

Smart Manufacturing Starts with Business Agility

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As manufacturers look ahead to 2018, what are the critical steps to achieve operational excellence and drive digital transformation?

In complex discrete manufacturing, change is expected. You can't build aircraft, ships, and industrial equipment made up of hundreds of subassemblies without making alterations to the original designs, production processes, and source materials along the way. Even so, operational changes can be very difficult to implement. Many manufacturers and MRO shops are still using paper and manual systems and hanging on to longstanding processes. Operations that function reliably are hard-won, and those who know what's involved are wary of changing anything proven to work well.

The convergence of powerful technologies (3D models, artificial intelligence, IoT, big data analytics, additive manufacturing, and cloud-based MES platforms) has created a unique opportunity to raise operations to a whole new level of excellence. The emergence of digital integration, automation, production, and inspection tools is enabling the realization of smart manufacturing and supply chain transformation on a global scale.

Focus on integrating shop floor operations

Operational excellence is fertile ground for smart manufacturing technologies. The year ahead is prime time for enterprises to make strides in implementation, especially when it comes to integrating production operations. LNS Research expert Dan Miklovic has argued that operational excellence can be a key driver for justifying investments in digital transformation. To improve operational performance multiple elements must be

addressed: asset performance management, quality management, health and safety, IoT, manufacturing operations, new product design, and supply chain management. Challenges and obstacles include: functional silos for people, processes, and data; underutilization of metrics; executive buy-in, and development of new skill sets. In order to realize the benefits of technology investments, these issues will have to be addressed throughout the enterprise and supply chain.

Many manufacturers thought that adopting PLM and ERP systems would bring them up to speed. But there's a lot happening on the shop floor that doesn't bubble up into the ERP. Small changes pile up over the course of large-scale manufacturing projects. The visibility enabled by complete, real-time, model-based data streams that integrate everything from design to real world performance to maintenance (often referred to as the digital thread and its corollary, the digital twin) results in less risk, higher quality, greater cost control, and major reductions in waste.

Next level change management

Often, a final design plan begins to unravel as soon as it arrives on the shop floor. Manufacturing engineers start by following the initial designs, but inevitably, countless changes happen in the production phase. We estimate that less than 20 percent of those changes are communicated back to the design engineers. This is highly inefficient — how can designers continue to improve if they don't receive consistent feedback about what works, what doesn't, and why?

Excellent, high quality products should be driven by designs that reflect engineering and production know-how, incorporate customer feedback, and avoid errors. As we know from lean and Six Sigma practices, quality increases through repetition — but it's important that the quality improvement extends across the enterprise and doesn't get stuck on the shop floor. Advanced change management, performance analytics, process visibility, and systems integration will drive major shifts along the entire continuum from design to production to MRO.

Streamlining supply chain management

In complex discrete manufacturing, the global supply chain and global competition are driving the need for step changes in efficiency, speed, innovation, and quality.

Manufacturing intelligence platforms ensure that you (and your suppliers) make the best use of equipment, time and people, resulting in increased profit margins and tighter delivery cycles. These solutions also optimize management of the stratospheric stakes involved in serving federal government agencies, airlines, energy utilities, and hospital systems. Regulatory compliance and cost and quality audits are expensive and time-consuming — especially when multiplied across a vast supply chain.

Advanced manufacturing intelligence platforms can automate many aspects of supply chain management, saving time and travel costs and allowing specialists to focus on more challenging issues. These systems force production workers at suppliers to perform quality measurements during production. Supplier auditing can be stepped up via the system; no need to send an inspector overseas. This approach pushes quality at the source and catches defects early. Likewise, digital recordkeeping requires less physical space and management, and records are more accessible to contributors.

Global competition is intensifying. When companies like Boeing and Lockheed controlled the entire industry, they were making so much money they could afford to ignore wasteful processes to a certain extent. As new players (Airbus) and countries (China) change the landscape, they have to optimize and differentiate. Increasing supply chain visibility and control is a huge factor in developing operational excellence in pressurized markets.

On the agenda for 2018

As the smart manufacturing revolution moves from the exciting idea stage to demanding execution efforts in the real world, the readiness to embrace change and dig in to pilot projects will be key to early success. The earlier you begin (New Year's resolutions, anyone?) the more prepared you'll be when disruptors emerge from the shadows or game-changing opportunities arise.

From the C-suite to the shop floor, everyone will have to leave their comfort zone and develop new skills. Developing capabilities around data analytics, integration work, and change management will enable enterprises to fully leverage the power of intelligent platforms and supporting technologies.

In the year ahead, change leaders should focus on operational excellence as a means to boosting business agility. Digital transformation is a collection of outsize yet intricate challenges; those willing to collaborate with partners, universities and smart manufacturing test beds will have a head start. CIOs have to push for a more central role by aligning their agenda with strategic business outcomes and clearing a path for their technologists to lead the way. Enterprises that operate at the highest levels of science and engineering already have what it takes to rise to the occasion; it will be thrilling to see what they do to advance smart manufacturing in the year ahead.