



NEW TRENDS IN LEAN
MANUFACTURING THAT
WILL IMPACT THE FUTURE

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INTRODUCTION

The concept of lean manufacturing was first seen in Japan, originally developed by the Toyota Motor Co. based on concepts pioneered by Henry Ford. The concepts, tools and techniques went through a lot of testing before they were accepted. Lean manufacturing means manufacturing without waste. Waste takes many forms and can be found at any time and in any place. It may be found hidden in policies, procedures, processes and product designs and in operations. Waste consumes resources but does not add any value to the product.

What exactly does it mean to be a lean manufacturer and what are the characteristics of such enterprises? A lean manufacturer is really a learning organization where the focus is on learning every day through problem-solving, connecting the business to the purpose and connecting the purpose of the business to the value proposition of the customer. Certainly, organizations are only as good as their people, and showing respect for people is an important and key principle for lean manufacturing.

Many professionals believe that to “be lean” is to eliminate waste and do only those things that add value for the customer. This is a crucial component of a lean manufacturer, yet it does not cover what a true lean manufacturer is. Thinking long-term as well as short-term is a challenge for many organizations when there are month-end and quarter-end goals. **The real power of a lean culture is to continuously improve, to get better every single day.**

Another misconception of the term “lean” is when businesses think of it as only relating to operational excellence. For instance, if workers are only focused on optimizing a supply chain and eliminating waste in that area they may think that they are running a lean work process, but they are only working on one piece of the puzzle; when in fact, there are numerous other levels in the hierarchy that can benefit from lean

manufacturing as well.

It is important to note that lean manufacturing isn't something that should be applied on an ad hoc basis or where it's convenient. It may work to provide temporary benefits when improving a particular process, but this approach doesn't make the manufacturer lean. Instead, it's a single component performing more efficiently rather than the entire machine working as a whole.

Lean manufacturing is essentially a consistent organizational culture that needs to be adapted wholly to a business and its manufacturing operations.

As discussed above, one of the most important components of lean is striving for improvement in long term and short term. This is why it's so important for lean consultants to stay on top of current trends in lean manufacturing. There are always new processes and ideas that are improved from previous years.

The purpose of a lean manufacturer:

- Build a learning organization
- Articulate a purpose and customer value proposition
- Show respect for employees
- Show respect for process-stability, standardization, and quality at the source
- Make problems visible and solve them in real-time
- Eliminate all waste and do things that only add value for the customer
- Think long term as well as short term
- Strive to continuously improve

In order to ensure that you are up to date we are going to discuss five trends that are significant contributors to the goal of a truly lean manufacturer in the past year.

5 NEW TRENDS IN LEAN

1. Strength Based Lean Thinking

The current mind set for lean enterprises is to try to expand continuous improvement initiatives or projects to a complete culture across organizations so that continuous improvement becomes the “way things are done”. While lean projects or short-term interventions can be successful in the short run, sustaining the improvements achieved and instilling the values, ethos, and culture of lean thinking is elusive and easy to miss.

The traditional view is that the best method for improving the way processes work is to understand in detail what does not work well at pres-

ent. The next step is to find a solution to the problem or its root cause, and finally, to implement it.

“Best practices” develop a vision about a desired future state for processes. **The focus is on the gaps, inadequacies, and weaknesses of processes, systems, and people.**

Admittedly, these approaches to organizational change and improvement have served fairly well over many decades by driving significantly greater efficiency and quality in manufacturing and other processes. However, there are well-documented examples of failures in driving improvement culture. For example, even the Toyota motor company, the source of the Toyota Production System (TPS), which laid the foundations for many of the principles and tools in the lean toolbox, has experienced several highly publicized challenges in recent years that exposed weaknesses and inconsistencies in the way its TPS philosophy was implemented.



These included a well-publicized slow response to the discovery of defective car parts installed in millions of cars around the world, as well as other glitches in its supply chain and customer service. These experiences exposed difficulties that were prevalent in responding to customer demands on time, in contradiction to the well-known principle of “Just in Time.” This example is not meant to highlight any failures but to demonstrate how challenging it can be to instill a true and sustainable culture of continuous improvement.

Strength-Based Lean: A New Way of Thinking

Most applications of lean thinking begin with an assumption that there is a theoretical “perfect state” for each organizational process, and that the current state deviates from the perfect state due to inefficiencies and waste.

This assumption results in focusing on the identification of gaps between the current and perfect state, in order to improve processes. What ensues is finding root causes for these gaps and fixing them. At best, this approach takes you back to a state of status quo where expectations are met but rarely exceeded. This approach is unlikely to help you exceed customers’ expectations.

The strength-based approach to lean has a different focus. **Instead of focusing on what is not working and inefficient, it teaches how to identify what is already working efficiently** and generates value in existing processes and systems (this is called “strength focus”). Next, it defines ways to expand those parts and implement good practices elsewhere. This focus on the search for and growth of existing efficiency enables the emergence of new ideas and supports implementation of process improvements by raising confidence, pride, and energy levels.

The strength-based approach to lean is more natural to work with and more sustainable in the long term. The focus of traditional lean tends to weaken the system—even when it is successful—



because it instills doubt and despair by giving unbalanced attention to waste and by amplifying inefficiencies.

In every organization, there is a wealth of knowledge and practical experience about efficient and value-adding ways of working. The strength-based approach relies on these existing good practices and internal knowledge rather than introducing “solutions from elsewhere,” thus making improvement easier and adaptable. This allows teams to discover the (often ignored) resources in their processes, leading them to finding creative and energizing ways to improve, truly moving them from good towards great.

Strength-based lean combines the rigor of lean with the innovation and energy of Appreciative Inquiry and other strength-based approaches to organizational change, creating a more successful, inclusive, and sustainable result.

Why Change Now?

We live in a world that is moving ahead at a fast pace. The rate of change and innovation is faster than ever. There is simply no time to collect data, analyze it, identify root causes, and fix them. By the time this cycle completes, reality has shifted and there are new problems waiting to be solved. In addition, this fast pace of change means that we continuously struggle to sustain the improvements that were achieved or to drive the importance of waste and defect elimination. In such an ongoing scenario, motivation and energy, both of which are equally essential for change, are likely to wane.

The alternative approach of bridging gaps does not offer a solution either. Focusing attention on external best practices, and on current gaps against those best practices, distracts staff attention and does not encourage engagement across the organization or sustainability of existing good practices.

Benefits of the Strength-Based Approach

A strength-based approach to lean thinking creates a committed and focused team, working on an improvement initiative with a keen search for possibilities rather than problems. Observing any process with this different “lens” is an invitation to start looking for the strengths and opportunities of the process, and to use this information to achieve the desired improvements confidently.

Focusing on what works raises motivation and energy levels. Creativity as a result, is also higher than that generated by following traditional improvement methods, and innovation is easier to achieve. The ideas for improvements generated through this approach are strong, as well as based on reality and knowledge from within the organization.

Because negative feelings associated with waste and defects no longer accompany the process

KEY LEAN TOOLS AND TECHNIQUES

In order to apply lean principles in operation management, some tools and techniques are Kanban, Kaizen, operator care program, SMED, and 5S. These have proven especially effective in reducing waste and improving sustainability in operations. Some of the lean tools are briefly explained as follows:

- **Kan-ban System or pull-systems:** A Kan-ban is a card containing all the information required on a product, at each stage along its path to completion. It also states which parts are needed for subsequent processes. This concept focuses on reducing excess inventories of raw or work-in process materials which cannot be consumed immediately by the production cycle.
- **Operator care programs:** These IT focused programs develop standard practices within the operating units that help decrease variation in the manufacturing process. This in turn, reduces the amount of product and raw materials wasted.
- **SMED or single minute exchange of dies:** The practice helps the organization reduce changeover durations in order to adjust the manufacturing process based on product demand. It has the potential to reduce the amount of waste generated from raw and unprocessed materials left over in the manufacturing processes.

of improvement (even if this association is only implicit, it is always present with classic lean thinking), there is a higher degree of participant engagement and sustained energy toward improvement.

Leveraging current or past knowledge, and accessing experiences and successes from within the system, are great resources for the next generation of improvement initiatives. They also provide motivation to everyone to face the challenges and opportunities ahead.

Teaching improvement teams and all members of the organization about how to find what is value-generating for customers drives them to consciously or unconsciously seek ways to deliver enhanced value to customers, which in turn raises organizational efficiency.

2. Lean Labor

Razor-thin margins, pressures to cut costs, increased competition from existing vendors as well as new players in the market have made it tough to remain in the manufacturing sector today, especially when it comes to gaining a true competitive edge.

Owing to all these reasons, it is important for manufacturers to increase productivity, control costs, optimize labor resources, and align them to the most important project or goal. **Conceptually, all of this sounds good, but for many manufacturers, the question remains: *How?***

Lean labor can be an extremely effective way to achieve all of these objectives. Most manufacturers are familiar with the concept of lean — as it applies to managing manufacturing equipment and processes — but now, many manufacturing leaders are applying lean principles to the way they manage their workforce.

The concept is gaining popularity and building momentum, to the point where the American Payroll Association is now offering a dedicated



lean labor educational course as part of its over all curriculum. As manufacturers embrace lean labor, many find that it is helping them gain a new competitive advantage. For example, lean labor methodologies are helping them align labor with actual demand, which leads to shorter lead times, reduced costs, and a stronger bottom line.

Lean Labor in Action: The Perfect Paycheck

To get a closer look at lean labor, consider the example of the “perfect paycheck,” or the idea of providing the right pay, at the right price and at the right time. Most manufacturers strive to deliver the perfect product or service to their customers, and delivering the perfect paycheck to your employees should be just as important.

However, it is not always that easy. Most often, the culprit is a manual, error-prone process, such as timekeeping or payroll processing. But when manufacturers also factor in variables such as overtime, leaves, shift differentials, vacation time, union agreements, and state, local, and federal labor laws and regulations — delivering the perfect paycheck becomes a lot harder.

However, with lean labor, providing a perfect

paycheck — every time — doesn't have to be an impossible task. Automated workforce management solutions can successfully eliminate manual efforts and additional efforts that accompany them. Getting rid of paper-based methods saves time and increases overall productivity, but it also helps eliminate employee “buddy punching” and other forms of abuse — both of which are critical to improving payroll accuracy.

Lean labor can also help automate repetitive actions and improve efficiencies to keep total costs low. Finally, by gaining a highly repetitive process that minimizes errors and wasted time, manufacturers can deliver the perfect paycheck, on time, every time.

Complete Insight. Complete Control.

Lean labor can also help manufacturers improve the way they align employees with production demand. For example, scheduling applications — a critical component to a larger workforce management solution — helps shift supervisors create each shift with the right mix of employees and skills. Not only does this increase total production and help achieve revenue targets, but it also helps decrease overtime costs for any replacement workers who may have to be called

“CONTINUOUS IMPROVEMENT IS NOT ABOUT THE THINGS YOU DO WELL, THAT’S WORK. CONTINUOUS IMPROVEMENT IS ABOUT REMOVING THE THINGS THAT GET IN THE WAY OF YOUR WORK. THE HEADACHES, THE THINGS THAT SLOW YOU DOWN, THAT’S WHAT CONTINUOUS IMPROVEMENT IS ALL ABOUT.”

- BRUCE HAMILTON

in to fill a gap.

Lean labor and workforce management technology give manufacturers real-time visibility into the activities on the floor. With true insight into what's happening with materials, machine downtime, new delivery dates, and more, manufacturers can redeploy employees in time to minimize delays and added costs.

Minimize Compliance Risk

Today, litigation on behalf of nonexempt employees over alleged violations of state and federal labor laws — including the Fair Labor Standards Act (FLSA) and the Family and Medical Leave Act (FMLA) — is on the rise. Part of the challenge in preventing non compliance; lies in how difficult it is to achieve overall compliance. Many manufacturers still rely on manual, paper-based approaches or pulling data from disparate systems to attempt their compliance efforts. Inevitably, these approaches only increase their risk of violating union bargaining agreements, industry regulations, or state and federal statutes.

Alternately, manufacturers can automate processes using workforce management technology that is critical to comply with industry regulations and labor laws. The technology can help track the status of employee training, certifications, and safety profiles, and even send alerts before an employee's status becomes an issue. The software also offers detailed records and complete labor audit trails to help streamline compliance efforts.

The Lean Labor Solution

While it is true that it is extremely tough to compete in the manufacturing industry today, lean labor can help. With lean labor, manufacturers can acquire a proven way to gain new efficiencies, reduce and control costs, and increase overall productivity. In turn, this allows them to focus on revenue-generating activities, strengthen the bottom line, and increase their overall competitive advantage.

3. 3-D Printing and Lean

It's no coincidence that 3-D printing is gaining fame as lean manufacturing is on the rise. Lean manufacturing and 3-D printing go together naturally. While 3-D printing isn't a new technology, it is getting more attention lately because of the potential cost implications for everyone involved. The leaner you are, the more you can save and create. The catalyst is 3-D printing.

Below are a few reasons why 3-D printing and lean manufacturing go hand in hand.

Easier Prototyping

Prototypes are expensive. Traditionally, prototypes were made with drilling, cutting, and removing materials. It is a potentially wasteful process, prone to errors. Additionally, prototyping is also a process that is outsourced to a third party, which results in marked up prices and delays. Manufacturers can now use 3-D printing to eliminate all these hassles. As technology is becoming less expensive, a business can create a prototype at a relatively low cost, do it all in-house and ultimately reduce wasted products.

Easily Customized Products

Today's customers are meticulous. The days of one-size-fits-all bulk are largely behind us, and that has complicated manufacturing. As 3-D printing does not require the same molding and cutting processes as traditional manufacturing; hence, each product can vary from the other as needed. The ability to customize allows for an increase in diversity, which keeps customers happy while running a leaner operation.

More Creativity and Efficiency

The prospect of leaner manufacturing is emboldening manufacturers to take more risks, as the stakes are much lower. 3-D printing allows manufacturers the creative freedom to design



the product in the concept stage, before a prototype even enters the equation. As a result, less time is wasted in trial and error, which is traditionally associated with prototyping. This also helps reduce the amount of materials that fall by the wayside, and makes for a much more efficient use of a manufacturer's time.

More Consistency

A vital advantage of 3-D printing is consistency. Once properly programmed, a 3-D printer will create exactly what is required, every single time. It not only keeps customers pleased, but it helps companies run a lean shop. There are no wasted materials with production runs that go awry, and manufacturers are no longer required to waste valuable time on inconsistent products. For that reason alone, 3-D printing is revolutionizing the idea of lean manufacturing.

Shorter Lead Times

Exorbitant lead times are anything but lean. Wasted time is never good for lean operations, and rushing a production run will always result in wasteful mistakes. The consistent nature of 3-D printing allows you to know what to expect and helps set more reasonable lead times. It's good for both, the business and lean manufacturing.

Local Manufacturing

Customers like the ability to have customized products, and they like knowing that it is deliverable within a specified short time. Local 3-D printing gives customers the close oversight they prefer and increases their ability to customize and tweak a product. The more customers are engaged in the process; the more likely a manufacturer is to get it right. This results in less wasted product and more happy customers.

Lower Prices

At the end of the day, it is about keeping customers happy, and nothing makes them happier than lower prices. With 3-D printing, it is possible to reduce the number of steps required to see a product through from concept to production as well as the amount of material that gets scrapped during production. Saving both time and material translates into lower prices for customers, prompting them to return for new projects.

New Consumer Demand

It's a cycle. Customers and businesses are becoming aware of the efficiencies that 3-D printing is making possible. This fuels customer's excitement with regard to customized products, resulting in potential cost savings associated with it, for both the manufacturer and the customer. With this excitement comes innovation, and with innovation comes new ways to be lean in manufacturing. Therefore, one way to jumpstart lean manufacturing is with 3-D printing. It will also likely lead to newer, leaner processes.

4. IOT and Lean

Some experts are calling it the "fourth industrial revolution."

The Internet of Things (IoT) is estimated to be roughly a \$14 billion market at present, and predictions claim it will reach \$50 billion by 2020.

This is just the tip of the iceberg for IoT, however; as academics at Georgia Tech and elsewhere foresee a potential \$19 trillion market, with manufacturing gains being a big part of that total.

Roughly, \$4 trillion of this value will come from manufacturing efficiencies as IoT radically changes the manufacturing process. Already, nearly 40 percent of U.S. manufacturers are collecting and using data generated by smart sensors to improve the manufacturing process, claims the consultancy, and yet, this is just the start.

Lean manufacturing will not fade away in this fourth industrial revolution, quite the opposite. IoT supports lean processes, and it enables a truly lean enterprise by delivering better metrics to drive increased efficiency and productivity, tighter integration with key clients and suppliers, better coordination among divisions, and both, increased manufacturing safety and reduced downtime, according to Bill Morelli, director of internet of things, M2M and digital for IHS.

However, he warns that manufacturers must get their house in order first. "IoT solutions can generate significant amounts of data, which can actually create more inefficiencies for enterprise," he says. "The key here is to map out the solution in advance, and to pick good partners for the analytics."

Clearly, there is a need for more IT engineers in the factory before manufacturers can take advantage of this fourth industrial revolution, adds Torbjørn Netland, associate professor at the Norwegian University of Science and Technology and a lean manufacturing commentator. "But before we get that, we need more operations management understanding. IT and IoT without the understanding of the value creating processes will only create more waste in our supply chains. This is a real challenge."

If manufacturers can get that right, though, IoT offers substantial efficiencies and can greatly improve lean processes. Here are five ways how

this can be made possible:

1. Real-time data for faster optimization

Companies such as General Electric and Honeywell are using intelligent devices in their plants to capture data on uptime and utilization rates, allowing them to make faster adjustments.

At Stanley Black & Decker, its DeWALT manufacturing hub in Reynosa, Mexico, uses radio-frequency identification tags to wirelessly relay data on quality and process metrics to the plant's computers, enabling the firm to perform Six Sigma in real-time instead of performing the analysis at the end.

2. Better process control

The two lean pillars of “just in time” and jidoka (stopping work immediately when there is a problem) can be improved with IoT, leading to better process control. With IoT, manufacturers can ensure that the right product gets the right treatment at the right place at the right time, and they can stay on top of standards' deviation in a better manner.

3. Tighter integration with customer demand

When IoT sensors are built into products that go out in the field, manufacturers have the opportunity to improve quality and make faster adjustments automatically. IoT helps manufacturers learn what products are tried but not purchased, for instance, and it could be used to more readily scale back production of items that are not selling.

4. Deeper supplier integration

Just-in-time gets a big boost when there is immediate sharing of demand data throughout the supply chain, which is something that IoT can provide.

The Internet of things will enhance the flow of information with suppliers such that produc-

tion and delivery of parts or components can be achieved closer to the ideal of just-in-time manufacturing.



5. Lean custom manufacturing

Consumers are increasingly demanding customized products, and this can be a challenge for lean. But IoT can help.

The trend is clear; there will only be more customization in the future.

IoT can reduce the need for keeping excessive finished stock. Lesser inventory reduces the number of standard products that need to be dumped in the market.

The current state of IOT is still in a mood of anticipation. There are not enough organizations employing these methods for it to be mainstream, but many feel that the industry is on the peak of an IOT revolution.

5. Lean Driving Green Manufacturing

Green manufacturing is a method of manufacturing that minimizes waste and pollution. Lean manufacturing is the system, which aims towards elimination of the waste from the system with a systematic and continuous approach. Operations management teams attempt to balance costs with revenue to achieve the highest net

operating profit possible. In this direction, green manufacturing techniques can play an effective role.

Green manufacturing is a method of manufacturing that minimizes waste and pollution achieved through research and process design. It is also a method that supports and sustains a renewable way of producing products and/or services that do not harm the environment or human beings in general. Green manufacturing goals are also aimed to conserve natural resources for future generations. The benefits of green manufacturing is that it creates a great reputation in front of the public, saves useless costs, and promotes research and design.

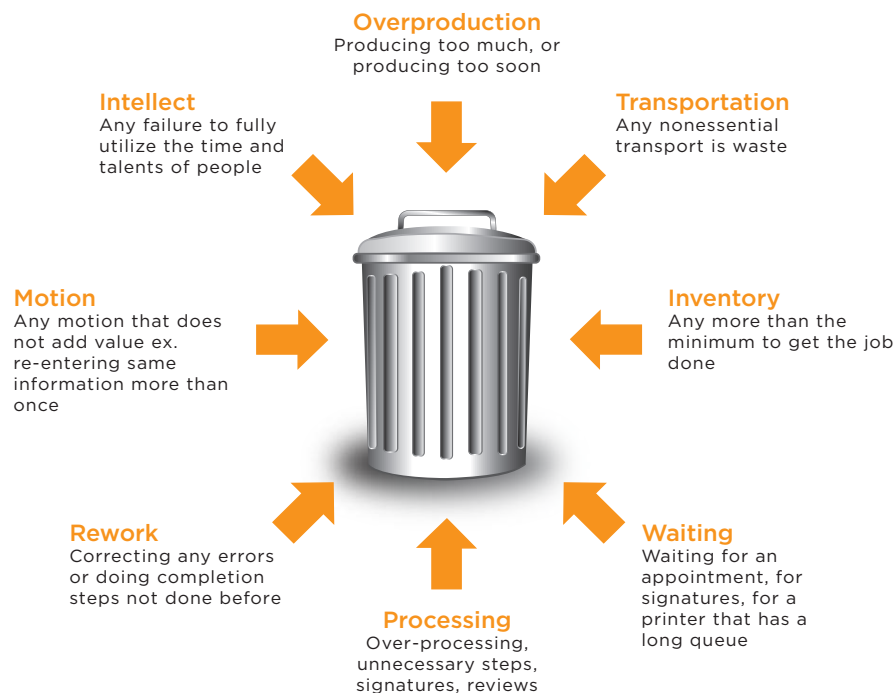
Reducing environmental impacts and resource consumption in manufacturing processes is one of the important issues in green manufacturing. Operation management (OM) is attempting to use the tools and concepts of lean operations to add green metrics to the measures of excellence companies' use in evaluating business processes. The field of operations management continues to expand in scope, currently towards the integration of environmental improvements into all areas of structural and infrastructural operating decisions. Although wastes have different types of categories, both (lean and green waste) sets are designed to increase the efficiency and effectiveness of the value stream or system.

Lean and Green are Made to be Used Together

To do this, a traditional lean thinker would seek to "map" these wastes in order to identify how they might be reduced or eliminated. It is found that there is no such thing as the right tool to do this. It takes a combination of diagnostic approaches, all with their strengths and weaknesses. In a similar way, there is no single right green mapping tool, but rather, a range of approaches for different stages of the processes. It emphasizes the legitimacy of environmental objectives as being consistent with the overall requirements of product quality and economy. Lean manufacturing is the business model and collection of tactical methods that emphasize eliminating non-value added activities (waste) while delivering quality products at the lowest cost with greater

efficiency. With these concepts in mind, lean manufacturing is a link to green engineering.

The leading similarity between the benefits of lean and the benefits of green is waste elimination, and so it makes perfect sense that in order to achieve lower levels of waste the organiza-



tion must adopt green practices.

A Double Focus on Waste Reduction

Lean and green manufacturing concepts are one of the best recent trends in operations management. Operations management has for a long

time remained focused on waste reduction, so modern management programs like lean manufacturing represent today's best practices in operation management. Even without explicitly targeting environmental results, lean efforts can yield sufficient environmental benefits. However, because environmental wastes and pollution are not the main focal points, these achievements may not be considered in the normal scheme of lean.

Higher productivity is critical for the long term competitiveness and profitability of organizations. It can be effectively raised if it is managed by lean manufacturing tools. Thus, it is concluded that the two strategies (lean and green) can be integrated and offered simultaneously in operations management to reduce both waste and pollution. This will certainly increase productivity and profit of the organization.

CONCLUSION

Lean manufacturing reflects a business' approach towards applying effective solutions to overcome workforce and manufacturing problems, that create competitive products that are embraced by customers.

Lean manufacturing can only be considered "lean" because it consumes less of all the available organizational resources relative to traditional "mass" production.

A strength-based approach towards lean thinking creates a focused and committed mind set that takes improvement initiatives with a keen search for new, lasting possibilities rather than overcoming problems in the short run. The lean approach to managing the workforce is an effective way to achieve these objectives. With lean labor, manufacturers gain a proven way to attain new efficiencies, reduce and control costs, and increase overall productivity.

Easier prototyping with 3-D printing allows multitudes of products to be developed, approved

and tested for their market effectiveness. This allows creative freedom and innovation to take place over a shorter period of time, as compared to traditional R&D practices. This in turn, will allow seamless blending of IoT with the driven green manufacturing process, because researchers and scientists can develop an effective as well as innovative manufacturing process that doesn't tax the environment as significantly.

We now exist in a global marketplace. There is someone out there looking over your share of the market and formulating strategies to take it. Competitors will continue to improve, they will evolve, and perhaps even revolutionize the industry, and businesses must either rise to the occasion or risk losing what they've worked for. It is nowhere near enough to make improvements when in a crisis. Rather, manufacturers must have a continual business improvement program to ensure that the business just doesn't struggle to survive, but thrives.

THE POWER TO MOVE YOUR WORKPLACE



ABOUT NEWCASTLE SYSTEMS

Newcastle Systems is committed to providing innovative solutions that help make Auto-ID technology and other hardware truly mobile and information more readily available across an entire enterprise.

Loss of productivity and inefficiencies such as wasted steps to the printer on a fixed desk, inaccurate inventory counts, improper labeling, time delays, manual processing and incorrect shipments are just some of the challenges that are alleviated with a mobile powered workstation.