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Benefits of IIoT in Manufacturing

By: Stephanie Young Monday, April 6th 2020



The Internet of Things (IoT) has transformed the way the world works—from smart bulbs that light our homes to the trending Smart City movement that's taking the world by storm. There's no question that connected things are making our lives easier.

Shorthand for “anything that connects to the internet,” the Internet of Things is disrupting markets and permeating every corner of the world—from schools to airports to hospitals and so much more. One of the more profound applications of IoT can be seen in the manufacturing industry—also known as

Industrial Internet of Things, or IIoT.

An ecosystem of sensors that collects data and translates it into insights used to optimize manufacturing operations, Industrial IoT has seen a significant uptick in recent years—and that trend is expected to continue. According to [Market Watch](#), the global IoT market is expected to soar to \$751.3 billion by 2023, representing a 23.88% increase from 2017.

For its part, the [IDC](#) estimates that by 2025, there will be 41.6 billion connected IoT devices, generating 79.4 zettabytes of data.

In other words, IoT in manufacturing is catching on. Today, IoT-enabled factories are accomplishing countless game-changing benefits, including reduced start-up and operating costs, increased productivity and efficiency, safer working conditions and more.

So how exactly does Industrial IoT drive the aforementioned benefits? Let's peel back the onion to explore the astounding power of IoT in our world's manufacturing facilities.

1. Predictive Maintenance

Traditionally, manufacturers took a “preventative” approach to maintenance that included scheduled

maintenance based only on the age of the operating devices and machinery. But according to research done by technology research firm [ARC Advisory Group](#), equipment fails due to its age only 18% of the time, while the remaining 82% of failures occur randomly, rendering the time-based approach to maintenance ineffective and costly. The recent proliferation of IoT in manufacturing has given way to a predictive approach to detecting and forecasting machine malfunction. With the ability to store large volumes of data and run machine learning algorithms, IoT-based solutions can forecast potential hazards and predict when equipment will fail.

2. Production Flow Monitoring

To ensure quality, cost efficiency and business process optimization, a facility's production processes must be continually and precisely monitored, controlled and adjusted—always. In a connected factory, entire production lines can be monitored. IoT lets machines talk to each other to self-coordinate and stagger production, thereby optimizing changeover times and completing lots precisely without overruns or shortages. Additionally, at any point in the process, machine defects can be identified and registered, parts can be ordered and/or added to the production run, service calls can

be scheduled and processes can be adjusted.

3. Quality Control

In a past life, manufacturers managed quality control on a reactive basis. If something went wrong with an item, it was up to the workers on the floor to (hopefully) catch it in time. But even the best assembly line worker is prone to error and oversight. They are, after all, only human. As a result, manufacturers were seeing high rates of scrap material with significant post-production rejects.

IoT changes that. In a smart factory, equipment is programmed to monitor the quality of materials, look for defects, analyze equipment performance in real-time and measure and test the finished product. If a problem occurs at any point on the assembly line, it can be addressed immediately.

On the human side, **visual work instructions** make it easy for workers to capture and share best practices for efficient in-process quality checks. This alone has been shown to reduce defects by as much as 95%. The combination of machine-equipped sensors that talk to each other and digital work instructions that support more efficient worker outputs ultimately prevents costly delays and wasted material.

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4. Safer Operating Environment for Workers

According to a 2019 U.S. Bureau of Labor and Statistics report, the private manufacturing industry experienced a total of 5,480 fatal injuries between 2003 and 2017. Yes, cost savings and operational efficiencies are important, but the human factor is a significant consideration in manufacturing—one that cannot be overlooked.

With the advent of Industrial IoT, manufacturing facilities have made significant inroads in protecting their workers. By way of intelligent, connected devices, managers can monitor the health and safety of the workers by tracking things like illness and injury, absences, near-misses and machinery or vehicle accidents. If trends are identified, issues can be proactively resolved to help prevent future incidents.

Wearables have also taken off in recent years. Used to protect workers from on-the-job injuries, wearables are equipped with sensors that can

monitor a worker's proximity to machinery and alert both the operator and worker when he or she comes too close to the "danger" zone. Connected things can also be used to monitor the workers' environment. For example, sensors can detect a gas leak that's traveling through the pipes, before it causes illness (or worse).

5. Inventory/Supply Chain Management

One of the biggest challenges in inventory management is having just enough supply on the shelves without running out or overstocking; it requires a perfectly timed re-order. The good news is this can be seamlessly achieved in a process that's guided by analytics, insights and contextual intelligence.

Devices such as wearables, sensors and radio-frequency identification tags (RFID) deliver insights about where items are located, their status, movement and more. With real-time asset tracking, monitoring and alerts, warehouse and supply chain managers can monitor events across a supply chain.

Complete visibility into inventories facilitates more accurate estimates of available material, the work-in-progress and the estimated arrival time of new materials—which, taken together, optimizes the

supply chain and cuts costs. Additionally, IoT can bring suppliers into the mix to facilitate a collaborative approach to supply chain management. By connecting manufacturing facilities to suppliers, IoT enables supply chain managers to better identify interdependencies, manage material flow and fine-tune manufacturing cycle times.

6. Process Optimization

The culmination of all the above elements will naturally lend itself to more efficient operations management overall. The connected factory offers tremendous operational benefits across processes—from machine performance, assembly line management and supply chain optimization to workforce safety, quality control processes and more.

While machine-enabled sensors can monitor conditions, equipment and workflows for general process optimization, electronic work instructions help operators do their jobs better, improve overall productivity and minimize downtime. Increased process efficiency translates to reduced costs and ensures regulatory compliance.

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7. Customer Satisfaction

Sensor-equipped inventory makes it possible for customers to stay apprised of the whereabouts of their order, in real-time. What's more, sensors offer valuable insights about customer usage that can be used not only to build better products with improved maintenance recommendations, but also to alert customers of a potential problem.

At the end of the day, a company's ability to satisfy customers will make or break the business.

Business operations and back-end processes are critically important, but without customers to purchase the products, there is no business. IoT has given manufacturers a significant competitive advantage in their ability to realistically predict and satisfy customer expectations.

We've only scratched the surface of IoT and where it can take us. Over the next few years, we can expect to see continued advancements that will profoundly shape the manufacturing industry.

8. AI Supercharging IIoT

Independent of each other, AI and IoT are two extraordinary technologies that have changed the face of business operations over the past decade. By

combining the “brains” of AI with the convenience of connected things, AIoT offers an intelligent network of connected systems that has the power to self-correct. According to [McKinsey](#), AI is advancing ten times faster and at 300 times the scale of the Industrial Revolution. In other words, AI is becoming more ubiquitous in the world, which for manufacturers means exponentially faster, more efficient processes and lower overall costs. As AI and IoT continue to work together in perfect harmony, manufacturers will realize more mass production of goods with better outputs at lower costs.

9. IoT-Powered Robots Enhancing Worker Safety

According to the [Robotic Industries Association](#), robot orders were up 5.2% through Q3 2019, totaling \$1.3 billion. We can expect to see this trend continue, as robots speed up operations, automate processes and reduce costly human errors. Perhaps even more important, robotics in manufacturing can also improve worker safety by taking the place of humans to perform repetitive, musculoskeletal-damaging tasks, or tasks that are altogether too dangerous for human workers.

As manufacturers continue to explore the use of

robotics for process improvement and worker safety, [digital work instructions in robotics](#) will play an increasingly significant role in ensuring the proper setup, maintenance and safe handling of complex robotics equipment.

10. IIoT Supported by 5G Enable Real-Time Communication

5G, or fifth-generation cellular wireless, came onto the scene in 2019, and its effects on speed are profound. Expected to be 10 times faster than current LTE networks, 5G will have a significant impact on performance and reliability of connected devices everywhere. 5G offers the promise of low latency, high bandwidth and high reliability to accelerate manufacturing processes and flows. By enabling IoT devices to communicate and share data faster, 5G will support the more widespread adoption of smart manufacturing processes moving forward.

11. Sustainability Through Energy Efficiency

Manufacturers are responsible for consuming 54% of electricity delivered globally, as per the [U.S. Energy Information Administration](#). The good news is as more manufacturing facilities turn to IoT, the industry's energy footprint is expected to shrink.

Here's how: Plant managers of smart factories can easily identify which devices and machines are using the most energy, and program those devices to power up and down accordingly. Additionally, as more factories adopt a predictive, "smart" approach to equipment maintenance, more defects will be revealed before sub-optimal systems begin draining too much energy. With the ability to monitor energy usage and take immediate action to address problems, manufacturers can ensure their machines are operating at peak efficiency and capacity without unnecessarily using excess energy.

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