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Manufacturing Technologies Plants Need Now to Keep Up with COVID-19 and Beyond

Visibility, variability, and velocity have always been important to manufacturing success—but never more so than in the current moment. The opportunity for digital technologies to improve all three are immense—but many mid-market manufacturers are too timid rather than too daring. Get started by adopting readily available technologies that will easily and rapidly translate into greater profitability and resiliency without dreaded disruption and downtime.

Key Takeaways:

• Don't wait for the next crisis to examine your data and technologies. Regardless of your budget, you can make improvements now.

• Start with the low-hanging fruit of managing data you are collecting now—or could be quickly, without a major investment.

• Training and cross-training are critical areas for continuity and can be improved with current technologies.

A crisis has a way of showing what people and organisations are really made of. For manufacturers, the myriad supply chain, labor, and operational disruptions of the COVID-19 crisis have revealed both strengths and weaknesses. Those who have invested in efficiency and organisational agility are weathering the storm better. Others are seeing more clearly their limitations in addressing three key challenges of modern manufacturing:

Visibility
The ability to see what is going on in your business.

Variability
The ability to cope with change in supply, demand, and other variables in the market and your own operations.

Velocity
Speed in all its forms, from the ability to respond quickly to the speed of production to meet demand.

The opportunities for digital technologies to improve all three are immense, but not everyone takes advantage of them. Midsize manufacturers, in particular, tend to shy away from investments that require big budgets and great technical sophistication.

Yet by letting themselves be intimidated by the prospect of large and costly initiatives, too many manufacturers overlook more basic steps and readily available technologies they can take to address visibility, variability, and velocity – and translate them into greater profitability and resiliency. Most are not optimising the data they already have or could reasonably obtain.

More ambitious strategies are not necessarily out of reach, either. Technologies such as predictive analytics and artificial intelligence applied to analysing operational efficiency are becoming steadily more accessible and affordable as they are packaged into products. There may be more intelligence than you realise embedded in your existing production control equipment.

Why Visibility, Variability, and Velocity Are So Important Now

Visibility, variability, and velocity are always important to manufacturing success – but never more so than in the current moment. In the midst of the pandemic, visibility has been challenging, variability has been extreme, and velocity has been more important than ever.

Think of all the ways your manufacturing environment has been forced to think and operate differently. One example: For safety reasons, people must be able to do many things remotely that used to be done face-to-face. This includes everything from managing the daily huddle to monitoring operations and identifying, escalating, and troubleshooting problems as they emerge.

In the best case, organisations had the right digital tools in place and needed to ramp up their use. But even organisations that undertook hurried implementations and upgrades to meet current obligations can benefit from the experience if they put in place the technologies and processes that will pay off for the long term.

Meanwhile, as we write this, we still don't know if the current crisis is coming to an end or whether another will be right behind it. Now is the time to plan for business resiliency, knowing that even outside times of crisis the need for these capabilities will remain.

1. Visibility

Visibility is the key to <u>understanding your post-pandemic demand curve</u> and being able to match your production activities against it. You want to identify abnormalities, which may be indicators of future variability in supply, demand, and operational efficiency.

Many manufacturers lack the right data on supply, demand, and operational efficiency—or don't get it with the right frequency. These are not new problems, but they are glaringly obvious now.

Smart use of technology can help you get the fundamental, basic data you need for better visibility in three critical areas.

VISIBILITY INTO SUPPLY AND SUPPLIERS

No modern manufacturer operates in isolation. The quality of your results depends heavily on picking the right suppliers and understanding their operations almost as well as your own. You need visibility into capacity, inventory, job status, and shipment status. If a supplier makes parts to order, you don't want to wait until those parts have shipped to project when they will arrive. You need insight into your supplier's manufacturing processes that will alert you if production has been delayed, or is at risk of being delayed, so that you know the impact on your processes and react accordingly.

The best suppliers will grant that access if you share data about your demand for their products. That leaves the challenge of accomplishing the data exchange and, even more important, using the data effectively.

Supply chain data exchange is not a new problem and can be accomplished with techniques ranging from Electronic Data Interchange (EDI), an older but still important technology, or supplier portals and web APIs.

Again, the most important thing is not obtaining the data but using it productively. A simple dashboard created with business intelligence tools would be a good start. The trick is to make sure someone who understands the data is consulting that dashboard regularly and turning it into actionable information. That means making decisions or advising the right decision makers of what the data says. The next level up is to apply predictive analytics to translate what the data says and the changes you can anticipate.

VISIBILITY INTO CUSTOMERS AND DEMAND

The twin of supply chain visibility is demand chain visibility. In a consumer products business, it includes access to data from point of sales systems and other market data from vendors such as Nielsen and IRI. In B2B, it means monitoring inbound orders and seeking the best intelligence on future orders.

In either case, you want to get real-time data as much as possible so you can identify abnormalities quickly – changes in demand that are outside the norm, either in timing or quantity. You don't want to ramp up production just as supply is about to collapse.

Again, you might have this data already but may not be making the best use of it. You certainly have the orders from your customers. Mining that data for patterns is an excellent start. From there, you can gather more timely and richer data, as well as applying more sophisticated analytics.

VISIBILITY INTO INTERNAL CAPACITY AND PRODUCTION CAPABILITIES

A blind spot for many organisations is analysis of their own operations. Even those keeping a close watch on supply and demand do not always do a good job of measuring how capable they are of responding to changes in supply and demand. That means achieving visibility into labor, equipment, processes, and flows.

Visibility into people: Keep an eye on factors such as absenteeism, productivity, and attention to quality. You need an inventory of skills and who has them, as well as an understanding of training programs.

For example, if absenteeism is surging, does that mean your facility is turning into a coronavirus hotspot? Is it a warning of a morale problem? If several of your most skilled people are out sick, how difficult will it be to replace those people? You must know the answers.

Visibility into equipment: Understand how you measure up against the standard of Overall Equipment Effectiveness, or OEE, including the performance and availability of equipment versus benchmarks. Improving OEE by even 1% can be worth hundreds of thousands of dollars.

This visibility is more available than ever before, thanks to Industrial Internet of Things (IIoT) technologies, but you still must make the effort to get the data and apply it to improving your operations. Find out what additional data you can squeeze out of PLC controllers and other factory floor devices that would be valuable for improving performance.

Visibility into material: Know exactly what is available at each stage of the manufacturing process, including what has been turned into scrap. Figure out what can be tracked with bar codes or RFID tags, as well as what data must be entered manually – or extrapolated from fragmentary data.

2. Variability

Reducing variability and promoting consistency in your operations is important to reducing costs and improving efficiency. The more you can feed consistent inputs into your operations the more you can optimise for a steady output. Some consumer products companies report stumbling into greater profitability because COVID-related disruptions forced them to narrow production to their core products. By reducing complexity, they reduced variation, and drove velocity back into the business.

Yet some variables will never be under your control, and one thing this year has taught us is how many things can change, and how quickly it can happen. In many cases, the magnitude of variability isn't necessarily increasing, but change is happening more frequently. Swings of +/-10% that might have taken place over two weeks are now happening daily.

Variability can exist in supply, demand, and within your own capabilities—think of the impacts of restricted travel, infection hot spots, quarantine orders being imposed or lifted, social distancing requirements, and the need to adjust factory shifts.

Once you have visibility, you can rely on several technologies to manage through the variability of your operations:

ANALYTICS: Go beyond manual spreadsheet analysis to software with the embedded intelligence to understand manufacturing data, with visualisation and pattern recognition algorithms that help you identify trends, warning signs, and opportunities. Configure ongoing monitoring and alerts for supply chain vulnerabilities so decision makers can respond to potential problems as proactively as possible. Sisense and **Dploy Solutions** are possible technologies.

MODELING AND SIMULATION: Understand the likely results of operational decisions before you commit to them. Computer modeling and simulation can help you game out a scenario, for example, the effect of rebalancing work across facilities or shifts, altering delivery patterns, or distributing inventory differently. Technologies in this category we have recommended include Simul8, Simio, Riverlogic, Arena, and AviX.

For example, a manufactured buildings firm had organised its operations around producing products as close to its customers as possible, believing that transportation costs were the key driver to velocity. Through simulation, we showed that they were controlling for the wrong variable – that they would be better off filling the capacity of their lowest cost plant

first, regardless of location. Making that change increased operating profit from 4% to more than 12% in a year. Building on that experience, they are modeling other big decisions to improve their results.

MANAGEMENT SYSTEMS: Promote safety and productivity at the same time. Digital management systems such as Dploy Solutions not only help you model scenarios and the impact of changes but track what happens once decisions have been made. For superior results, keep refining your strategy based on data and analytics.

In addition to tracking productivity, manufacturers are being challenged to adjust factory operations for social distancing to prevent the spread of the coronavirus. Meanwhile, they are exploring what jobs can be done at a distance and capabilities for remote supervision and productivity tracking. Seek a digital management system that can help you with these challenges as well.

DIGITAL TRAINING: Build organisational capability and resiliency by broadening access to training, either just-in-time for a current need or in anticipation of future requirements.

Many manufacturers have lost trained personnel to illness or been unable to rehire those laid off at the peak of the COVID-19 crisis. This has heightened awareness of the need to understand and develop talent pools across the organisation. With the right cross-training, workers can fill in for others as needed. At the same time, regulatory and practical safety requirements mean many policies have changed and employees must be retrained for new standard operating procedures yet delivering that training has become more difficult.

Readily available digital tools make delivering new training easier. One building supplies manufacturer filled skills gaps on its production line initially with intensive in-person training. Then it turned video recordings of those classes into a course that could be offered online, making it possible to offer the same training at scale and with consistency of instruction. An industrial metal products company did something similar, creating its own welding school by integrating digital training tools.

Combine video with artificial intelligence technologies, and you get something like **Drishti's** factory video analytics, which you can think of as a souped up time-and-motion study of the manual steps in any production process. With this technology, you can offer more precise instructions while improving procedures. Personnel learn the best way to do the new task. **AviX** does something similar for both manual procedures and machine efficiency. We mention these options not because they are the only solutions you might consider but to give you a sense of what's possible.

3. Velocity

In part, velocity is the payoff from taking control of the other two major factors we have been discussing, visibility and variability. At the same time, velocity cannot wait until the end. You must have velocity in the way you gain visibility – gather data too slowly, and you won't be able to act in a timely manner. You want to get visibility within hours, not days.

Meanwhile, your response to variability must have velocity of its own so that the adjustments you make are timely. Ultimately, the velocity we most desire is the speed with which we can deliver the right products, at the right time, to the right places. Choose technologies that let you do everything faster, from understanding real-time demand, supply, and capacity, to fulfilling orders, and to converting orders to cash.

When you have visibility and understand your variability, you can move faster. You can increase availability, do more formal problem solving, and find solutions much more quickly. Knowing manufacturing productivity metrics like OEE lets you improve them, which keeps production lines moving and translates into velocity across the organisation.

Choosing the right technology solutions to enable this velocity will separate the winners from the losers. The technologies you choose now set the stage for continuous improvement further down the road. Even if your first steps are modest, thinking carefully about the data you collect and how you apply it can pave the way for more advanced analytics, including applications of AI and machine learning.

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Closing Thoughts

You'll probably never have as much visibility as you'd like, have as much control over the variability as you'd prefer, or operate at the velocity you desire. But, you can improve on all three dimensions. You can improve your performance without a sweeping digital transformation. That is not to say you shouldn't be ambitious, but more organisations are too timid rather than too daring.

If budget is limited, focus on doing more with the data you have available, or that is relatively within reach. There may be monitoring features in factory floor equipment you have deployed that need only to be turned on and aggregated in an intelligent way. A "poor man's solution" might be as simple as getting managers to check analytics dashboards on a more regular basis. Don't avoid doing anything just because you can't afford the perfect solution.

On the other hand, if you can afford to invest in machine learning and predictive analytics, that's a great way of amplifying your capabilities by trading computing power for manpower.

Either way, you should start by learning what data is critical for you to manage your business better. Then prioritise gathering, analysing, and acting on that information. Assess your analytical capabilities, including technology platforms, staff resources, and management understanding of how to put the information to work. Where there are gaps, consider making new hires, bringing in consultants, or doing some of both.

Build the most robust digital platform you can, understanding that the job is never done. Some technologies you will want to take advantage don't exist yet, or may be too expensive and experimental for you to embrace. As prices decrease and capabilities increase, vet technological solutions to improve customer experience, enhance quality, and improve productivity.

Take what you have learned in the middle of a crisis and apply it to making your organisation ready for whatever the future may bring.

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