Environment article (*1,000 words*)

Fred Woolfrey looks at the possibilities of converting raw process data into valuable environmental monitoring information in today's process plants.

The global market for Process Information Management Systems (PIMS) is well established. Companies using these systems have collected data for many years, and the advent of open systems architecture now means data from many different systems can be shared around the plant or business and used in many different ways, including providing environmental monitoring capabilities.

The key challenge for the process industries is what should be done with the data stored in many different systems, to provide better business information. Various attempts have been made, but many have proved very expensive, as they are extremely complex and have tended towards over-intellectualisation of the subject matter. By using existing data from diverse sources in new and novel ways, much fresh information about processes can be revealed, adding value to the business in many and varied places.

Environmental monitoring is a key function that will add value to an enterprise seeking operational excellence, and allow them to demonstrate due diligence to environmental agencies. In many cases environmental monitoring is carried out by dedicated instrumentation and recording systems, but some businesses may be surprised to find that the addition of a very few additional data points to an existing PIMS system may make it possible to start analysing environmental outputs from a plant. Companies can potentially achieve business advantages by using data from mandatory environmental record keeping and reporting with other information to improve plant operations.

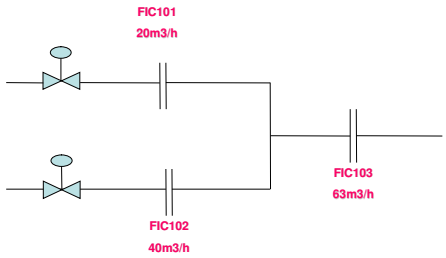
To provide comprehensive environmental reporting on an enterprise scale, information must be gathered from a range of disparate systems:

- Process data from Process Information Management Systems (PIMS)
- Laboratory data from Laboratory Information Management Systems (LIMS)
- Financial data from Enterprise Resource Planning (ERP) Systems
- Other systems contributing data, such as maintenance systems

The size of a supervisory system at the reporting and analysis level is quite small in comparison to the contributory systems, as it only needs to record the data pertinent to the functions defined for its purpose. The information output is typically lower than the frequency of PIMS data gathering as the environmental system looks at events over longer time periods.

Value can be added to reporting data by mapping the plant into operational units. An informational model of the plant can then define cost centres and product and energy flows between them. Knowledge about the operational characteristics of plant items can be entered into such a model-based system. With this information an object-oriented system can be used to define and create many different things, such as performance ratings, production accounting and mass balances across easily re-definable specific areas of the enterprise. This will allow operators to seek out and quantify losses to the atmosphere and other waste emissions.

Mass balancing is one of the cornerstones to such a system, so how does this work ?



The three tags described above have specific flow rates associated with them. The diagram illustrates a situation where, due to measurement inaccuracies, errors or the presence of too much instrumentation, the two feeder flows do not equal the total flow. The situation is currently being viewed as 20 + 40 ≠ 63, which can be analysed using reconciled mass balancing to resolve the differences. If the situation is 63 – 40 = ? where the third measurement is missing a mass balance can be performed by inference. When flows are considered in this way it is possible to adjust their rates and inventories calculated from them to make the measured values more accurate to better fit the overall balance of the production unit or plant. Alternatively malfunctioning instrumentation can be readily found and problems resolved at an

early stage, improving efficiencies and helping operators stay within their defined environmental emissions.

By providing environmental monitoring functionality on the back of a system that provides wider plant functions it is possible to corroborate and re-use already verified information, thus keeping the cost of this specific analysis down. This re-use of already verified information also saves time and ensures consistency in analysis across an enterprise.

An object-oriented system can easily be made aware of local and specific emissions limits, as defined in legislature. This knowledge will improve its functionality and usefulness dramatically. The ability to provide information on the following will also provide useful tools:

- Emissions over specified time periods
- Average values presented over specified time periods
- Peak output
- Any deviations and violations

This information will allow a company to demonstrate compliance with confidence or to discuss any breaches with regulatory bodies knowing what the extent of the problem is. By tying a supervisory system holding environmental data to an electronic log record, further beneficial opportunities can be revealed: Information concerning breaches of limits can be recorded alongside details of action that was taken to resolve the problem, further demonstrating due diligence to environmental bodies. Electronic logs will also enable better inter-shift communications in general, with many other peripheral benefits, too.

Analysis within the Enterprise Resource Planning (ERP) market is considerably more developed, with big players such as SAP providing services that enable companies to analyse the financial performance of their business in a wide variety of ways. With processes mapped out in an object-oriented manner it becomes possible to provide a similar level of instant, timely and flexible financially-aware environmental and production analysis at the process level, in ways not possible using traditional Process Information Management Systems.

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Notes for Editors:

1. Yokogawa is a world leader in information management systems for process industries. The company provides a systems development and integration capability specializing in integrated information systems for the global marketplace.

2. The Yokogawa Exaquantum Plant Information Management Systems (PIMS) and Management Execution Systems/Operational Excellence Solutions (MES/OES) deliver benefits for plant operators in many process industries in most parts of the world. Yokogawa PIMS/MES/OES integrate data from many systems in a plant and produce high value business information for use by decision makers at all levels of the enterprise. Yokogawa PIMS/MES/OES automatically integrate data from process control systems, including Distributed Control Systems (DCS) and Programmable Logic Controllers (PLC), with other data from quality, maintenance, laboratory, planning, scheduling, Enterprise Resource Planning (ERP) and many other systems. Yokogawa PIMS/MES convert Plant Data into Business Information.

3. The Yokogawa software being installed today is already in use in chemicals, food, petrochemicals, oil & gas, pharmaceuticals, power generation and general manufacturing plants throughout the world, providing monitoring, management, optimization, modelling and control of many diverse, dynamic, and hazardous processes.

4. Yokogawa Website: www.yokogawa.com

5. Photographs (both high resolution electronic and print) and system/network graphics are available to accompany this story. Please contact Kari Mitchell at Kari.Mitchelll@us.yokogawa.com