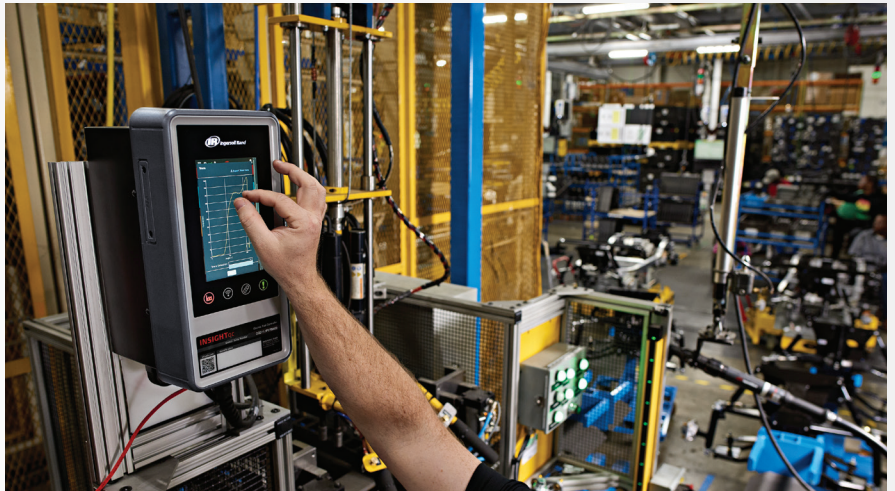




DATA INSIGHTS FROM PLUG-AND-PLAY TOOL CONTROLLERS INCREASE MANUFACTURING QUALITY

New technology innovations are transforming manufacturing facilities into digitally-driven factories. By utilizing the power of data and its derived insights, manufacturers can increase productivity, improve quality, optimize performance and lower costs. Connected devices are growing exponentially and the Internet of Things (IoT) is now a significant factor within most industries, including manufacturing. IoT is ushering in a new wave of smart manufacturing, using analytics and insights drawn from data produced by network-connected equipment, including assembly tools and controllers.



The Ingersoll Rand INSIGHTqc™ controller comes with plug-and-play hardware and software that works with your industrial protocol.

Factories rely on a number of technology suppliers and partners. When these systems work together, manufacturers can experience significant benefits. Connected assembly tools and controllers are one part of this essential digital ecosystem. Industrial networks use programmable logic controller (PLC) platforms to connect and communicate with equipment, machines and tools. To effectively integrate with PLCs, tool controllers must be simple to connect, as well as collect and analyze data in a secure manner.

Connected tools with plug-and-play controllers help manufacturers optimize their assembly processes and create a greater capital return on their tool investments. These technologies help manufacturers be more competitive in the marketplace. However, the point is not to become enamored by technology, but to see the real benefits and value that manufacturers can achieve by leveraging digital technologies as solutions to improve factory operations.

| Innovation begets innovation

When plants integrate assembly tool controllers into a factory digital ecosystem, manufacturers can access the data from the tool to get a better understanding of how assembly processes are working. With this information, manufacturers can make changes and adjustments to improve the assembly process, by making it faster, improving product quality, running it more efficiently and saving costs by eliminating



rework. These benefits are the reason manufacturers rely on tool controllers, but in doing so, manufacturers face two primary challenges.

Challenge #1 - Integrating controllers with existing networks and PLCs

A plant-wide system with connected tools and controllers can benefit a facility in many ways. These systems provide vital information that multiple stakeholders can access including operators on the line, quality control personnel and plant managers, in real-time. However, integrating these systems is not without complications. A networked manufacturing facility requires tight communication and coordination between multiple departments, from the operators on the factory floor to the line supervisors, manufacturing engineers, and plant control personnel analyzing the data results in the front office.

A manufacturing facility may have multiple devices from different suppliers, each with their own preferred communication protocols. This can make it difficult for tool controller suppliers to keep up with the various protocols. Fortunately, there are

suppliers that support many communication protocols and have developed controllers that conduct data analysis and are easy to integrate and manage. For example, Ingersoll Rand®, a global leader in reliable and innovative power tools, recently introduced its INSIGHTqc™ controller with plug-and-play hardware and software that can integrate with any industrial communication protocol.

Think about how Apple® forever changed the smartphone market with a simple and intuitive interface. Today, simple and intuitive web interfaces are

changing the way factories are using controllers. Plug-and-play controller platforms with web interfaces allow plant personnel to easily set up and program devices. No additional software or licenses are required and there is no need to install software on a separate computer.

Challenge #2 - Using analytics to gain insights

The real advantage of connected assembly tools is getting the fastening data. But,



Manufacturers can use connected assembly tools to analyse fastening data and gain insights on how to improve production and product quality.

collecting data is not where the value lies. The value lies in the data analysis, and using it to gain insights into how to improve production processes and product quality.

A digital factory is only as valuable as the people who understand how to analyze the data and take appropriate action from the insights obtained. Manufacturers can differentiate themselves from their competition by taking advantage of the insights they acquire from the controller's analytics. The key to accomplishing this is training the workforce so they can leverage the data and analytics, and understand how best to use the insights they've gained.

A successful controller implementation involves a system that is simple to use so both technically savvy and non-technical users can take advantage of its benefits. To start, it is essential to develop a list of data and analytic parameters the system needs to gather, and then articulate how each organizational department will use the insights.

Manufacturers rely on tool controller suppliers to build in the functionality to collect data, provide the capability for analysis and incorporate indicators to notify operators, line supervisors and other personnel when a threshold has been exceeded on a fastener. For example, tool controllers provide a common set of data, with factors like actual torque reached, the angle result, the time and date when the fastening occurred and which tool and station were used to tighten a screw or bolt. Manufacturers then



The high-capacity local storage of the INSIGHTqc™ controller offers a large data sample that manufacturers can evaluate to optimize performance and lower costs.

associate this data with a variety of parameter targets. For example, if the tightening result was 10, what were the targets or limits? Analytics can show why a target parameter was not met, or why the target was exceeded. It can also show what a tool tried to do, what the tool actually did, when it was done and which tool did the work.

After an engineer sets a predictive threshold on the controller, they can then use a third-party application, or better yet, use a controller with built-in Statistical Process Control (SPC) to monitor the percentage of completions for a particular fastening cycle. If the number of uncompleted actions goes above a 5 percent threshold, the controller notifies a line supervisor with an email alert showing the station and that the fastener tightening has gone over the maximum threshold. Because the data is stored on the controller, line supervisors and quality control personnel can review and analyze

the data and see the tightening curves. With this information, they can make adjustments to the program, investigate the components or correct a process to address the problem.

The power of the connected factory

Manufacturers are finding ways to work smarter to remain competitive. Smart manufacturing occurs when a factory increases quality control over their assembly lines by collecting and analyzing production data. A cost-effective measure of predicting process performance is through an SPC. When assembly tool controllers are integrated with a SPC, manufacturers can monitor their production processes and identify the cause of a failure by using data from connected electric and battery-driven tools.

Smart assets, like connected tools and controller systems, give sight to an otherwise blind

operation. Data management and analytics have been used widely in business IT systems, such as enterprise resource planning (ERP), supply chain management (SCM) and customer relationship management (CRM) to improve business operations. Now, industrial devices, tools and machinery with controllers, sensors and actuators are taking advantage of data and analytics to improve factory operations.

To successfully incorporate tool controllers requires seamless integration with hardware and software platforms that are easy-to-use and intuitive to setup. These systems need to be secure, run backups and restore data quickly, as well as store reports. Quantifying the cost savings, or the return-on-investment, of a controller can be difficult to measure. For aerospace and vehicle or heavy equipment manufacturers, using controllers with data analysis to improve assembly productivity increases product quality and eliminates rework to lower costs. But, these industries gain even greater value by using this data to reduce product failures that could have put someone's safety at risk.

| Connectivity

Tool controllers need to be flexible and interoperable, and they need to easily connect with all communication protocols. This is where a plug-and-play controller that supports many protocols and features a number of configurable ports has an advantage.

Every controller supplier uses their own protocol for dynamic

data management and control of stations on assembly lines. A factory with multiple PLCs from different suppliers may use a number of communication protocols, such as PROFIBUS, PROFINET and others. Data archival systems handle bulk acquisition of data and storage for long-term use. For example, a Manufacturing Execution System (MES) can track and document data in real time. An MES helps manufacturing decision makers understand conditions on the plant floor and assess if changes need to be made.

A controller with multiple configurable Ethernet ports offers the flexibility to access it using multiple Ethernet schemas. For example, this kind of controller can be connected to an MES system for data collection and accessed for programming and servicing simultaneously over different networks.

| High-capacity storage

High-capacity local storage on the controller provides a built-in data backup in the event of a network outage. It also offers a large sample for conducting effective data analysis, while offering protection for users that don't save their data on a server. Having a short recovery saves valuable time and prevents lost productivity.

| Security

A robust cyber security strategy provides the confidence engineers need when integrating controllers

into their network without the risk of a data breach or unauthorized access. Having an audit trail of all modified settings and created data provides traceable evidence to protect the data and a means to resolve security issues.

Implementing security methods can be complicated. This is where a controller with a simplified web interface can mask the underlying complexities. It provides administrators with easy-to-implement access control and allows users to securely login from any location that has an Internet connection via a desktop computer, laptop, smartphone and tablet.

| The digital factory is a competitive

Controller platforms for a digitally connected factory with simplified device connectivity, data analytics, and process optimization, are here. The ability for manufacturers to differentiate themselves by using the power of data analytics is for the taking thanks to the Internet, easy-to-use interfaces, and data management platforms that provide insights to improve manufacturing processes.

For more information about the Ingersoll Rand INSIGHTqc controller visit irtools.com/insightqc.

By: Jeff Lowe
Global Product Manager,
Advanced Assembly Tools,
Ingersoll Rand Power Tools