
Simplyfying Connectivity for Predictive Maintenance

Predictive maintenance is already proving to be one of the more rewarding uses of the Industrial

Internet of Things(IIoT), creating new opportunities for businesses to reduce downtime and improve productivity. For many businesses however, implementing predictive maintenance has been harder than expected. We look at ways to simplify connectivity to achieve predictive maintenance

Predictive maintenance along with Industrial Internet of Things(IIoT) data, is creating new opportunities for businesses to reduce downtime and improve productivity, ultimately, cutting costs and increasing profits. It aims to predict when machine failure might occur and to

prevent its occurrence by performing maintenance. Not only does predictive maintenance ensure reliability, but it brings huge cost savings in comparison with routine or scheduled preventative maintenance, because tasks are performed only when needed.

According to a joint study by the Wall Street Journal and Emerson, unplanned downtime costs industrial manufacturers approximately \$US 50 billion annually, and equipment failure is the cause of 42% of this unplanned downtime. ARC Advisory Group estimates that predictive maintenance can reduce maintenance cost by 50% and unexpected failures by 55%.

Predictive maintenance is already proving to be one of the more rewarding uses of the IIoT for businesses. For example, a distinguished global firm that provides audit, tax and advisory services, leveraged AIoT (AI and IoT) technology to help an automotive engine parts manufacturer increase yield and build predictive maintenance. To achieve this, they added more sensors to existing devices to collect additional data on vibration, temperature, rotating speed and electric current; subsequently, sending the data to the backend AI platform. Here through analysis, control standards were established, making predictive maintenance possible as any deviation, which could result in the production of defective products, was immediately detected.

Slow out of the Blocks

For many businesses, however, implementing predictive maintenance has been disappointingly slow out of the starting blocks. In fact, implementing predictive maintenance has been harder than expected; making it a testing challenge to obtain valuable insights from collected data. But by now, we have come to learn that with new opportunities come new challenges, and enabling predictive maintenance has not been the exception. The two main challenges that managers have to deal with are performing diverse data acquisition and deploying edge intelligence. For the purpose of this article, we discuss how to address diverse data acquisition.

Just Too Many Connections To Deal With

The beauty of predictive maintenance lies in the unlocking of valuable insights from diverse sets of data to prevent downtime. Hence, manufacturers need to acquire columns of new data by adding more sensors and devices to legacy machines for analysis and intelligence software development in the cloud or IT systems. On paper, everything seems straightforward but the problem comes in that the interfaces and protocols of legacy machines are varied. For example, barcode scanner and displays use RS-232, RS-422, or RS-485 serial interfaces while tower lights and signal lights use analog and digital I/O interfaces, respectively. What's more, industrial standard protocols, such as Modbus EtherNet/IP and PROFIBUS, need to be used simultaneously in a Network.

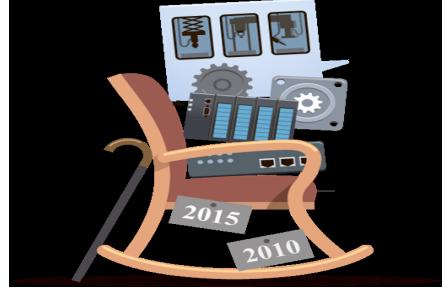
Commonly, most businesses tend to just use familiar PLCs or communication modules to connect devices of different proprietary protocols as well as different analog and digital I/O interfaces, installing edge gateways to convert industrial standard protocols to online SCADA, cloud or IT systems in the absence of cloud communication abilities.

However we know that PLCs are assigned for control jobs such as storing procedures, sequential or position control, time counting, and input or output control. The additional data acquisition and edge-to-cloud protocol conversion jobs maybe minor in the case of just one or two points, but will bring major challenges to the fore in managing diverse connectivity on a large scale.

The Issues

A closer look at the challenge at hand shows that three issues are complicating things to get predictive maintenance out of the starting blocks.

The Costs	Time-consuming	Troubleshooting

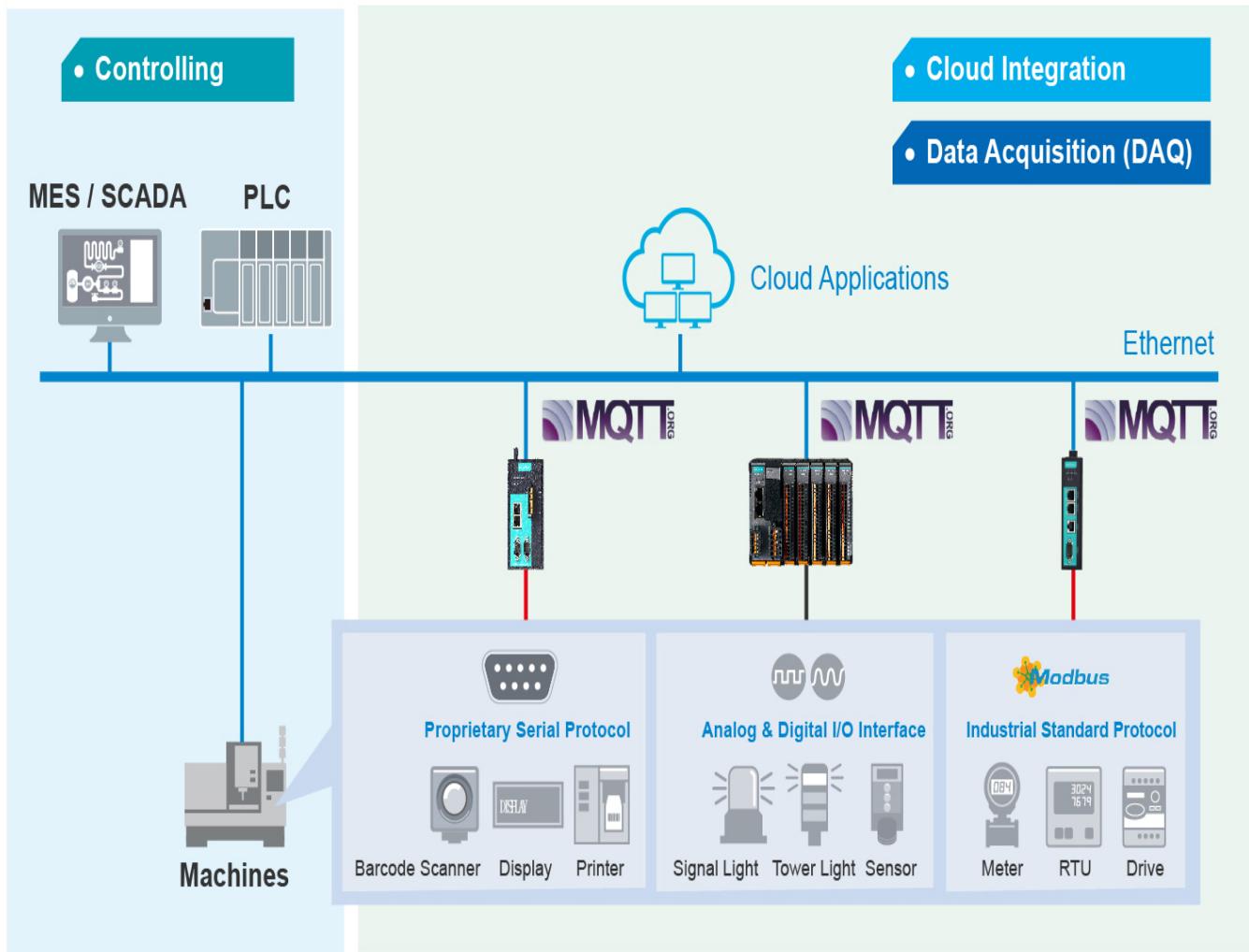
		
<p>The need for additional PLC modules for protocol converters and I/Os can be prohibitively expensive. In addition, legacy PLC may not have the capability to communicate in cloud protocols such as MQTT or AMQP</p>	<p>Extra configuration and programming efforts are required to realize edge-to-cloud connectivity from scratch, and they have often proven to be time-consuming in large deployments</p>	<p>Troubleshooting can also add to engineers frustration as it is very difficult and time-consuming to pinpoint all the communication issues caused by incorrect software parameters, such as slave IDs and register addresses, or incorrect command configurations in large-scale networks</p>

Simplifying Diverse Data Acquisition

Even when so many protocols and interfaces are involved, system integrators ideally want to keep everything about connectivity in a network, sweet and simple, especially when it comes to data acquisition from multiple, diverse sources. For them to keep things as simple as possible seeking out ready-to-run connectivity offering that easily convert protocols of multiple field devices, including serial, I/O, Modbus, and EtherNet/IP to MQTT is strongly advised. MQTT is the most widely used protocol for cloud connectivity and enables communication with intelligent software and systems in private and public cloud platforms, such as Azure and Alibaba Cloud.

Other key considerations for connectivity must include diagnostics tools that ensure the accuracy of setting and a connection loss buffer function that avoids packet loss when the cloud connection gets disconnected.

With regard to troubleshooting issues, devices troubleshooting tools are definite deal breaker. Embedded traffic monitoring and diagnostic information functions, along with a convenient web console, make troubleshooting easy.



Moxa's Solutions

- The MQTT-ready NPort Serial device servers easily connect serial to MQTT/Azure/Alibaba Cloud. Their diagnostics tools ensure the accuracy of settings while their connection loss buffer function can avoid packet loss when the cloud connection is disconnected.
- The ioThinx Series Moxa's MQTT-ready advanced modular Remote I/O supports I/O-to-IT/OT protocol conversion, such as Modbus TCP for OT engineers as well as SNMP and RESTful API for IT engineers.
- Moxa's MQTT-ready MGate industrial protocol gateways simply convert protocols such as Modbus and EtherNET/IP to MQTT/Azure/Alibaba Cloud. Their embedded traffic monitoring and diagnostic information functions and convenient web-console make troubleshooting easy