sponsor to navigate toward the change they envision. Change starts with the person motivated for a change, and ends when that person:

1. Gets what they wanted
2. Decides against it
3. Simply gives up

But if we do not want for things, nothing changes. If there is no vision for something better, everything stays the same.

"The future ain't what it used to be."
Yogi Berra

Isn't that somewhat representative of each of us? Many of us seem to coast through each day accepting things as they are without initiating changes that may make a tremendously positive impact on our lives and the lives of those around us. But what if tomorrow could be better based on a change you made today? What if it could be easier, faster, more flexible or even more fun if we implemented this or that change? What if?

Well it all starts with a vision, and a vision that sets a course toward improvement. We can desire something, but if we don't go after it, it will never happen. The vision for a better way for the manufacturing floor needs the sponsorship of a leader within the organization who can embrace an ideal and align everyone to drive toward that ideal.

Recognizing we are a provider of MES software, we intend to keep our perspectives shared in this write-up as non-biased as possible, and hopefully you will see evidence of that as you read further. Also realize that our opinions are shaped predominantly through years of customer influences that educate and shape our thinking, versus just having wild ideas conjured up in our development lab.

VISION

It starts with a vision.

We need to find a system that can help us work better, smarter and faster. We need to gain efficiencies on the floor where the information we need from others, and the information we share with others, is exchanged with minimal imposition. Wouldn't it be ideal to find a system that aligned with the workflows within our company and made employees and processes more productive and our day to day lives easier?

We need to get away from all of these niche software solutions and manual spreadsheets keeping track of the same information. Wouldn't it be nice if we could find one system that could run the entire shop floor, like ERP runs the office?

Wouldn't it be great if we could implement a solution that helped us drive down waste, improve inventory turns and help delight our customers by increasing our on-time delivery performance?

"Don't let your ability to cope with the status quo overwhelm your desire to change it."
Mike LeRoy, Paper-Less

These and more are all appropriate business goals that shape a very fine vision for, ideally, how things could be. While it remains to be seen if there are systems that can do all that, isn't it fair to say you must set your goals at a high level and try to pull your results up to meet or exceed that goal?

Clearly fewer systems on the shop floor are better than more. In fact, the reason behind lean purists believing that software should not exist on the plant floor may be rooted in their experiences with shop floor systems where Access databases and Excel spreadsheets rule the world each serving the "silo'ed" needs of various departments or individuals. In time it becomes a nightmare and may indeed substantiate the call for less software if that is to be the result. But it does not have to be that way. There are comprehensive systems that overcome these issues and thereby have major roles and contributions to make on the factory floor.

That lean thinking is not new, but I do think their opinion is born from a dated perspective on manufacturing software. Modern MES software can help achieve those ideals. But you have to have the vision, and even to some degree, go against the grain of lean-thinkers, knowing there are solutions available that can enhance otherwise manual systems of lean through software and technology.

THE HURDLES

Time, cash flow, budget/access to funding, resource constraints, opposition, inexperience, lack of confidence, consensus, intimidation, bias and more are all typical hurdles to cross in the course of lobbying for a change of most any kind, particularly when it is for things that come at a relatively high cost and effects many areas of an organization. These cannot be ignored as they will impact your buying process dramatically at one point or another. The best response is being prepared.

Opposition
Let's just say you have room in your budget, and you are convinced you need to implement a better solution on the plant floor that affects process improvements in several departments in addition to your own, but your counterpart from another department does not share your vision. In fact, they really like what they are doing in their department and they are not willing to spend the energy to consider an alternative. Where will your initiative go under these circumstances? If they stand their ground on being on an island with their own tools they will not only impede the goals for your department, but for the company overall as well. Opponents are out there and we need to find a way to bring them on board if we are to succeed with our project.

> *"If you do what you've always done, you will get what you've always gotten."*
> *Anonymous*

Bias

Likewise you may find a product that is the best on the market and one that you know you can succeed with, only to find out the CEO is best friends with the VP or CEO of a company who has a competitive solution. Where will your initiative go under these circumstances?

Lack of Confidence

Confidence, or the lack of it, to launching significant projects is typically rooted in one's inexperience with getting a major initiative off the ground or discomfort with the budget numbers associated with their large projects. How ready are you to take forward a project that costs your company **$25,000?** Literally, going forward to management and asking for **$25,000?** How about **$250,000?** In the end they're all the same. It is just a

matter of what you are used to and as a result, comfortable with taking forward as a request. The "Shark Tank" television show illustrates that some people are comfortable making multi-million dollar decisions in short order. Where are you in your expenditure comfort zone? Much of the success of getting significant projects off the ground lies with the confidence of the person launching the initiative.

These examples sound silly in ways but they are the very real influences that impede progress and their ability to justify the purchase, regardless of size. If you cannot find a way to navigate the issues then your idea never gets off the ground and, in turn, nothing changes.

Tip: Consider building justification for your proposed project using case studies and testimonials from other companies achieving similar results that you'd like to see at your company. Most MES vendors will have those types of examples on their websites. Also, consider reviewing resources and advice from professional associations such as the Manufacturing Enterprise Solutions Association (MESA) or SME as well as analyst firms such as Frost & Sullivan, IDC or LNS.

Gaining Consensus

In the world of sales, inside sales reps and outside sales reps mean different things and suggest different roles for a similar job. But let's twist it a little further. Let's refer to the outside sales rep as the one who calls on you trying to peddle their product. But here is the twist – you, as the buyer, are the inside sales rep. The more you are convinced a product or service is the right choice to fulfill a vision that you have for your company the more you become the inside sales rep to now sell this idea/vision/product internally to your organization. Because of that, you need to be as savvy a sales rep as the person who is calling on you - arguably even more so.

We see many cases where the enthusiasm and interest emanates from one central point of contact. That contact can be brimming with excitement, and believe me, as a vendor we too then brim with excitement; however there is more work to be done. Our enthusiastic sponsor can be totally convinced of the need for our solution, but they may be a lone voice from an environment absolutely unwilling to change. Culture plays a huge role in the success of a decision the size of an MES selection and implementation. That very enthusiastic resource for this project may be up against a senior manager or other key resource who will simply not agree with the suggested change. These hurdles need to be known, and the sooner they are known, the better off the "Inside" and "Outside" sales reps will be.

This gets back to the vision. You need to embrace a vision for how your solution serves the business objectives of the company and be able to see how a change to the process or a change to the methods can enhance things such that it drives the business goals set by the executive team. With that understood you can then seek out tools to get the job done. But of equal, if not greater importance, would be seeking out other resources within your company as allies.

Launching an initiative the size of an MES project impacts many different areas across the manufacturing floor. The extent to which your ideas and enthusiasm for change are embraced by others will determine the ease or difficulty you will face going forward. Work hard to build relationships with other key organizational leaders and key influencers. Do not run from those who oppose your interests, but instead embrace them and try to find a way forward together. Help others to see things from an enterprise level versus their own department. Often it is not until they share an enterprise view that they will change their opinions and side with you. If they do not, it is a real threat to your personal and project success, and certainly whatever MES product you choose.

Budget

How often do we hear "it's not in the budget"? Does it imply that if it were in the budget we could proceed with a purchase? Is approval of spending actually made when suggested projects are put "into the budget", or when the time comes to actually make the purchase? And, if it is not in the budget, will we not buy?

Lack of budget is a peculiar topic. If there is true return on investment (ROI) it means the cost is already being incurred by funding the substandard methods and practices in place today. Think about that – you are already paying for it, so the sooner you act the sooner you can start saving. It's not like a coupon where you can save $5.00 on a meal if you spend $25.00. You are still spending $20.00 that you will never see again. On the other hand, coupon or not, if you could buy a new central air conditioning system for a home that costs $4,000, and the ROI analysis illustrates it will pay for itself in electricity and gas savings in 5 years, then I am already paying that $4,000 in increased utility bills in the meantime! So the sooner we act, the sooner we can start saving in that 6th year. Everyone is likely well aware of ROI, but just looking at it from another angle is interesting and it might encourage you to trudge forward as you endeavor a new MES, or any other improvement investment. If there are returns on investment, there is savings thereafter.

With that in mind, if there is true ROI, would that suggest your project will be approved? Absolutely not! Conversely, if there is a freeze on capital projects because of business constraints, does that mean your project will be shot down? Absolutely not!

Executives are faced with cash flow considerations every day. The most profitable companies still need to decide what bills get paid tomorrow and which projects will be approved; cash flow always seems to be an issue. But do you think for one minute that an executive will say no to a project you propose that offers substantial returns because they have previously put a freeze on all capital expenditures? Absolutely not! This means it is incumbent upon you to do your homework. If you want something, fight for it. If you truly have a good case, more often than not the executives will approve it regardless of publicized constraints or freezes.

> **"I think it is possible for ordinary people to choose to be extraordinary."**
> *Elon Musk, CEO of SpaceX*

MES Clutter
Now to add a new one, one of the biggest hurdles is the level of misunderstanding around what an MES is defined as. We face three scenarios typically when representing MES.

1. People do not know what MES is at all.

2. People think they know of what MES is but have a very dated understanding.

3. People know one type of MES system very well, but have little or no exposure to the others.

The importance of understanding this is for you as the internal champion to know what you are up against and who you are ultimately selling to. You need to know your audience. Where are they coming from? Will they even pay attention to what you are telling them when they themselves feel like they already know? Remember, people are not very good listeners. And even when they do pay attention, are they really connecting with the value you are trying to convey if they are predisposed to what they think before the conversation even begins. These presumptions can derail your efforts before you even get started. The best defense against this is to understand the people you will be selling to and help prepare them for what you will present.

Certainly a part of what lends to this problem of MES meaning different things to different people is simply the evolution of the industry.

What is a Manufacturing Execution System (MES)?
In the simplest of definitions, it is a system designed to enable performance improvements in a manufacturing environment through the acquisition and effective application of production data in a meaningful manner to the end user.

Other terms used to describe an MES type of system include Manufacturing Operations Management (MOM), Collaborative Product Management (CPM) and Production Operations Management (POM).

How MES Originated
The term was originally coined in 1990 by AMR Research, a major supply chain market research and advisory firm. In 2009, AMR was acquired by Gartner, a leading technology market research and advisory firm.

According to Gartner, Manufacturing Execution Systems manage, monitor and synchronize the execution of real-time, physical processes involved in transforming raw materials into intermediate and/or finished goods. They coordinate this execution of work orders with production scheduling and enterprise-level systems. MES applications also provide feedback on process performance, and support component- and material-level traceability, genealogy, and integration with process history, where required.

MES Has Evolved
Manufacturing companies seeking to gain greater visibility about production operations and workflows should consider MES. Early MES solutions were primarily data collection systems. Now, most MES systems have evolved to go well beyond data collection. The new MES solutions optimize communication and information flowing across the shop floor and the enterprise to support real-time or historical analysis of production operations and workflows for achieving production and business goals.
http://www.paperlessllc.com/production-intelligence-and-management-blog/mes-system

While we agree those are good definitions of MES systems, pursuing vendors can often illustrate how fragmented our industry and their product contributions can be versus the textbook definition.

Let's try to elaborate by sharing

1. ERP Centric
2. Procedure/Process Centric
3. Machine Centric

ERP Centric

MES was born out of the data collection era and those systems needed to feed ERP, hence the #1 above - ERP Centric. These were very burdensome systems for the plant floor. They were typically one directional data exchanges and served the needs of accountants, but not the needs of the plant floor personnel. In fact, they offered no value at all to the floor and imposed only burden for production workers and distracted them from getting product out the door. These systems were very ERP oriented and as a result, very transactional with little validation and often deployed in a means that batched the data together and forwarded it to ERP only once or twice a day. When an event occurred on the floor that effected ERP, it needed to be reported. And once that information was loaded into ERP it disappeared into a black hole.

Procedure/Process Centric

Another version of MES systems would be systems that are focused on the information and workflows of people and their processes as well as the information they generate or consume – Procedure/Process Centric systems. We believe these systems largely exist in manufacturing environments but in silos and therefore lend to the issue of having too many disparate systems resident on the plant floor. This works against our credo of having one robust solution for the plant floor like ERP is to the office. However these systems are improving their reach to become legitimate MES solutions, to the point where the acronym of MOM (Manufacturing Operations Management) emerged better representing these procedural based systems reaching into numerous areas of function within one application.
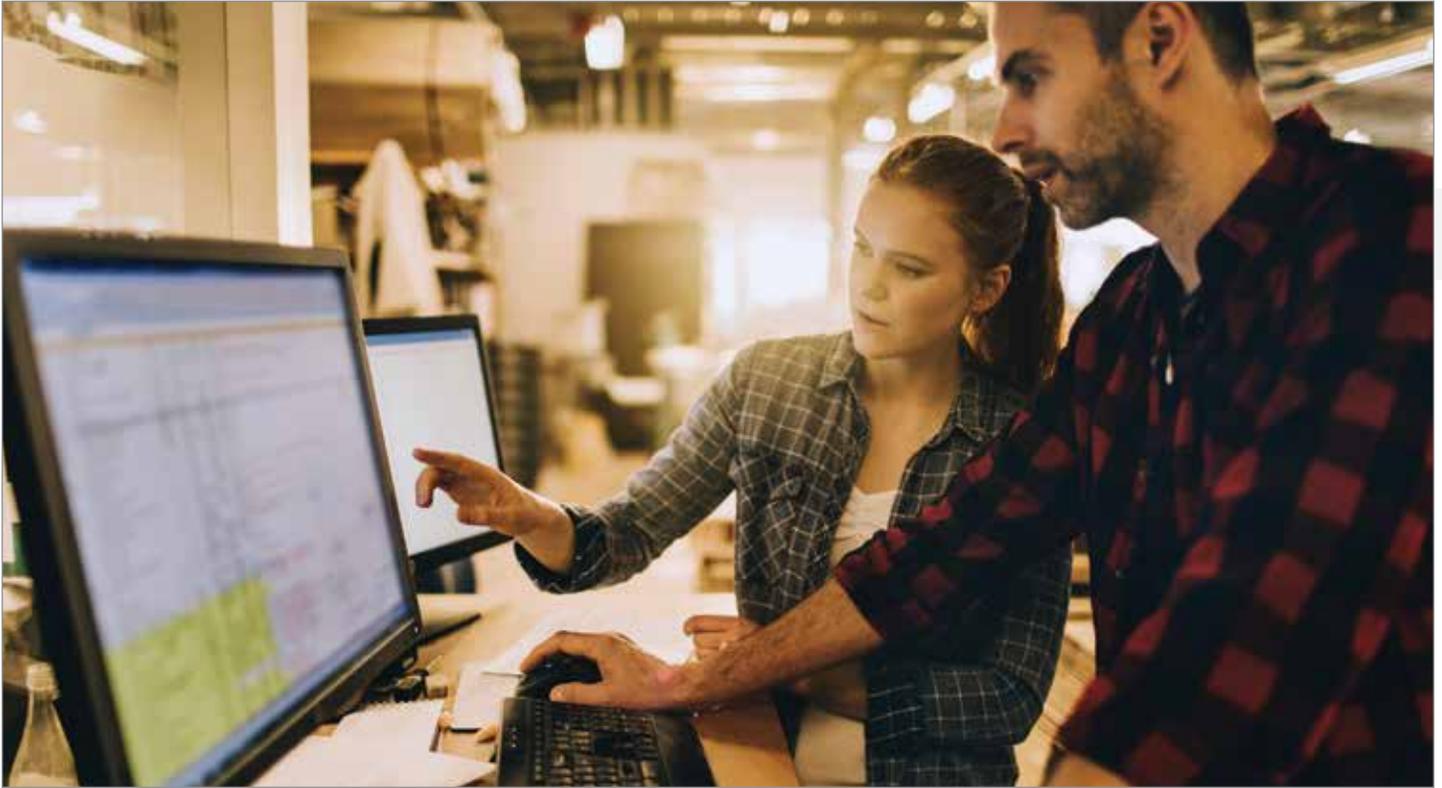
Machine Centric

This is perhaps the most typical perspective on MES and it involves MES systems that are oriented toward machine interfaces and process control – Machine Centric systems. These systems work well in many environments and are typically very statistically oriented toward machine performance and optimizing efficiency and utilization. These systems tend to operate on an island at least in terms of not being tied to the business systems and ERP. They typically benefit engineering, production management and maintenance departments. While vitally necessary in certain environments, they typically do little to help with the procedural aspects of plant floor needs.

When sponsoring an MES initiative in your company you need to understand, not only these different types of systems and their contributions, but how they apply to the needs you perceive for your company. Resolving this in advance of an evaluation can save you and the MES providers a lot of time. The alternative is going to the web, finding MES vendor candidates, inviting them in and learning where the cliché "this is like comparing apples and oranges" came from. Furthermore, you need to be prepared to address those who have a different understanding of the role of an MES system based on what is stated above.

According to industry analysts at Gartner and the manufacturing association called MESA, the biggest issue for businesses to overcome when implementing MES systems is having a proper understanding of the business requirements. Seems fundamental doesn't it? But at the same time it begs the question of how this can happen? We believe it is rooted in three root causes.

1. The MES industry being fragmented with vastly different solutions all under the umbrella of MES, thereby exposing customers to this variability.
2. The varied opinions within your organization of just what an MES is (as described above) can disrupt the project well into implementation.
3. Simply poor project management.

PERSPECTIVE

We used to say that outside of a physical move of your facilities, an ERP implementation effects more people in the organization than virtually any other company event. Modern MES systems or MOM systems that focus on "Procedure/Process" procedures and process flows may prove that statement wrong.

There are typically 3 or 5 times the number of people on the factory floor versus the office and unfortunately the reach of a typical ERP system stops at the door to the factory floor. So a comprehensive MES or MOM (Manufacturing Operations Management) system would instead be the most significant change for a company and its employees outside of a facilities move. Maybe the "E" in ERP, standing for "Enterprise", should be replace the "E" in MES since MES effects so much more of the enterprise.
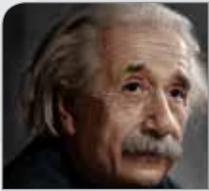
> *"The world as we have created it is a process of our thinking. It cannot be changed without changing our thinking".*
> Albert Einstein

THE OPPORTUNITY

So, what's the point? This is a big project that needs to be taken seriously. A comprehensive MES system can be a roadmap for process improvements within an organization for years to come. By that we mean that MES holds the opportunity to be a catalyst for wholesale change if the culture and leadership are able to embrace that change. This is a cultural thing. Some companies embrace and implement change well while others simply do not. Aberdeen ranks companies and their tendency to embrace technology as "Best in Class", "Industry Average", and "Laggards". With that in mind, it suggests the opportunity for success is largely rooted in the mindset of individuals and ultimately the culture of a company.

The more resistance to change your organization possesses, the larger the job becomes to implement change through MES. You need to understand the MES industry, the products available, and your company's mindset toward embracing change to implement true process improvements. Not having your arms around these issues and the means by which you will achieve your goals when you approach management with your vision

for MES will only result in disappointment. These influences are very real and the only way to prepare for them is to be informed and be able to express how the solution you are recommending can overcome the objections or obstacles that others may put in your way.

BUSINESS INFLUENCES AND EXECUTIVE MANAGEMENT

Executive management wants to deal with things that serve their overall business objectives. Do you know what they are? Your project may offer return on investment, it may improve processes and make life easier, but if it does not serve executive management's interest and business objectives, guess what? It will go nowhere despite your best efforts and intentions.

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Learn what executive management is striving to accomplish for the business. Learn what they require for consideration of new projects. If it is a Hurdle Rate – what is the bar? If it is ROI – what is the period of time for investments the size of yours. Will you need a Cost Benefit Analysis? If so, are you prepared? What do they consider to be valid justification and ultimately what do they require to approve the procurement of a new solution? Are you ready with those answers?

Have third party tools available that will help justify your perspective on going forward with an MES system. For example obtain factual representation of meaningful statistics from third parties like Price Waterhouse Coopers 2016 Global Industry 4.0 survey, "Industry 4.0: Building the Digital Enterprise," Companies

are anticipating significant gains from implementation of Industry 4.0 initiatives such as MES. On average, companies expect to reduce operational costs by 3.6% while increasing efficiency by 4.1% annually.

Be cognizant of the fact that you may have the perfect solution that fits their business objectives, holds ample ROI and meets their hurdle rates, but their current cash position may not allow them to bless your initiative. Knowing that the threat of cash constraints may loom out there, be prepared with alternative financing. Years ago no one would lease software, but they will today. Maybe more favorable payment terms are available from the vendor. In the end you need to be prepared to overcome the hurdles that stand in the way of achieving your vision.

A COMPREHENSIVE MES SYSTEM

When designing our software we follow the ideology that suggests fewer software solutions on the floor are better than more. As a result we encourage you to seek out systems that are far reaching across many areas of the factory. It will make the decision process more complex but it will set a direction for a standardized MES/MOM system improving all processes with a consistent look and feel and overall user experience, and as important, a single database repository of all manufacturing data.

LESS IS MORE

If you are a department leader, avoid the temptation to focus narrowly on your department for a best of breed solution. When that strategy is adopted by yourself and other department leaders it begins the downward spiral of disparate systems all attempting to track the same core business information. This inevitably creates redundancy of data and overhead, and at the same time introduces errors and non-value add time. While this approach may work for individual compartmentalized departmental needs, it is not good for the company.

Expect the same of software for the manufacturing floor as the office has for ERP. In other words, to the extent possible, seek software from one vendor that serves the needs of the factory floor. There was a day, not that long ago, that accounting systems were bought from one vendor, forecasting tools from another, estimating and planning tools from another, etc., but those days are gone and now we expect all of that from our ERP providers. That software matured and so have expectations of ERP, and now the same should be expected of MES. MES has matured, so much so that new acronyms are introduced like MOM and CPM (Collaborative Production Management) as they attempt to express how comprehensive and far reaching that software has become. Carrying a message to management that holds a vision to support Manufacturing 4.0 initiatives through consistent information and highly effective systems will go further than narrow sighted vertical solutions with a finite contribution.

Tip: Many companies have urgently implemented MES due to an imminent threat from the government, their customers or others requiring things like improved quality, FDA compliance or Nadcap certification. Those companies invariably say they really wish they had initiated the MES solution sooner. While there are many other great reasons to begin the process now, these are preventable scenarios. Ask your dissenters why they want to wait for some serious financial penalty or loss of important business?
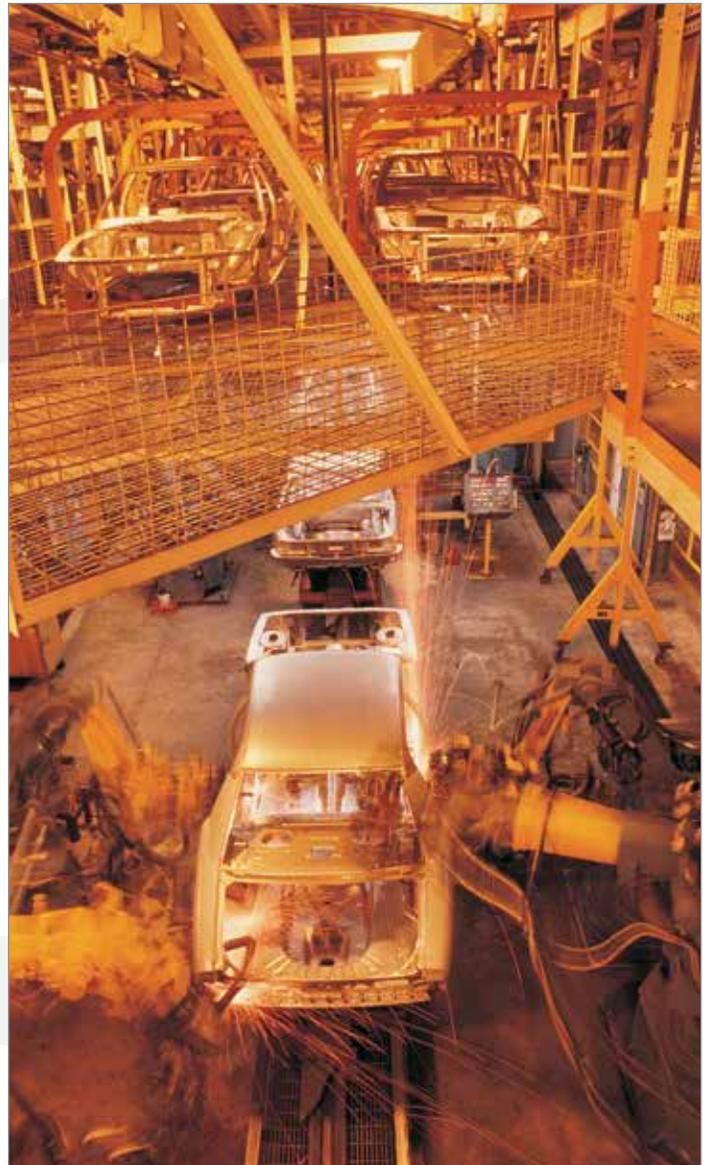
PAPER-LESS

PAPER-LESS

Paper-Less is a provider of MES software that serves to bridge the gap between ERP and the production floor by offering a solution that extends the business systems so there is a two-way flow of information between the office and production. Our solution is centered on supporting the workflow needs of production resources from material handling, receiving, inventory control, production and quality testing. Our product is highly configurable to meet the specific needs of our customer environments. We provide for extensive process improvements by facilitating better communications and improved monitoring of production activities thereby enabling the enterprise to be more responsive overall. Our philosophies are represented throughout this document. More importantly these beliefs guide our design and development activities.

Paper-Less MV2, our MES product, holds the potential to transform processes and create efficiencies within each and every one of our customers. Quite literally, in environments we fit well, the only missing ingredient for success with our MES products is the leadership, wisdom, experience and vision that come from within our customers, and their ability to focus on achieving their goals.

"If you don't like change, you're going to like irrelevance even less."
General Eric Shinseki,
Chief of Staff, U.S. Army

References and Resources:

Manufacturers: Resolve to Improve Business Performance with an MES System

Business Needs Solved By Using MES: By Business Problem, By Role, By Industry

Paper-Less ROI Worksheet

MES Success Stories

Manufacturing Professional Associations:

American Welding Society (AWS)

Fabricators and Manufacturers Association, International (FMA)

Manufacturing Enterprise Solutions Association (MESA)

Precision Metalforming Association (PMA)

SME

Manufacturing Technology Analysts and Associated Organizations:

Frost & Sullivan Manufacturing Leadership Council

Gartner

IDC Manufacturing Insights

LNS Research

Manufacturing Execution System (MES) and Industry 4.0 Reports:

IDC MES Report Excerpt

Price Waterhouse MES Report "Industry 4.0: Building the Digital Enterprise"
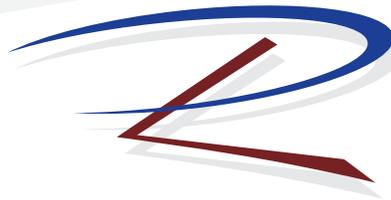
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MANUFACTURING EXCELLENCE THROUGH SOFTWARE

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