

New rules of data management

New tools help attain 24-7 data collection.

BY SONDRA GRINER

When modern plant historian databases debuted in the 1980s, they were valuable as an engineering tool for generating reports or perhaps finding out why a particular upset occurred in plant production. Older closed technologies also constrained control systems to a very small amount of historical data for the operator. We used information-system-level historians to supplement operator reports and logs. Loss of data was merely a source of frustration or annoyance; it might require a trip to the control room to look up the missing data. All in all, glitches in the plant historian had minimal impact on plant performance.

Today most customers no longer see the plant historian as just a convenience; it has become a critical part of the processing environment—an environment that requires reliable, 24-7 (twenty-four hours a day, seven days a week) data collection and often 24-7 data access. As such, plant engineers have to be sure that the data absolutely will get to the history system, and that it is highly accessible. Why? Because tougher government regulations, increased industry consolidation, and tighter process monitoring contribute to the need for consistent, accessible data.

REGULATIONS

The plant historians collect and store the emissions data—used to demonstrate to the U.S. Environmental Protection Agency (EPA) that operating units are in full compliance with their limits.

So, what happens if data is missing? At best, the site can report the anomaly to the

EPA, or it can back up electronic data with expensive-to-maintain manual logs. The EPA doesn't tolerate large or frequent periods of missing data. Additionally, you could end up with large fines or jail sentences.

DATA CUSTODY TRANSFER

The evolving complexity of corporate entities is also driving the new rules for data management, particularly in regard to data custody transfer. More and more, large chemical and petrochemical complexes involve two or more corporations. What was once a site owned by one company is now divided into multiple entities with multi-part names such as ConocoPhillips, Chevron Phillips Chemical, ChevronTexaco, and ExxonMobil.

Companies also have specific units—COGEN and Coker units—owned by special joint venture companies. These companies pay each other for feed stocks, products, and energy within highly integrated businesses. To ensure they are making and receiving the right payments, they need reliable data on what came into and out of these transfer points.

OPERATIONS MONITORING

In today's facilities, reliable real-time access allows operators to analyze trends and take action before they see plant upsets and financial impacts. Plant staff monitors thousands of process data points for deviations against plans. They can monitor process tags against standard operating limits and planning targets. Automatically recorded and detected deviations stay in the system for years of

analysis. Automatically calculated economic impact ranks deviations based on their real cost to the plant. Recorded reasons for deviations help explain how and why the plant is operating the way it is.

OUTAGES HAPPEN

Clearly, preventing outages is an important step in avoiding data loss and maintaining reliable access to data. Outages may be due to unplanned situations such as hardware failure, disk errors, power outages, and network failures. A mirroring, retrieval, and information database (RAID) and other robust hardware may protect you from hardware failure, but they do not protect you from operating system or application failures.

Scheduled system maintenance for backups, application of patches, and other components are necessary to prevent unplanned outages. However, these activities also create a period when the organization is not gathering and distributing critical process data. Such maintenance is valuable and necessary, but even during a planned outage, we need to make provisions to continue data collection. The loss of a single data collection component cannot be the cause of data loss.

Two approaches—a history recovery scheme or the use of a hot spare—can ensure collection reliability and availability.

HISTORY DATA RECOVERY

History recovery schemes are one approach to avoiding data gaps. You may already have a centralized historian that contains data for your entire site. Other data collection systems



or underlying control systems may already have the data you need, if only you can get it back. A plant historian with the right real-time data interface (RDI) can recover missing history from any system that is history aware. Suppose the historian is down for planned or unplanned reasons. During this time, the historian is not collecting or storing key plant data to history archives. When the historian restarts, it must fill in the missing data from the lower-level system, thus filling in the data from the period of noncollection.

The cost of implementing history recovery schemes has dropped dramatically with the widespread acceptance of the OPC historical data access (HDA) standard, which provides a completely open application programming interface to historical data. When plant historian systems employ this standard, they can recover history from any system that provides OPC HDA access. HDA awareness is necessary in two places: on the source system, such as an OPC HDA server, and on the RDI, such as an OPC HDA client.

Customers need to separate plant information data requests from operationally required data systems. Others need to collect data from a diverse set of control systems and consolidate it into a single data store. Such distributed systems create an environment where unit-level history systems maintain a local data set. This local data set can meet operational data needs and provide a source for history data backfill in the event of area-wide system loss.

THE HOT SPARE

If data gaps—however temporary—are unacceptable and real-time data access is critical, prepare for the possibility by having a hot spare—a secondary system that immediately picks up data collection when the primary system goes down. A hot spare creates some challenges; however, you can easily handle them all with the right implementation.

First, data gaps may occur if the switch over to the secondary data collection system is manual. A technician must be on call to manage the switch to the secondary system, which increases operating expenses. An automatic process prevents data gaps and expense.

Limit data loss to only the time it takes for the spare system to detect the loss of the primary system and activate the standby

processes. Although this may not completely eliminate data loss, you should reduce the gap to an acceptable level, as few as two to three scans. The spare system must maintain knowledge of the primary system's status on a continuous basis, so it can evaluate when it is time to start up the spare processes.

Second, the backup system must indeed be a spare system; it should not be collecting data at the same time as the primary system. Dual collection creates a duplicate data load on the underlying system and potentially inhibits the operator's ability to control the process on a timely basis. When activated, the backup system must act as a fully functional replacement, and therefore must receive a duplicate copy of all data the primary system collects. When the primary system restarts, it must also quickly take back the role as a fully functional history system. So the secondary system must be continuously checking the primary system's health and must be capable of taking over immediately upon detecting the lost heartbeat. The primary and spare systems must track each other's status and share data, so both will contain a fully functional set of plant history archives.

WHAT'S RIGHT FOR YOUR SITE?

Which of these approaches—history recovery or a hot spare—is right for your site or company? It depends whether your primary concern is real-time access to the data, or just knowing you can capture that data, even when it interrupts communication. If your main concern is being able to recover data after an outage, a history recovery scheme may suffice. However, if your operators need to maintain real-time access to data even during an outage, you will need a hot spare.

A hot spare also might be the right approach if you do not have an underlying history collection system, or the system you do have doesn't provide enough detail, doesn't have an interface that allows for easy data retrieval, or doesn't store data long enough.

Even if regulations, business directives, or other factors do not immediately dictate consistent data collection and access, going ahead and investing in data reliability is a wise choice. Select systems to allow for increased reliability in the future. As an example, you can initially set up a single server system at a relatively low cost. As more people rely on the his-

torian and require 24-7 availability, you can add the hot spare collection unit with hardly any interruption to the existing data collection processes. Yet this will only work if the organization selects the initial collection system with at least the future possibility of robust spares.

MEETING OPERATOR NEEDS

As you establish history recovery schemes or add a hot spare, consider how the components and systems you use will affect the ability of your users to track data in real time. Three system features are becoming more readily available to support operator effectiveness.

SEAMLESS REDIRECTION

In seamless redirection, the system knows which plant historian (primary or secondary) is currently collecting data, and automatically switches the live interface. This is particularly important in the operational environment, where it is unacceptable to require any explicit steps to detect loss of a primary system and switch to the spare. Operators must be able to focus on the safe and profitable operation of their units, and not be concerned with the internals of their computer systems. When you distribute data over multiple systems, you might want to have the client make a single connection and allow the system to maintain the knowledge of the true location of the stored data.

COMMON INTERFACE

Regardless of the historian or the software you use to track a specific data point, the system presents the information to the user as a comprehensive, generic summary.

CONNECTION TO BUSINESS PROCESSES

More often you will need to evaluate process information in light of business plans and customer requests. Plant historian systems collecting this data and presenting it to the operator help achieve this level of plant-floor-to-customer integration.

The value of 24-7 data collection and access will only continue to increase in the coming years. IT



Behind the byline

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