Data everywhere

Is the race for big data the key to the future of data acquisition technology, asks Louisa Hearn


Source: Honeywell

Data acquisition technology is set to become a key staging post for gathering valuable process insights from the shop floor and feeding them to the rest of the organisation.

But while the abundance of Ethernet networks has been one of its key enablers, it is the drive towards 'big data' analytics that will cement its place in the process plant, say experts.

The main signal types being collected by the current crop of data acquisition devices include temperature, voltage, sound, vibration, strain and load.

Sujan Sami, manager of measurement and instrumentation research at Frost & Sullivan, says the need for of data acquisition (DAQ) hardware and software is being driven by the increasing sophistication of mechanical and electrical products on the market today.

These are creating "the need for higher measurement quality and accuracy of data analysis," he says.

But in order to achieve some of the benefits promised by the 'internet of things' all these devices and applications must first be configured to speak a common language.

While the development of standards to provide this 'language' is well underway, many installations can still only share a very limited amount of the data, say experts

"In our market, data analysis is the biggest discussion point but the challenge really is in getting hold of the data," says Steve Wise, vice president of statistical methods at manufacturing intelligence software supplier InfinityQS.

The company's main product is the ProFicient software platform that gives operators a real-time view of manufacturing operations, allowing them to control quality at each point of the product lifecycle.

According to Wise, improving product quality relies heavily on having access to good, actionable data.

"The types of data acquisition software tools we provide are tools that can get into streams of data for statistical sampling. We are looking for a data volume sweet spot to improve our understanding of the process."

This means taking raw data and putting it into context to create a fully qualified subset of data that can become searchable and ready for analysis.

"We need to tap into a wide variety of data streams and then standardise data and mash it together," he says.

"We also have to represent that data to multiple personas."

Here the veracity of data and security become paramount, says Wise.

"The data we manage are recipes and set points of processes, and those are industrial secrets that can be more valuable even than financial information. We need to ensure those trade secrets are safe because any smart device can become a data acquisition point."

Another complicating factor is the need to exchange meaningful data across a global company using a wide range of software in multiple time zones.

"To have that data available anywhere in the globe involves issues of language, time zones and different standards of measurement," he says.

> **"Not all customers want to pay for data analysis hardware, so it would very useful to offer them what we call 'Cloud Measurement'**

Legacy systems are also a huge problem in plant environments, where aging technology is often deposited when the rest of the organisation upgrades.

"We are having to deal with companies that won't move away from [Windows] XP and still think they can have all the 'cool' tools out there," says Wise.

An added level of complexity arises from industry regulations that demand those collecting process data, must find a way to validate it.

"That means if an instrument is picking up a piece of data from the line, you need to be able to validate that it is passing correct data," says Wise.

Chris Fox, sales and marketing manager at Rotronic Instruments, also sees increasing regulation of processes and data. "Monitoring and controlling temperature and humidity is very important. In the case of food stuff this includes water activity measurement which is a key indicator of product quality," says Fox.

"Regulations and a company's internal Quality Measurement Systems require them to monitor and record temperature and humidity measurements if these parameters have an effect on product quality in any way."

While industrial Ethernet has played in important role in data acquisition infrastructure, Rotronic Instruments has recently introduced a range of wireless data loggers for humidity and temperature monitoring tasks in pharmaceutical and food sectors.

Radio frequency transmissions can save the user wiring costs, says Fox, and useful data can also be recorded quickly and easily where access is severely restricted.

Rotronic's wireless HL-NT series was created for applications where data and events need to be tracked according to the Good Automated Manufacturing Practice (GAMP) or US Food & Drug Administration's (FDA) regulations that affect the food, pharmaceutical and paper industries.

In the pharmaceutical industry 'electronic signatures' are also often required, he says, which necessitate passcode-level access to secure data logging hardware.

Michael Guckes, the product manager for industrial amplifiers and software at HBM, says: "When you are talking about automated processes, you have to be able to guarantee quality, so every product step must not only be measured precisely, but the data must also be stored on logging systems."

▲ **ProFicient software from Infinity QS delivers real-time quality data** *Source: InfinityQS*

The company has a range of data acquisition devices including PMX, a data acquisition and control system for use in both production lines and industrial test benches.

While data acquisition has typically centred on PC technologies, Guckes observes a growing demand for browser-based data acquisition and analysis that would allow users access to data via smartphones and tablet devices.

Cloud data

The company plans to start rolling out this functionality on some of its devices next year, and is also considering methods to put measurement-as-a-service into the Cloud.

"Not all customers want to pay for data analysis hardware, so it would very useful to offer them what we call 'Cloud Measurement'," says Guckes.

"The benefit is that they won't have to use their own on site PCs that can break down or lose data. Instead we can send it directly into a Cloud environment where every engineer has access to it."

So how might plant floor devices actually communicate their data with the plethora of operating environments and mobile gadgetry in the market today?

The answer lies in the adoption of a common standard, says Darek Kominek, marketing manager at MatrikonOPC.

The standard that he believes will enable this fundamental shift is the next generation of OPC (or OLE for Process Control).

The original OPC standard - which already has wide acceptance - was developed to enable collection and transportation of data in a common form, from various devices, control systems, and applications.

Kominek says the updated standard – now called OPC Unified Architecture (OPC UA) - will expand its footprint further, owing to its platform and operating system independence (see box).

OPC UA will now allow an OPC server to be embedded directly into a device, which can then connect seamlessly to any other device with an embedded OPC server, says Kominek.

MatrikonOPC has launched an OPC UA Embedded Server Software Development Kit (SDK) specifically to facilitate the process for device manufacturers wishing to embed the server in their own equipment.

Kominek predicts that in the future, intelligent materials will be able to inform machines how they need to be processed; maintenance and repair will be directly initiated by the components of the intelligent factory plant; and rigid production lines will be transformed into modular, efficient systems.

"Ultimately, the entire lifecycle of a product could be fully documented," he says. ■

▶ TECHNOLOGY

Standard solution

Integration between the jumble of hardware and software systems in the industrial marketplace is the main challenge when it comes to gathering and analysing important process data.

In an attempt to solve this issue, the OPC Foundation in 1996 introduced a series of standards and specifications based on Microsoft's object linking and embedding (OLE) and distributed component object model (DCOM) technologies. This standard has become known as OPC (OLE for Process Control).

Its purpose was to give PLC protocols (such as Modbus and Profibus) a standardised interface with HMI/SCADA systems.

With its foundations based on Microsoft technologies, however, the OPC standard was restricted to the Windows operating system.

"In complex production environments, that became a real problem," says marketing manager of MatrikonOPC, Darek Kominek.

To address this issue, the OPC Foundation has now developed the OPC Unified Architecture (OPC UA) specifications that no longer use DCOM.

"Now it can run on Linux, Windows or embedded systems running on RTOS (Real Time Operating System) or even 'bare metal' environments which don't involve an operating system at all," says Kominek.