LISTEN.
THINK.
SOLVE.®

You can't achieve Smart Manufacturing without embracing modern technology

But how do you get started?

Rockwell Automation

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Globalization – and the pressing need to stay competitive in a global market – are driving a heightened focus on Smart Manufacturing

You've probably heard about the concept of Smart Manufacturing by now, with various government and industry initiatives championing new approaches and technologies that can enhance productivity and performance.

Smart Manufacturing is here and it continues to evolve with initiatives such as Industry 4.0, Advanced Manufacturing Partnership 2.0 (AMP 2.0), China Manufacturing 2025 and others around the globe which champion new approaches, technologies and standards that enhance the productivity and performance of industrial operations. But what changes are required in today's manufacturing environments to be able to realize the vision these initiatives represent?

Justifying the risk and expense of upgrades has traditionally been an uphill battle versus simply maintaining the status quo. Systems may operate in isolation, or equipment might be outdated and costly to run, but the threats of obsolescence have often seemed less daunting than the upgrades themselves, and the risk of migrating has often outweighed the benefit received. Today, Smart Manufacturing is causing many to rethink that…
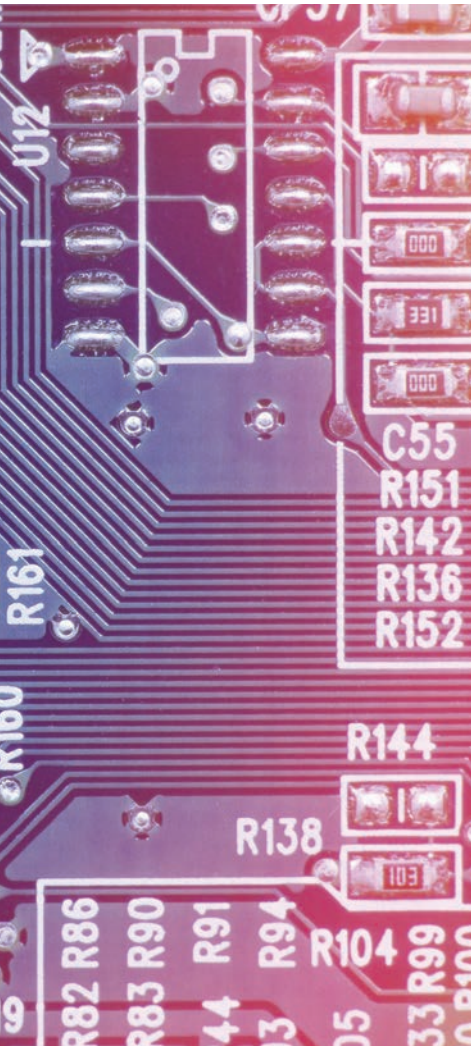
The truth is, modern technologies – for example, those highlighted in Industrial Internet of Things (IIoT) strategies – are already helping forward-thinking manufacturers reap the benefits of Smart Manufacturing. Early adopters are embracing technology to optimize their processes and equip their people for higher performance and efficiency.

Is it time for you to join them?

- **Are you challenged to reduce operating costs,** or to keep up with changing consumer demand?

- **Do you think new technology could help** you to improve productivity and/or reduce downtime?

- **Do you know how to gain better visibility** into the information that will help you extract more value from your operations and be more responsive?

- **Are you concerned** about your ability to be globally competitive?

Smart Manufacturing represents the integration of three key productivity factors: Automation, Operations Information, and Advanced Analytics. These factors link machines through open platforms and enable them to 'think' – reacting in real-time to improve productivity across the value chain.

What are the issues and opportunities?
What are we talking about?

Technology is transforming industry, unlocking unprecedented quantities of data from intelligent 'things' embedded within industrial applications. Information is readily available, and companies with strategies to harvest it become more productive and globally competitive. As bigger data sets are aggregated, businesses get 'smarter.' The challenge is contextualizing the data to make it actionable and accessible to all parts of the organization, maximizing efficiency and creating value.

'Modernization' often describes the implementation of new equipment and/or technologies to address a pressing business problem or risk to operations (e.g., missed production expectations, product changeover issues, or spare part shortages). But Modernization is also a means to execute Smart Manufacturing strategies and gain value from a Connected Enterprise. It encompasses not just infrastructure changes (like network and security), and industrial control and information systems, but also workforce dynamics and wider supply chain considerations, including scalable computing and analytics.

A modernization strategy does not always mean 'rip and replace,' but rather proactively creating a roadmap that addresses all aspects of the operation, including people, process and technology. By modernizing, manufacturers can future-proof their operations and tap into the value at stake in the market today.

Successful modernization efforts can radically change business models and build new revenue streams, driving people, machine and process optimization and leveraging contemporary technologies, including:

- **Mobility and visualization**
- **Information management and analytics**
- **Scalable computing**
- **Multi-discipline control and information**
- **Secure network infrastructure**

Nearly half (45%) of companies responding to an IndustryWeek survey said internet-enabled equipment is valuable for supply chain efficiency. In addition, half of all respondents said they found Internet-enabling of devices to be valuable for predictive maintenance, 59% found it valuable for quality and inventory control, and 56% for uptime.

Highly connected,
knowledge-enabled operations

The 'smart' in Smart Manufacturing is a highly connected, knowledge-enabled industrial enterprise where devices and processes are connected, monitored and optimized to enhance productivity, sustainability and economic performance.

Today, this means taking into account advances that allow smart objects and machines to interact and communicate with one another, configure themselves, analyze data, predict and prevent failures and adapt to changes within the manufacturing process. Self-aware and system-aware, this connectivity drives efficiency and increases business value.

Ultimately, every employee is enabled with contextualized information, using smaller footprints of real-time data analytics, and the workforce evolves into a team of knowledge workers as operators.

Enterprises that embrace Smart Manufacturing are flexible, agile, efficient, responsive, collaborative and lean. Central to success are the seamless collaboration and integration

of IT and OT, where digital, manufacturing and industrial capabilities can be managed on an ongoing basis, allowing for real-time production modifications based on real-time analytics. This enables production to demand, rather than capacity.

In a modern operation, organizations navigate proactively through the supply and demand chain and are responsive to external events, supplier and customer activities, business trends, and changing market conditions. This adaptability makes it possible to be more competitive, more efficient, more profitable and future-proof.

82% of companies using smart manufacturing have experienced increased efficiency, and 45% experienced increased customer satisfaction.

Source: ASQ 2014 Manufacturing Outlook Survey CE ebook

A blueprint to reach
achievable goals

With the proliferation of smart devices and sensors, the availability of scalable computing, software solutions and multiple network technologies merging into one, the convergence of IT and OT transforms data into actionable and insightful information.

This gives decision-makers across the enterprise new visibility into their operations, as well as the ability to act on business insights, including real-time performance measures and costs.

One of the first steps in implementing these solutions is to assess the needs of an organization based on current operations and business goals. Once the needs are identified, manufacturers can put a modernization strategy in place to help them realize significant benefits and reduce their total cost of ownership in the forms of:

- **Expedited time-to-market**
  Intelligent devices support demand-driven production

- **Improved customer satisfaction and experience**
  Improvements in product quality, delivery and customization

- **Improved asset utilization and optimization**
  Improved equipment reliability, quality, energy management, and predictive maintenance

- **Better-managed risk across the enterprise**
  Safer, more secure operating environments with reduced exposure to threats

- **Increased workforce efficiency**
  Increased collaboration and problem-solving

24% net margin improvement achieved by top performers.
Source: MESA Research

New **value** and **opportunities**

Increase productivity

Equipment and devices are transformed into intelligent assets that can self-analyze, predict and adapt to change, providing the ability to monitor processes and equipment in real time to drive out inefficiencies and improve performance. Having this knowledge enables faster and better business decision-making that can help increase productivity, improve quality and meet demand more precisely and cost-effectively.

In Automotive, companies are deploying automated data systems and increasing OEE and productivity by 50%.

Pharma companies are overcoming inconsistent processes and systems to increase production by 65%.
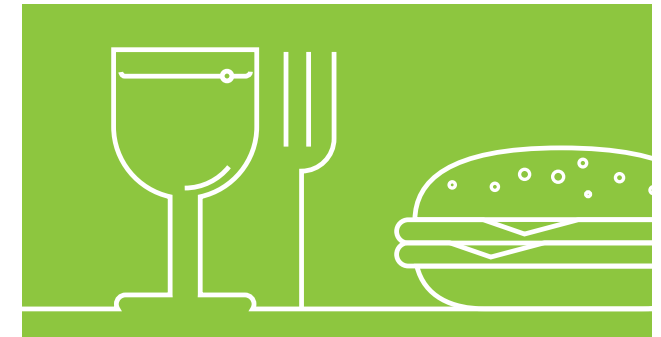
Food and Beverage companies have integrated their control and information architectures and doubled production.

Increase
intelligence

Smart Manufacturing makes the best use of data that often already exists, contextualizing and transforming it into actionable information in real time. It also reconciles historical data to leverage insights in support of future planning.

Users can move away from manual reporting, and connect siloed operations, facilities, suppliers and customers to a more agile, integrated and autonomous process.

With the improved ability to respond to changing customer needs comes better workflow management for more demand-driven production, and deeper insight into supplier deliveries that can help improve inventory costs.
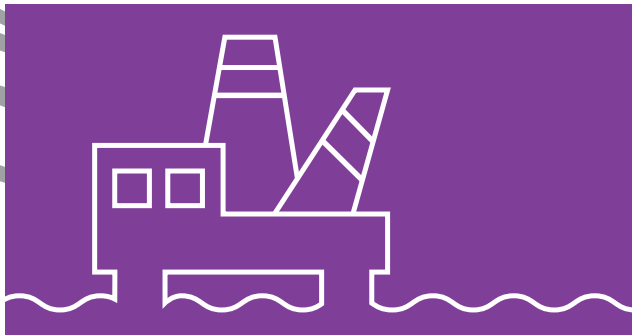
Oil and Gas companies are minimizing unscheduled downtime with real-time prediction of potential failures.

Automotive manufacturers are nearing zero-defect delivery with real-time data flow between ERP, production and the supply chain.
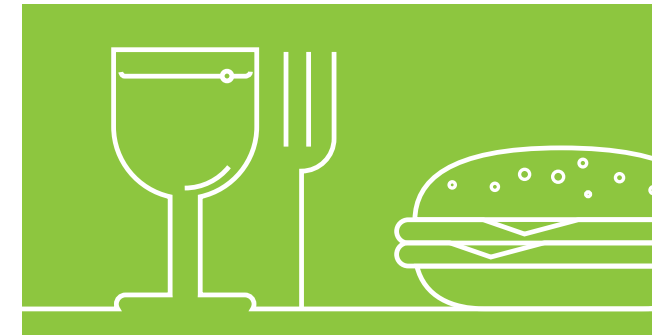
Beverage companies are achieving product tracking down to the gallon with centralized operations.

Improve **safety** and **security**

For purposes of business continuity and risk management, security now needs to be part of a company's overall safety strategy. At the same time, the presence of smart assets and robotics requires smart safety to improve productivity and mitigate risk.

This means addressing the need for proactive safety management beyond worker safety to consumer safety. It requires integrated, contemporary technology to deliver a measureable difference in plant performance, with best-in-class safety strategies, going beyond mere compliance to become an integral part of a company's culture.

At the same time, a layered, defense-in-depth approach to security will help protect against internal and external breaches, enabling organizations to capitalize on connectivity, while mitigating the risks.
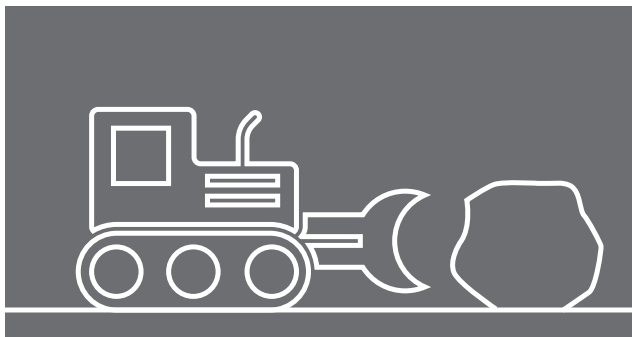
Mining companies are using technology to gain complete visibility from pit to port, enabling remote information access and increasing safety by keeping workers out of dangerous environments.
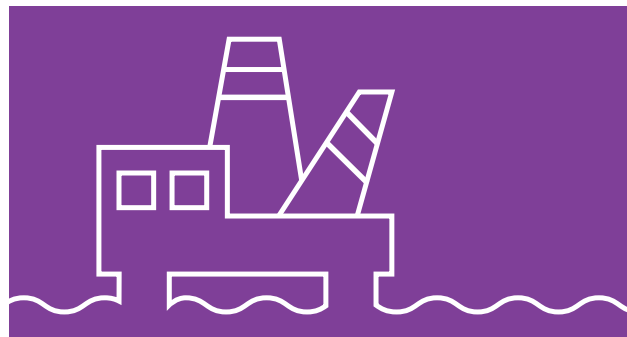
Oil and Gas companies can detect and resolve incidents before they occur, avoiding downtime and increasing safety.

Wastewater companies are reducing starts and stops, increasing data communication between equipment and reducing risk to plant workers.

Enable new business models

Modern technologies, including the Internet of Things strategies, are driving new ways to innovate and operate. Some organizations are moving from selling capital goods to selling products as services, enabling the ability to monitor machine usage and charge accordingly. Others are providing add-ons or using information in new and different ways to create value for customers in both the business-to-business and business-to-consumer markets. This 'as-a-service' approach can provide a higher value and foster more intimate relationships with customers.

Two-thirds of manufacturing executives believe that the IoT will increase profitability over the next five years.
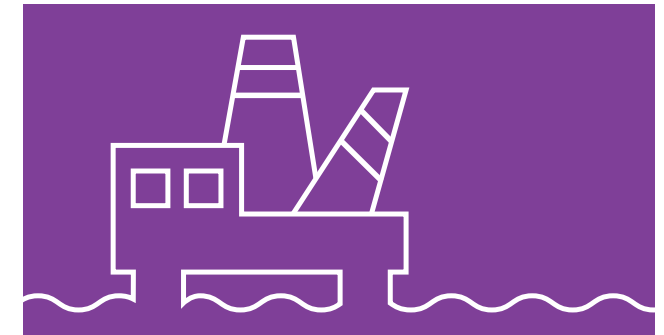
Source: MPI Group
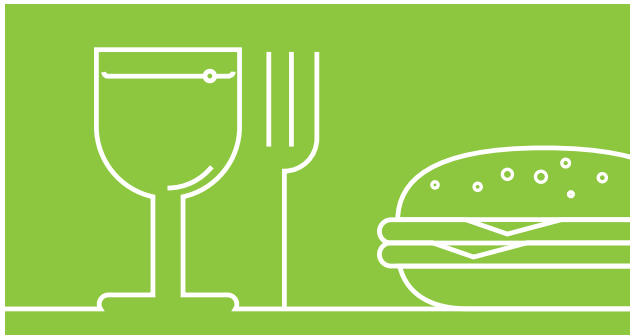
Food and Beverage companies are using infrastructure-as-a-service solutions, shifting from CAPEX to OPEX and gaining a 90% reduction in time spent troubleshooting.

Automotive manufacturers can manage vehicle production in real-time with more than 2 million variations.

Oil and Gas companies are deploying scalable monitoring and management solutions for more effective utilization of expensive assets, allowing for on-demand versus scheduled maintenance.

The Connected Enterprise:
Smart Manufacturing in action

Our experience and understanding of manufacturing, industrial operations and information technology has enabled us to develop a model for companies to follow, based on both their needs of today and in the future. The Connected Enterprise brings IT and OT together into a robust, secure and collaborative architecture, uncovering data, contextualizing and transforming it into actionable information.

This knowledge enables faster and better business decisions that increase productivity, improve quality and help to meet demand more precisely and cost-effectively through faster time to market, lower total cost of ownership, improved asset utilization, enterprise risk management and increased workforce efficiency.
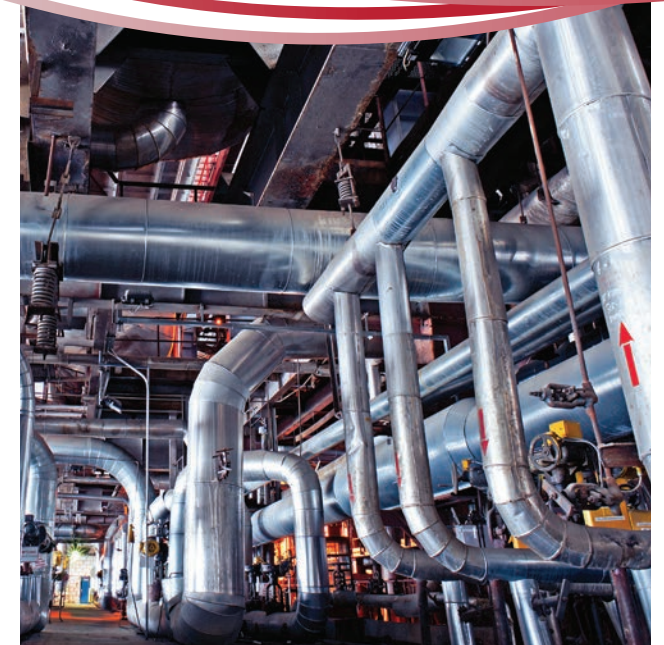
While you keep things moving, we can help you to **move things forward**

Smart Manufacturing, enabled by The Connected Enterprise, brings together equipment, machinery, sensors, and devices in a modern automation system. It provides increased visibility of operations to help people and machines to work smarter together.

We have developed The Connected Enterprise Execution Model as a roadmap for industrial companies seeking to bring their equipment and systems into the modern information-enabled world. The process includes four areas of focus:

■ **Assess and Plan**
Evaluate all facets of an existing IT/OT infrastructure (information, controls and devices, networks, and security policies) to baseline the current environment and develop a prioritized strategy for modernization

■ **Secure and Upgrade**
Securely upgrade the OT/IT network and automation controls to prepare for new configurations, advanced technologies (e.g., mobility, big data, and cloud computing) and increased visibility and performance

■ **Data and Analytics**
Determine how to use existing and new data for optimum gains and utilize it with scalable analytic strategies for continuous operational improvement

■ **Optimize and Collaborate**
Engage with internal business processes and teams, suppliers and customers; extend the use of real-time information throughout the enterprise and value chain, and leverage it to respond to internal and external events

We have developed this model so that manufacturers and industrial operators can move through a process of modernization in order to meet the needs of their operations today and in the future, at a pace determined by individual needs, challenges and opportunities, infrastructure, readiness and resources.

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