MAGNIFY CONTINUOUS IMPROVEMENT EFFORTS

Leveraging Digital Technologies and the Rise of IIoT

History can teach us a great deal about improving factory operations. During the industrial revolution, processes were created to evaluate core performance indicators such as quality, worker safety, deliver time and inventory. These hallmarks of performance have stood the test of time and today meeting them are imperative for every successful business. Yet, new technologies and system advancements are quickly driving them forward and creating a level of magnitude not seen before. Now, digital technologies and networking infrastructure supported by the Industrial Internet provide valuable data for faster production processes, greater consistency and safer work environments.

Digital Technologies are Transforming Lean Manufacturing

With the proliferation of the **Industrial Internet of Things** (IIoT), continuous improvement is becoming a hybrid of human intelligence and digital intelligence. Thanks to IIoT everything that has an electronic pulse can be network-connected including large machinery, down to hand-held electric tools. Although IIoT is not yet ubiquitous, Accenture estimates the
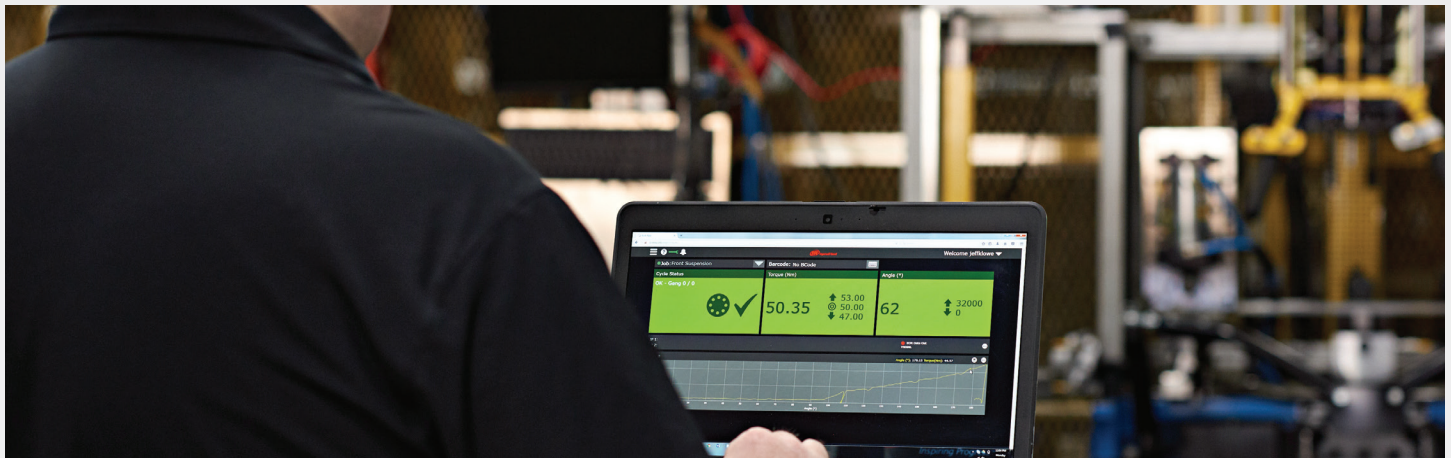
market size to grow to trillions of dollars during the next few years1.

IIoT was initially adopted by manufacturers who wanted to predict and protect the performance of high-capital equipment such as computerized numerical control (CNC) machines, air compressors and heating, ventilation and air conditioning (HVAC) equipment. Motor vehicle manufacturers were also pioneers in the application of IIoT to improve manufacturing, just as they have been the first-movers on many other continuous improvement methods. They started using industrial internet technology for safety-critical assemblies and procedures but not for a Class C or non-critical joint. After seeing the value IIoT brought to high-value applications, they understood that connected devices can add another layer of safety, quality and performance at every level of the manufacturing process. As a result, we often see customers converting all their tools to connected tools or building assembly lines from the ground up with only connected equipment.

In the early days of IIoT, operators could only justify the costs of the digital controllers and the networks for high-value equipment. Now that the costs of sensors and controls have come down, and networking is aided by economical fiber optic cabling and cloud-based data management, manufacturers can apply IIoT to just about any equipment and reap rewards. Cloud technologies give manufacturers the low-cost processing and storage needed to support IIoT and levels the playing field for manufacturers of all sizes to quickly and cost-effectively scale connected plant operations, on demand.

For example, one of our customers manufactures kitchen faucets – a low cost item compared to a car. Yet, these are high-end kitchen faucets installed in luxury homes. Realizing that a busted faucet in a high-end home can equate to a high-stakes product liability claim, this manufacturer started using connected tools to track the data for the fastening point during the assembly of the faucets.

Exponentially Improving Manufacturing Processes with IIoT

Machinery and tools equipped with embedded sensors and actuators send data to analytic systems that provide data for key process indicators. While data collection begins with equipment on the production line, it can also be aggregated with industry-wide cloud metadata. By combining closed-loop data with an industry-wide data perspective, plant managers and engineers can gain new insights into trends in quality, throughput and efficiency to help them quickly and efficiently solve a myriad production problems.

IIoT is also beginning to play a role in information flow, work sequencing and error proofing processes, to optimize the time and effort spent collecting, organizing and understanding production data. A manufacturing plant with smart,

connected equipment is able to share data with operators on the line, quality control personnel and plant managers, in real-time. The more data collected and analyzed from the production line, the more robust the sample sizes obtained to help manufacturers gain actionable insights, so they can make informed decisions for reducing waste, and improving safety and product quality.

IIoT Changes Total Productive Maintenance to Total Predictive Maintenance

Total productive maintenance is an approach that applies lean tactics to the maintenance environment. With IIoT, productive maintenance can be further enhanced by improvements to predictive maintenance. Adding sensors to equipment that monitors equipment and predicts when the next downtime might occur allows companies to proactively address potential problems before equipment fails, eliminating unnecessary maintenance and downtime. And when digital diagnostics identify a fix to equipment is necessary, connected tools can be used to repair equipment, torque fasteners and bolts back to the original manufacturer's specifications.

A successful controller implementation involves a system that is simple to use

That's one of the many advantages of IIoT; it allows manufacturers to be systematic and strategic, rather than simply reacting when a problem occurs. The integration of connected equipment, data and analysis helps manufacturers achieve higher quality standards and more control over their processes.

Looking Ahead, Artificial Intelligence Applied to IIoT

Despite the recent advancements, surprisingly, some of the most high-tech industries in the marketplace are still reticent to adopt, or even try, IIoT technology simply based on fear of change. Even those who are not early adopters will eventually convert, as enterprise customers will expect the peace of mind of knowing the data behind the performance and quality of a product.

As we look forward, and IIoT becomes integrated with artificial intelligence (AI), manufacturing will see a reduction in many time-intensive manual tasks. By leveraging machine learning, real-time predicative recommendations will give plant engineers advance notice before production workers experience problems and safety issues. As more data is collected, machines will continually accumulate intelligence through assimilation and virtual production assistants will help guide engineers to make improvements before operators even know an issue exists.

IIoT is improving lean manufacturing exponentially, and its adoption will only become more rapid. The ability to gather raw data, and analyze and act on the data, is what will continue to fundamentally advance lean manufacturing and give manufacturers the control they need to improve processes, in ways they have never been able to achieve before.

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