TURNING DATA INTO ACTIONABLE INFORMATION

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We place a lot of emphasis on historical information. We study it, discuss it, and ultimately use it to make decisions impacting our future. But what if no one took the time to gather and store this information, or chose to focus on events that were mostly irrelevant? Lessons wouldn’t be learned, history would be repeated and society would suffer.

So how did the Wright brothers become famous for being the “First in Flight”? They created the first piloted glider in 1900 and then the first powered flyer in 1903 by studying the results of their predecessors’ trials. We’ve reached new levels of flight and aircraft technology by doing the same — improving on history to reach today’s advancements in aircraft design, safety and functionality. This classic paradigm of innovation from history is the same scenario that today’s plant managers must achieve in their production processes — they must collect, transform and integrate their historical operational data into useable production information.

For manufacturers, data historian software provides a clear view of the past that can offer solid insight into where improvements need to be made. When used in its full capacity, a data historian helps manufacturers gain a deeper view into production operations and the underlying correlations that affect performance. Historians capture process variables in the form of time-series information, which can be used in various calculations, estimations, statistical processes and quality controls at different levels of the enterprise. Storing this information for future analytical needs affords management an opportunity to not repeat history by making the same mistakes again.

While data historians can provide valuable insight that can be used to streamline manufacturing and production processes, many organizations fail to maximize the extensive capabilities these software systems provide. Identifying the “right” type of data and recognizing the wide range of functions available is often the key to fully leveraging the data that already exists — often concealed — within the facility.

The “Right” Stuff

Historians retrieve and display data in single values at specific times relevant to the process, or as a series of data between two relevant “events” or time stamps. The data is typically stored in a time-series optimized data store, which are proprietary formats to optimize the speed of data capture and retrieval. Others store data in an open relational database, such as an SQL Server. The stored data is able to be viewed and analyzed at the equipment or area level, across the site, as well as across multiple areas and sites. The ability to correlate the data to products, process changes, shifts, material suppliers or even quality procedures is almost endless.

Ideally, historians should be used as a central repository for data that supports timely decision making by utilizing the data as information for making improvements and modifications to the production process. This level of analytical support can invigorate innovation throughout the entire business. A system set to capture virtually every process variable in the plant, including environmental, production and event data, gives management and their employees the ability to derive the right Key Performance Indicators (KPIs) for optimal operation of the business. In order to do
this, manufacturers must extend their current thinking and utilization of their historian software and drive to deeper and different uses of the process data being collected.

For example, if it is taking a machine longer and longer to dry a product, its cause could be any number of things — from the humidity in the air to changes in raw material. This is where the advanced analytical capabilities of historians come into play. By using statistical totalizers, performance equations and other methods to determine correlation, manufacturers can calculate and compare process variable trends over time. Using these performance equations to derive information not directly captured makes it easier to determine the “real” root cause of problems.

Once the production is fully understood and the relevant process variables have been selected and captured, manufacturers can manipulate the information in a variety of ways. For instance, a change in one equation could lead to the missing piece of information that explains how to improve the quality of the end product.

Clearing the Hurdle

Unfortunately for many manufacturers, the cost model of a historian hinders optimal usage. Most historians are licensed based on how many data points are stored in the application. Others only charge based on the number of points collected from the equipment and not on the points derived during the calculations and analysis portion. Unless manufacturers have an unlimited site licensing system, they are likely limiting the number of points in the historian. Adding points to an existing historian could result in having to upgrade to a larger application. Historians with cost models only charging for points collected from equipment allows customers to size the historians based on the equipment installed in the plant, and allows the customer to grow the number of analysis points and equations without having to pay more.

Another issue that contributes to the under-utilization of historians is the lack of knowledge about what controls the processes in the plant. Users who are accustomed to capturing time-series data and viewing it in trends to identify issues within a process might find it too complicated to expand the use of the historian into generating KPIs and other types of analysis. However, this type of data might make it easier to identify issues with a process and could help stop users from identifying a wrong slope on a trend.

The value that a historian provides is linked to how the historian application is utilized and the user’s understanding of its full range of capabilities. Therefore, it’s critical that manufacturers work with a knowledgeable technology provider who can assist in how to best apply the software for maximum value and return.

A Closer Look at the Data

Historians allow employees in different locations and at different operating levels to view and analyze historical data from their unique perspectives. For example, machine operators can view data from the actual machine they are using, while plant-level supervisors can view individual machines or complete lines in real-time to build
comparisons against standards, and assess how batches and critical processes are performing. Meanwhile, senior management can use the same technology on their executive dashboards that compare KPIs of production activity across multiple locations such as manufacturing costs, complete and on-time shipments, schedule compliance and manufacturing cycle time. This information can play a crucial role in helping to provide a reliable baseline for continuous improvement.

Manufacturers in different industries gather and use information in different ways. In process industries, manufacturers often use historians to collect data and display trends that are used to identify product quality, efficiencies and process improvements. Generally, users compare the trend information against a previous good batch (also known as the “Golden Batch”), which allows them to monitor any unexpected behaviors that may affect the machine or product.

In these types of plants, production supervisors can build comparisons and assess how batches are running at their individual site and compare them to other locations or to corporate standards. With the ability to analyze processes in real-time, they are able to perform immediate corrective actions as soon as performance deviations surface.

When used properly, historians offer a valuable tool for analyzing the past while laying the groundwork for decisions that affect the future. A good example is a Georgia-based flooring manufacturer that wanted to standardize its data collection and network configuration across six of its ten facilities for better access to plant-floor information.

**Delivering Results**

Excessive downtime due to unreliable equipment was the driving force behind the company’s decision to implement an integrated data collection and reporting system that included FactoryTalk® Historian from Rockwell Automation. In addition, the company needed to curb the complexity and inefficiency that came with multiple networks. In addition to a single, unified network architecture, the company also needed a way to collect, store and analyze manufacturing processes in real-time. With the implementation of the historian software, the company can now collect carpet processing data from the information-enabled controllers and store that data for later retrieval. Upper management can perform critical analysis and reporting on production processes to identify potential and impending problems and help improve overall performance. Operators also have real-time access to this data, which helps them make production adjustments immediately or as needed.

The solution has helped the company reduce downtime by 50 percent, reduce the number of startup errors and improve equipment reliability. Additionally, the system has helped saved the company hundreds of thousands of dollars in off-quality claims by allowing it to easily archive historical data and pull reports at a moment’s notice. Now that the company has learned how to optimize production processes through the analysis of historical plant-floor data, they’ll be able to continue the process improvements, using the historical data to improve their production processes for years to come.