Expert Advice on Flexible and Inexpensive Approaches to Adding Capacity

IQMS
Manufacturing ERP

Mint Jutras

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An upturn in the economy has brought a welcome increase in manufacturing demand. And while optimistic about the future of the manufacturing industry, many companies are exercising caution when it comes to expansion. This prudent attitude has prompted many to ask: How can I grow capacity without adding floor space, equipment or personnel? IQMS has been collaborating with its customers to solve this familiar question for years and recently had the opportunity to discuss this issue with industry expert, Cindy Jutras, president of research and advisory firm, Mint Jutras.

IQMS: There are two common routes manufacturers can take when faced with a surge in demand. The first is to maintain status quo with current business processes and operations, while adding new work centers, employees and square footage to handle the increase. The alternate route is to ramp up all existing resources as efficiently as possible first, prior to expanding.

Cindy: Well you certainly can't do it through management by walking around. You need the right software and technology. Manufacturing has benefited tremendously from plant automation. Now we need to bring the same level of automation to managing and scheduling the manufacturing process. For that you need a comprehensive Enterprise Resource Planning (ERP) system suited to manufacturing and a Manufacturing Execution System (MES). Preferably those two solutions are tightly integrated.

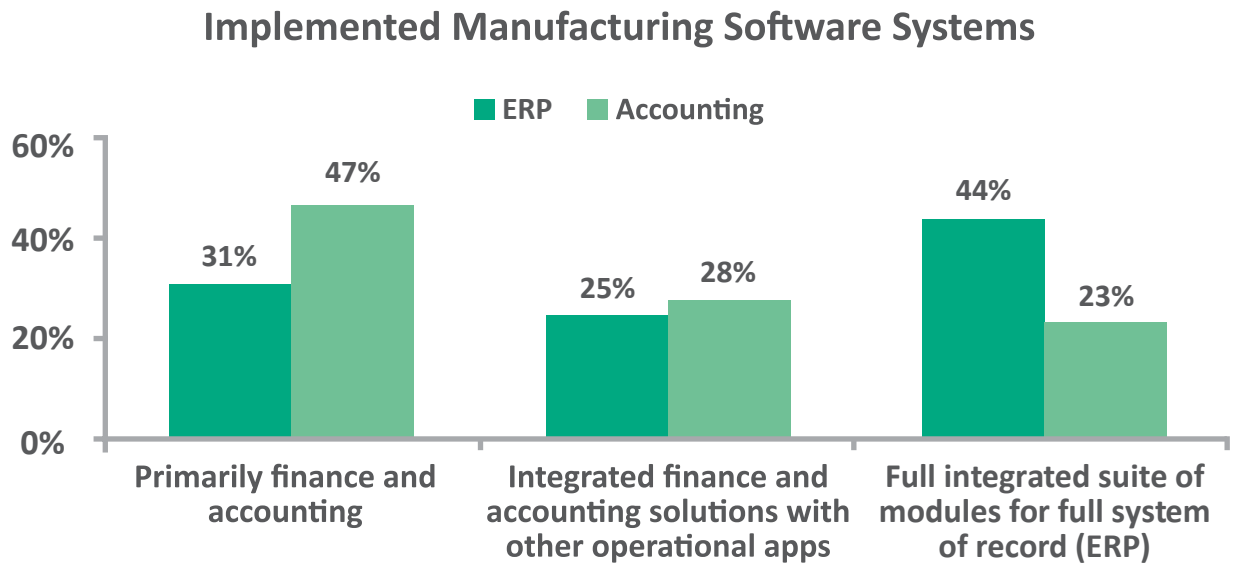
IQMS: We completely agree. We call that type of ERP solution "comprehensive" and we have found that there are not a lot of end-to-end ERP solutions like ours on the market today.

Cindy: Right. Not every ERP solution has what it takes to meet the needs of manufacturing, and not every ERP solution vendor also offers an embedded MES. While integration of third-party programs into a core ERP system can work, it is fraught with challenges such as duplicate data and data entry, information delays and silos, interface issues and customization expense. The key to increasing capacity is to have an end-to-end solution that covers every aspect of your business, from ERP to MES, material requirements planning (MRP), financials, order management, warehouse management (WMS), customer relationship management (CRM) and more. An end-to-end, fully integrated solution is what makes every aspect of your business transparent, traceable and efficient.

Where Can I Experience the Greatest Capacity Increase First?

IQMS: So if you are looking to add capacity without adding more people, equipment, work centers or facilities, where would you recommend a manufacturer start?

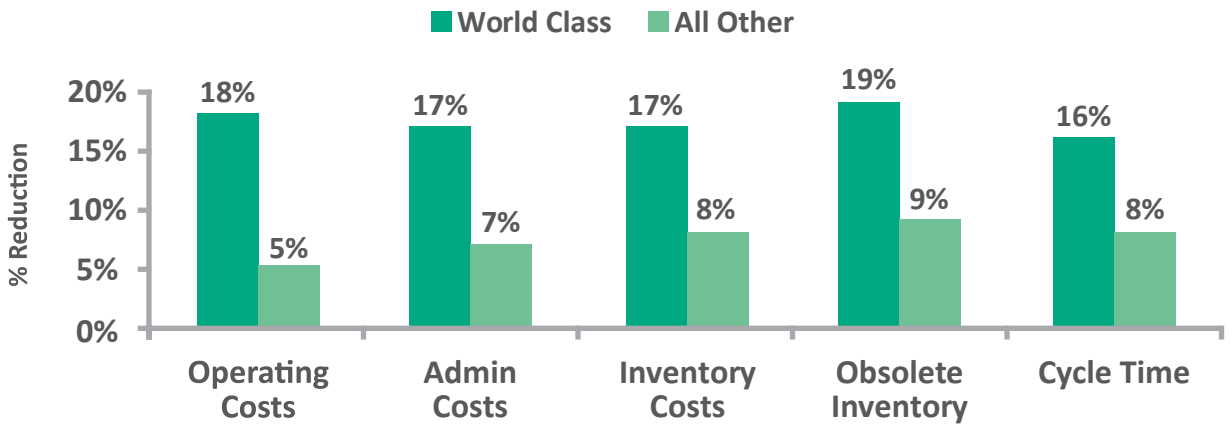
Cindy: A lot depends on where you are today. My (survey-based) research indicates there are a lot of incomplete software solutions installed in manufacturing plants today. The very first question in our Enterprise Solution Study this year asked how the respondent would characterize the software that runs their business. We later asked which software package they were using. Some of these solutions are marketed as "ERP" and others simply as accounting solutions. We split the responses based on that in the figure below and found that less than half of those that actually bought an ERP solution are even using it as a fully integrated suite of modules that provides the system of record of their business, which happens to be my definition of ERP.



And making matters worse, many of them are based on outdated technology and lack the full functionality we're talking about here. If you are not running your operations on a modern, technology-enabled, fully functional ERP solution, you are probably feeling the pain of inefficiencies and you are not optimizing your business. If you think things aren't that bad, you are probably fooling yourself and falling into the trap of complacency. Before you can take full advantage of the capacity you have, you need to fix that.

My data shows that the average increase in production output after implementing a comprehensive ERP is 9 percent. A "World Class" ERP implementation increases production output by an average of 19 percent. And this is not at the expense of rising inventory levels. Inventory value, obsolete inventory and cycle times also shrink (see next page). There is generally some low hanging fruit to be harvested just from automating the material planning and scheduling processes. But this doesn't necessarily lead to 100 percent utilization and an increase in capacity.

Cost Reductions After Implementing Comprehensive ERP



IQMS: So let's say you do have a comprehensive ERP and MES solution, and also some level of plant automation. Where is your most immediate ROI? For our manufacturers, it is often found in the process monitoring package within our ERP.

Cindy: Well the most immediate ROI would definitely be sitting on your shop floor, where the capacity is actually consumed. With a process monitoring module that allows you to link directly to work centers and high value production equipment through programmable logic controllers (PLCs) and sensors to collect process data and compare against set thresholds and parameters, you are able see in real time how you are performing and producing.

World Class ERP Performance

Mint Jutras defines World Class in the context of an ERP implementation. We use a composite metric that includes:

- ✔ Actual measured results experienced since implementation
- ✔ Progress made in achieving company specific goals
- ✔ Current performance in selected KPIs

The top 20% of survey respondents comprise "World Class." The remaining 80% are referenced as "All Others."

Are you meeting requirements for quality and specifications? If not, you can immediately shut down processes in real time, before you waste capacity making product that will require scrap or rework.

And are you meeting production standards? Exceeding them? Over a very short period of time this can lead to refinement of these standards and far more accurate schedules. But in order for this process monitoring to translate to increased capacity, you need to relay that data immediately to your ERP solution for analysis. You need to make your ERP solution an active participant in the manufacturing process. Unfortunately, it is not safe to assume that every ERP solution has a process monitoring module, which is why I recommend the comprehensive ERP solution we discussed above.

IQMS: Our customers say that you can't hide from real-time process monitoring! It always exposes the truth about what is actually happening on your shop floor as it occurs.

Let's explore the value of this increased transparency a little further. Not only can process monitoring collect and store this data in real time, but it also allows manufacturers to monitor the processes remotely. What implications do you see this having on capacity?

Cindy: Well the most obvious impact is on the staff needed to watch over automated operations. Given the skills shortage many manufacturers are experiencing today, this is a significant benefit that should not be overlooked. With process monitoring solutions, typically you don't need to physically have dedicated eyes on the process at all times. Nobody likes the idea of eliminating jobs, but if you are hoping to increase capacity, everybody likes the idea of doing that without having to increase staffing levels or having to replace skilled Baby Boomers as they retire. Where one operator per machine might have been required before, by implementing process monitoring, you might be able to have a single operator overseeing the production on several machines.

With process monitoring you can:

- Collect every important variable that relates to production: Temperature, pressure, dimensions, weight, thickness, fill rate and more
- Utilize this data in real time to ensure part quality and avoid unscheduled downtime
- Catch and respond to rejects and parts trending out of specification as they occur, not hours later when you receive a production report or batch upload
- Use that collected to data auto-populate statistical process control (SPC) tools for accurate analysis and improved decision making – even better if SPC is a module of your ERP solution
- Track whether a job is running too fast or too slow, then review your standards and adjust your upcoming jobs on the schedule accordingly
- Increase accountability throughout the organization. Unscheduled downtime, employee labor, parts produced and more are fully tracked as they are occurring

IQMS: Yes, we know of one successful manufacturer that uses our process monitoring module to run its work centers in cells, with six machines to each cell. Rather than have six operators, one for each machine, the manufacturer uses the software to employ only one skilled worker to supervise all six of the machines in each cell. With automatic alerts that tell him if the job is having difficulty or parts are trending out of specification, the traditional model of one operator per work center is no longer required.

But, what about creating a second (or third) shift if demand continues to increase? Without

an automated tracking and monitoring system, an additional shift is very likely to suffer from a shortage of senior staff members. You can either have fewer eyes on the floor or have less experienced employees working the shift. Neither is ideal. But with automated tracking and monitoring, you can be more comfortable adding more hours with the same number of supervisory employees.

Cindy: I would agree in principle, but for this to be sustainable, the manufacturing processes being monitored have to be very stable and someone needs to be on call to deal with a problem as it arises. Supervisors either need to be passively monitoring from afar, or be alerted when something goes wrong. This will only be sustainable if this monitoring is not too intrusive. To be less invasive (into their personal lives), this will require some modern technology including:

One successful manufacturer in Germantown, Wisconsin uses its process monitoring module to run a completely lights out manufacturing facility 24/7. From the central material handling system to the automated box conveyor system, all parts are run without human interaction. This lights out facility is only achievable with a comprehensive ERP system that allows the manufacturing staff to monitor and schedule all production from an off-site facility. Thanks to automatic alerts customized to trigger when certain parameters are not met, the employees know immediately if something is wrong.

- A web-enabled interface to the process monitoring solution itself or a series of dashboards layered on top. Fortunately, according to my research, the majority (87 percent) of ERP solutions in place today have either some or all functions web-enabled.
- Alerts delivered automatically to mobile devices. These on-call supervisors can't be tied to a laptop during their off hours. Unfortunately, only 29 percent of manufacturers today are able to get alerts on mobile devices that are automatically generated. Another 22 percent can receive these alerts that are manually generated, but this does little for you unless you have staff on site to create and send those alerts.

IQMS: We have come to the same conclusions, Cindy, and our manufacturers rely heavily on our mobile applications and activity monitoring alerts to accomplish what you suggest above.

Other Areas in the Software That Increase Capacity to Meet Increased Demand:

IQMS: After process monitoring, what are some other tools do you recommend for increasing capacity? The first that comes to our mind is finite scheduling.

Cindy: Agreed. Traditionally shop orders are suggested and released from MRP, which assumes infinite capacity. Work centers and machines that are over-scheduled are dealt with on an exception basis. When this happens on a regular basis, which often happens when companies

shift into growth mode, planners and schedulers start to pad schedules, which sends utilization heading in the wrong direction. Schedules created based on actual capacity will of course be far more accurate.

Also look for tools that automatically analyze which operators and work centers are the most efficient in order to answer the question: Of all your tools, people and machines, which ones run the best for this particular job? Adding this level of intelligence to the dispatch process allows you to "smart load" your work centers based on historical performance data, ensuring that you are optimally using your assets.

IQMS: We don't just recommend running on the most optimal equipment, but also running the most optimal order size.

Cindy: Yes, of course the concept behind MRP is to create orders to match actual and forecasted demand, but today MRP should also be able to create ideal production order batch quantities through minimum and maximum run sizes, designated multiples and time fences to eliminate unnecessary teardowns and resets. The goal is to optimize production runs without forcing you to carry excess finished or semi-finished goods inventory.

IQMS: Now that you have raised the issue of inventory, we have found that in order to ensure that you have the right components and materials "just in time," you need process-specific functionality built into your Bills of Materials (BOMs). Generic BOMs just don't cut it when maximizing efficiency and accuracy.

"Of all your tools, people and machines, which ones run the best for this particular job?"

Cindy: Well certainly you have to be able to specify where in the manufacturing process the materials are consumed. ERP solutions need to link the components in a BOM to a step in the routing. Accurate, process-specific BOMs allow the automated schedulers to do their jobs correctly, delivering the right material to the right work center, just as it is needed. This is a feature that has been around for years, but if you are evaluating solutions, don't simply assume it exists. For years, MRP solutions handled this with an approximation of component offset lead-time. We can achieve a much higher level of accuracy today with materials linked directly to the point of consumption. You don't want to be wasting capacity waiting for materials nor do you want to inflate inventory.

Also make sure the BOMs and routings and your solution in general support your production methodologies. Gone are the days when all production was managed through discrete work

orders. In fact our research finds a broad mix of production methodologies in place today, including continuous processing, pull-based repetitive build schedules, discrete or batch work orders, project-based orders or any combination of the above. The BOM structures in some manufacturing ERP solutions work great if you make widgets using discrete work orders, but not so great when you produce by weight, length or pieces or through continuous or batch production.

IQMS: Multi-level BOMs with routings have always been a strength at IQMS, with routings that go beyond the usual setup and run times. By displaying equipment and labor requirements and allowing the flexibility to schedule processes that are work center, assembly line, application based or a combination of many types, our manufacturers are able to diversify their operations as needed to remain competitive.

Managing Changes

IQMS: In real life, change is simply a fact. A common cause of job resets and rescheduling of production orders occur because of delays in communicating the change in an order to the shop floor. How does change impact utilization, and in turn, available capacity?

Cindy: The secret to success here is in automating and digitizing that communication. Electronic Data Interchange (EDI) has become an almost universal means of communication. Through EDI, you gain accurate, up-to-the-minute order accuracy.

IQMS: The key here is to use the EDI program that is native to your ERP solution. With embedded EDI (rather than a third-party package), you automatically and immediately know about the change. Did a change in deliverables, quantity or due dates just come in? Your ERP solution can check for changes every hour or every minute, automatically, based on your operational needs. Changes that impact orders yet to be released can happen automatically. Those that impact work in progress can trigger alerts for exception management.

"Electronic Data Interchange (EDI) has become an almost universal means of communication"

Dealing with Downtime

IQMS: Finally, in order to maximize and optimize capacity, you would need to minimize downtime. How do you typically see ERP and MES help here?

Cindy: Actually this brings us full circle back to the shop floor and process monitoring. First, automatically gather usage data and track where the tool or equipment is used throughout your shop floor. Then, set up automatic alerts that remind you of upcoming and pending

maintenance, generate work orders and schedule labor and materials for planned maintenance when you have the parts and bandwidth to take the machine offline. This approach lets ERP handle maintenance, repair and overhaul (MRO) parts the same way it handles direct materials. With additional features such as repair documentation linked to the work order and maintenance cost tracking and visibility, your ERP solution can help you avoid costly unscheduled downtime and maximize equipment utilization.

Conclusion

A need to increase capacity is a good problem for any manufacturer to have. But rather than investing in new personnel, machines and floor space to handle the boost, manufacturers should first consider if automating their plants to 100 percent capacity isn't a less expensive and more flexible approach to adding capacity.

The key to truly maximizing your output is with a comprehensive ERP and MES solution. Only with the ability to trace and track every aspect of your business from quote to invoice will a manufacturer be able to achieve the competitive advantage they seek.

About Cindy:

Cindy Jutras is a widely recognized expert in analyzing the impact of enterprise applications on business performance. Utilizing more than 40 years of corporate experience and specific expertise in manufacturing, supply chain, customer service and business performance management, Cindy has spent the past 9-plus years benchmarking the performance of software solutions in the context of the business benefits of technology. In 2011, Cindy founded Mint Jutras LLC (www.mintjutras.com), specializing in analyzing and communicating the business value enterprise applications bring to the enterprise.

About IQMS:

For more than 25 years, IQMS has been designing and developing manufacturing ERP software for the repetitive, process and discrete industries. Today, IQMS provides a comprehensive real-time ERP software and MES solution to the automotive, medical, packaging, consumer goods and other manufacturing markets. The innovative, extended single-database enterprise software solution offers a scalable system designed to adeptly grow with the client and complete business functionality, including accounting, quality control, supply chain, shop floor, WMS, CRM and business. With offices across North America, Europe and Asia, IQMS serves manufacturers around the world. For more information, please visit www.iqms.com.