

Leveraging the Full Power of Industrial Data

Today's highly automated manufacturing plants generate mountains of system data. For that data to have real value to the business, industrial networks need critical tools to efficiently and securely access and deliver that data to critical operational and analytical platforms.

Digital transformation is providing manufacturers with unprecedented amounts of data related to production system performance; however, many older manufacturing platforms use legacy protocols that complicate access to that information, leading to "islands of data" that can inhibit effective industrial data use. A new generation of scalable edge computing platforms is providing a critical solution to this challenge, incorporating key capabilities such as robust protocol conversion libraries and user-friendly programming interfaces that make it easier to build bridges between those data islands. Improving industrial data networking capabilities can also help manufacturers more fully and efficiently integrate the worlds of IT and OT, with software that safely and securely collects, organizes and contextualizes OT data and makes it available to higher-level IT applications and databases.





The promise of Industry 4.0 is rapidly being realized across many manufacturing segments. A wide range of sensors, smart components, and advanced automation drives and controls are routinely integrated into production machines and processes, furthering the growth of automated manufacturing.

These systems are now generating prodigious amounts of industrial data. The challenge for many manufacturing operations invested in this digital technology is how to efficiently access and utilize this data, leveraging its full value with networking systems that are reliable, secure, and scalable to meet both current and future needs.

Several key technologies provide the critical building blocks of high-performance industrial data networks. Systems integrators, OEMs, and manufacturers are seeking strategies to use these tools to gain more complete access and control of companies' industrial data and bridge existing gaps between OT and IT within the manufacturing enterprise. The goal: Access that data to improve operator performance, plant safety, predictive maintenance processes, and manufacturing productivity.



Red Lion's N-Tron series NT5000 switches are designed to keep your network connected, protected and provide ease of use, security, and reliability today's manufacturers and industrial operations need.



CONNECTING ISLANDS OF DATA

Today's manufacturing platforms constantly generate mountains of data related to the performance of individual machine components, subsystems, and production lines. It's being generated by sensors, pneumatic valves, control devices, electric drives, and other components. The volume of this data constantly grows.

However, in many production environments, that data is isolated, complicating efforts by manufacturers to use that data to improve productivity and return on investment. In many cases, this isolation is unintentional. For example, in many systems, temperature and valve performance data are fed through I/O channels to a machine controller, but may not go any further without manual intervention, limiting its value.

Industrial data is a manufacturer's most valuable asset. Data's true value is only realized when it can be easily accessed, aggregated with other machine and line data and analyzed. These "islands of data" exist because many factory automation plants have multiple generations of equipment installed — in some cases, decades-old systems that still provide productive performance.

Incompatible communications protocols are a major reason why full industrial data networking can be so challenging to implement. Many older machines will be using protocols such as Modbus RS-232. At the same time in the same plant, a newer production system added to the line will use more current, open protocols, such as OPC-UA. To compensate, some companies building out their networks may try to create specialized software patches on a case-by-case basis.

The most effective solution to this challenge is a robust set of protocol conversion capabilities that can be implemented as part of investments in new data access and connectivity systems.



RISE OF EDGE COMPUTING SYSTEMS

Edge computing platforms, sometimes called edge gateways, are playing a fast-growing and critical role in solving the challenges of disconnected islands of data. Edge computing typically refers to hardware/software networks and devices located at or near the end user. It enables data access and processing closer to where the data is generated, for faster processing speeds and higher data volumes that supply actionable data in real time.

Edge computing platforms are widely used for critical, real-time protocol conversion to bridge legacy and current generation production systems. Leading providers of these edge platforms are designing them to be powerful networking devices, engineered to supply critical data access and management tasks.

Leading suppliers offer robust platforms that can simultaneously process up to 20 protocol conversions from over 300 supported drivers. These platforms are designed to be all-in-one edge devices that support other critical functions, such as data logging, easy access to MQTT-based cloud servers, and remote access.

Edge systems are being offered by many different technology suppliers, so picking the right one calls for careful assessments. In some operations, manufacturers are reluctant to invest in edge platform technology out of concern that implementing these systems will be costly and time-consuming.

Look for systems that feature user-friendly software that features efficient, drag-and-drop programming platforms that make it easy to set up protocol conversion, cloud connections and data logging features. There are also advantages to utilizing platforms that are scalable: for example, one leading platform can serve as a protocol converter, a networking gateway or an automation controller via software upgrades.

It's also important to weigh potential yearly software fees and costs for external support services. And, unless properly accounted for when purchasing multiple systems to upgrade your networks, costs could escalate outside of established budget parameters.





EXPANDING REMOTE ACCESS

Today's automated manufacturers are, in many cases, multi-location operations, with multiple plants situated across the globe. To be competitive and productive, they need to operate as fully integrated enterprises — and that means eliminating any data communications barriers between facilities and leveraging cloud-based analytical tools.

Along with edge computing platforms, a new generation of remote access systems is now being launched to meet these needs. These systems provide a dedicated platform to advance remote system monitoring, making it possible to remotely access and interact with production systems in a secure and reliable way from anywhere in the world.

Just as legacy production tools in a plant can become islands of industrial data without effective protocol conversion capabilities, geographically separated plants can also become islands. With a single remote access device, users can access multiple other connected network devices, for real-time insights and comparisons about how similar production systems and plants are performing.

These devices are particularly useful as more and more multi-location companies use cloud-based analytical tools to conduct deep dives into their industrial data, to extract trends, modify production or supply chain processes, improve enterprise-wide predictive maintenance programs, and guide long-term planning. It is impossible to carry out these kinds of high-level analysis without having robust remote access that ensures real-time data is accurate and up to date.

Cloud-based data management and analysis depend, in part, on secure and efficient data communications from the plant to the cloud. One emerging technology in plant automation that is shaping the future of manufacturing

is MQTT (MQ Telemetry Transport) protocol. MQTT was originally designed for connections with devices in remote locations with resource constraints or limited bandwidth, making it very lightweight and efficient at moving data to and from a data broker (either locally or in the cloud).

MQTT is capable of “report by exception,” which means that data is only transmitted when it has changed. This feature can provide significant bandwidth savings for both internal and external networks. Specifically configured topics can be stored by the database during a network outage and forwarded to users once reconnected, which guarantees delivery of messages about critical topics. MQTT is not necessarily “new” but is still relatively new to the world of manufacturing with many companies just starting to adopt this powerful technology. Automation companies seeking to bridge the remote data islands between their production facilities will benefit from selecting edge computing platforms that support MQTT.



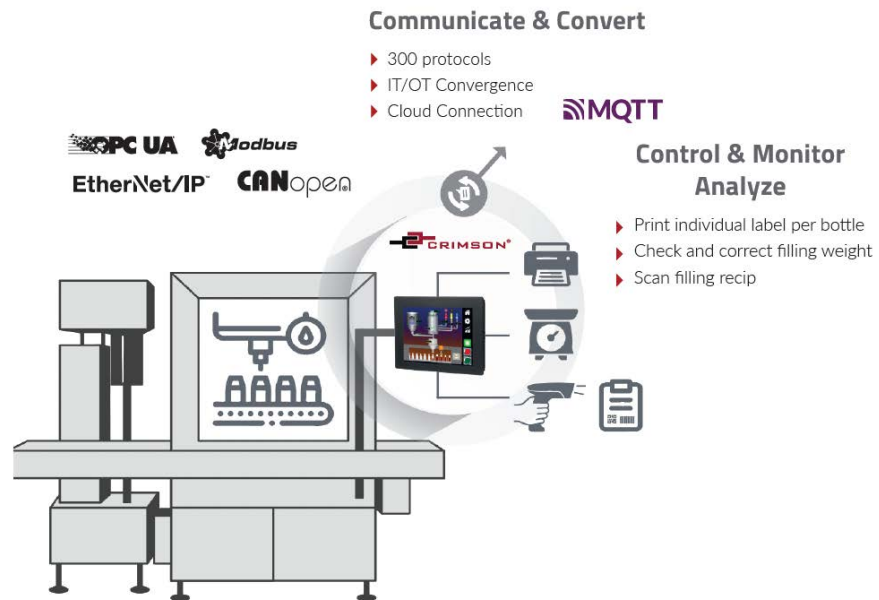
VISUALIZATION KEY TO USING REAL-TIME DATA

Connecting industrial data with enterprise-level analytical platforms is crucial to gaining deep insights into automation system efficiency and performance. However, that data has equal value (in some cases greater value) for operators and managers on the factory floor.

Actionable data needs to be presented in real time to help operators visualize the information they need to maximize productivity and throughput. The latest generation of HMIs and operator panels are designed to deliver that data in clear and compelling formats. They incorporate features that let them integrate data across multiple devices and, in conjunction with edge computing platforms, acquire and display data that has been converted from multiple legacy protocols.

Newer generation panel meters feature large, easy-to-read displays that include a broad range of user-selectable graphics and intuitive screen libraries that are simple to configure and customize to specific plant and production line requirements.

With this new generation of visualization technology, operators and line personnel are able to respond to issues faster, process critical information immediately, and have just one person monitor multiple machines and processes at the same time. These tools let operators see more than just information – they also see what that information means, so they can react to it faster with the right steps.



The latest generation of HMIs and operator panels incorporate features that let them integrate data across multiple devices and, in conjunction with edge computing platforms, acquire and display data that has been converted from multiple legacy protocols.



INTEGRATING OT AND IT

One of the biggest challenges factory automation companies face to fully leverage their industrial data is finding smarter ways to integrate the worlds of information technology (IT) and operational technology (OT). These two worlds have traditionally functioned independently of each other.

The goal of OT was to keep the plant running smoothly, while IT managed all the business applications within the enterprise. However, as digital transformation continues in factory automation plants, these two technology worlds are rapidly uniting.

Successful IT and OT integration will depend on enterprise connectivity solutions between the systems that create the data and the users that consume the data. In order to extract any actionable insights from this OT manufacturing data, it needs to be packaged in an interchangeable and flexible format that can be easily shared between OT and IT applications.

This is one of the key capabilities that edge computing platforms are providing. Software that collects, organizes and contextualizes OT data – and then makes it available to higher-level IT applications and databases – can unlock actionable plant- and enterprise-level insights to guide critical decisions about ways to improve manufacturing processes, increase energy efficiency, reduce machine downtime and provide a more flexible and productive manufacturing enterprise.

This data exchange between IT and OT also needs to be as secure as possible. Hackers and ransomware criminals will try and target industrial systems for vulnerabilities so they can access enterprise IT networks through OT systems. It is critical to select edge computing platforms with top-of-the-line security features, including a stateful firewall, access control list capabilities, packet filtering and fully secured VPN connections.

These edge devices deliver valuable, long-term insights into plant floor operations. With the data collected from OT, operations can transition from reactive and preventive maintenance strategies, to proactive, predictive and even prescriptive ones. For example, these devices can automatically alert operators to any changes or events that could lead to a machine shutdown, allowing them to stay ahead of – and avoid – costly production issues. And finally, thanks to powerful remote access capabilities, users from anywhere in the world can easily add alarms or improve logic and data collection processes, or even monitor traffic on the OT network.



Platforms such as Red Lion's FlexEdge provide a versatile and full-featured solution to bridge the worlds of IT and OT to realize the total value of a manufacturer's industrial data more efficiently and completely.



MAXIMIZING THE VALUE OF INDUSTRIAL DATA

Digital transformation has woven a wide range of data-generating components and systems into automated manufacturing systems. Many manufacturers continue to struggle with effectively accessing that data, particularly from older legacy equipment.

Sophisticated edge computing, remote access systems and smart visualization systems can provide solutions to these challenges, bridging persistent “data islands” so that each company’s most valuable resource – its industrial data – can be accessed, connected, visualized and analyzed to help drive operational improvements and long-term decision-making.

Finding and implementing the right technology for each plant and manufacturer can be challenging. Today’s leading industrial data networking suppliers are experienced at analyzing each plant’s unique infrastructure and a company’s data needs. They can apply their expertise to develop strategies to meet those needs, based on an in-depth appreciation of where data is isolated, as well as insights into future needs as each company grows and evolves.

Industrial data is a company’s most valuable and useful asset. The right technologies, combined with smart approaches for using those technologies to improve day-to-day operations and long-term business strategies, can play a critical role in helping realize the full potential of digital transformation in factory automation.



Leverage the full value of your industrial data through Red Lion's product portfolio.

About Red Lion

Red Lion is focused on being THE Industrial Data Company™. We empower industrial organizations around the world to unlock the value of data by developing and manufacturing innovative products and solutions to access, connect and visualize their information. Red Lion's global manufacturing and support facilities serve customers in factory automation, alternative energy, oil and gas, power and utilities, transportation, water and wastewater industry segments. We provide scalable solutions for cloud connectivity, edge intelligence and asset management, industrial Ethernet switches and industry leading panel meters and operator panels, to make it easy for companies to gain real-time data visibility that drives productivity.

www.redlion.net



ADLD0543 0503 ©2024 Red Lion Controls, Inc. All rights reserved. Red Lion, the Red Lion logo, THE Industrial Data Company are trademarks of Red Lion Controls, Inc. All other company and product names are trademarks of their respective owners.