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PUMPS & SYSTEMS

ROTATING EQUIPMENT

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Knowledge is POWER

Web-Based Monitoring Solutions

Lubrication challenge – Have you done your homework?

Defense in depth against problem-fluid leaks

Payback from a sole-source supplier arrangement

The Shift Toward Web-Based Monitoring Solutions

Select the one that's right for your specific needs

Mike Drainville, Director of Technology, The Walchem Group
and John Goreham, Product Development Manager, Iwaki Walchem Corporation

The concept of monitoring pumps and pumping systems is not a new idea. Monitoring pumping parameters such as flow rate, motor current, suction pressures, discharge pressures, vibration and efficiency has been done for decades. The information has been used for predictive maintenance, diagnosing modes of failure, instantaneous alarm notifications and, in some cases, profiling long-term performance.

What has changed recently is the manner in which these monitoring, control and communications features can be packaged together into powerful, low-cost and easy-to-use products.

In addition, regulatory and business model changes also are combining to drastically increase the demand and viability of "smart", remotely accessible pumps and pumping systems.

Business Model Changes

In an effort to differentiate themselves in a highly competitive global economy, manufacturers in many industries are shifting away from selling "hardware" to selling solutions. Customers are demanding more and more with respect to post-sale support and they, in turn, have far fewer technical resources to commit to equipment maintenance. Moreover, companies are looking to employ assets away from large capital expenses or high-maintenance items and apply them in more opportunistic areas.

Many companies are meeting these customer demands while satisfying their own desire to reinforce customer relationships by bundling products and services together in a solutions-oriented approach. Some of the questions end users are asking these days include:

- *Why should I buy a compressor when I can buy only the compressed air that I actually need?*
- *Why should I buy a water purification system when I can just purchase the water I use instead?*
- *Why should I take responsibility for purchasing and maintaining water- treatment equipment used for monitoring and controlling the water in my cooling towers, chillers and boilers when I can simply purchase specific results and performance from a water treatment chemical company?*
- *Why should I spend X dollars on 25 chemical process pumps when I can purchase a lease and service contract directly from the manufacturer that includes continuous monitoring?*

These are but a few examples of some rapid changes taking place in many industries. With these changes comes the increasing need for equipment with remote monitoring capability. The ability to monitor, trend and reconfigure field-based equipment with this business model is essential.

Technology Trends

The advent of the Internet and rapid advances in electronics technology have facilitated the design of pump monitoring products that overcome many of the shortcomings of traditional products, including:

- The system was often cobbled together in a piecemeal fashion with transducers, transmitters, a controller, a communications module and sometimes a "bridge" that would enable connection to a Local Area Network. This often became an expensive system that required extensive training to set-up and troubleshoot.
- These systems required proprietary PC-based software to be installed in order to communicate with the equipment. This was often expensive, unreliable and presented many challenges dealing with revision management and distribution issues.
- Remote access was accomplished via modems that often resulted in costly, long-distance charges.
- Modem-to-modem (point-to-point) systems using standard telephone company lines only allowed one person to view the equipment at a time.
- The lack of communication standards resulted in many "ad-hoc" communications protocols that lacked reliability and were difficult to configure and troubleshoot.
- The lack of a standard graphical user interface resulted in the development of unfamiliar, often difficult to use, proprietary software for communicating and interacting with the equipment.

Most of these types of shortcomings can be addressed through the development of *Web-enabled equipment*. Essentially, Web-enabled equipment is designed to look like a typical Internet website. This is accomplished by embedding a Web server and support for Internet communications protocols directly into the equipment. The result is a prod-

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uct that end users can communicate with easily—as easily as if they were to "surf" the Web and interact with any Website. Gone is the need to install and learn a new PC software application. Instead, the user interacts with the product using a familiar, easy-to-use, *free* software application: *a standard Web Browser.*

Finding the Right Features

While it is true that most of the traditional system monitoring problems can be overcome with Web-based solutions, end users should make sure that the ones they choose have adequate features to meet their particular needs.

Things to look for in a Web-based remote monitoring and control system include:

Ease of use

- Modifiable equipment parameters, viewable in real time via the Internet in a simple point and click fashion; (Many products are "view only" and configuration is possible only on site through a keypad interface—not with a Web Browser.)
- Communications via standard Internet Web Browser—no proprietary software required;
- Ability to send system summary reports or datalog files as attachments to standard E-Mail on any user-configurable schedule (time of day, frequency etc.).

Auto-alarming

- Ability to select from one or all of the following notification methods: local relay, E-Mail, fax or page.

Datalogging

- Sufficient embedded storage capacity to accommodate at least one-month's worth of data, with a back-up copy maintained for additional reliability.

Flexibility

- Accessible via the Internet over a standard phone line connection;
- Remote equipment access via the Internet without having to be connected through an On-site Local Area Network (LAN) with a permanent Internet connection;
- Optional Ethernet connection for connection to an on-site LAN;
- Ability for equipment to receive a standard modem-to-modem (point-to-point) call in addition to a modem connection via the Internet; (In the event of any loss of Internet service, the user can still connect to the equipment using the traditional modem-to-modem method while still maintaining the advantage of using a standard Web Browser as the client software.)
- When in close proximity to the equipment, ability for local communications to be accomplished with a laptop or portable handheld device and RS-232 serial connection. (This can be more convenient than requiring the product to have built-in Ethernet support.)

Although small in size, Walchem's prototype Micro WebServer is capable of reaching new levels of integration.

Aggregate data collection

- While it is important that a standard Web Browser can be used to view live data and manipulate configurable device parameters, it is also important that these devices have the ability to readily communicate with centralized databases. The centralized database becomes important when hundreds or thousands of devices are deployed in the field. With this approach, aggregated information can be used to profile accounts, schedule chemical delivery and even directly drive production.

Security

- System capability for using a randomly assigned, dynamic IP address;
- System access ONLY when requested by the user, as opposed to being permanently connected to the Internet;
- Multiple operator security access levels.

Low cost

- Highly integrated electronics in a low-power, small-form factor;
- No proprietary PC software required;
- No long-distance phone charges.

Regulatory Trends

What is now being done in some plants where real-time data management is a must for proper system operation eventually will become a strategic advantage or a mandated regulatory function. For example, chemical management in the clean and wastewater treatment industry will move to require real-time reporting to the local municipal or EPA office. This is now common in the UK. The practice of having local officials conduct routine data retrieval will be done

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remotely rather than through personal visits to multiple pumping stations.

Another regulatory trend driving the need for "smart" pumps and remote monitoring solutions is in the area of pump efficiency. Pumps currently consume more than 20% of the world's electrical energy. This fact, coupled with recent energy shortages has brought the issue of pumping efficiencies to the surface. The United States Department of Energy (USDOE) is working closely with groups such as the Hydraulic Institute (HI) in an effort to determine mutually agreeable, enforceable standards that will lead to efficiency improvements. Continuous improvement in industrial pumping efficiencies is on the way to becoming a mandate in much the same manner as the home-appliance and automotive industries. Continuous pump monitoring enabled through the proliferation of embedded communication technologies goes hand-in-hand with a tighter focus on pump performance.

Real-World Web-based Monitoring Now

One of the first industries to fully embrace the Web-based process management and remote access model is the Water Treatment Industry—specifically, the specialty chemical industry that provides chemicals and water treat-

Building a Better Mousetrap

by Jane Alexander

Success doesn't come overnight, and that's especially true when it comes to "building a better mousetrap". On the surface, the technological "leap" to Web-enabled monitoring described in the accompanying article may look easy. Moving this type of solution from concept to reality, though, can require considerable time and resources—*and patience*.

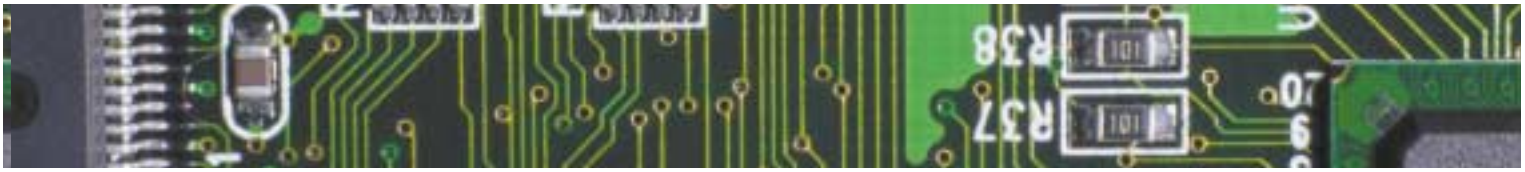
Development of Walchem Corporation's WebMaster®, an industrial Web-based multi-input/output, control and monitoring product, began back in November 1998, and continued for almost three years. It was not until June of 2001, that the first application developed on the platform, Cooling Tower Water Treatment, was re-leased for sale.

During the design phase, Walchem developed a proprietary, Internet connectivity technology with broad application that goes well beyond industrial markets. Patents were filed in November of 1999. Alpha stage prototypes were first installed in the field in April 2000. The BETA program began in July 2000 and ended in June 2001.

In addition to the U.S., BETA sites were located in the United Kingdom and Japan. The ability to perform remote software upgrades and communicate with the product at virtually no cost (only local phone charges apply) came in very handy particularly for BETA installations across the globe.

Today, roughly seven months after the product's launch, WebMasters are installed and accessible via the Internet in the U.S., Canada, Israel, Mexico, UK, Singapore, India and Japan. Commercialized applications now also include boiler water treatment, and will be expanded to cover pump monitoring, field chemical inventory management, industrial and municapal waste treatment, metal finishing and a variety of other general industrial applications.

For more information on the WebMaster, go to www.walchem.com



ment expertise for cooling towers, chillers and boilers for both comfort and process heating and cooling.

Traditionally, although end-user facilities have purchased chemicals from these water treatment companies, it is the end user—not the water treater—that primarily has been left responsible for the purchase and maintenance of the analytical equipment used to perform the critical role of monitoring and controlling the water treatment process.

Led by the availability of practical, Web-enabled process management equipment, there has been a shift in the Water Treatment Industry toward *fee for service* types of arrangements. Now, facilities can purchase a turn-key yearly treatment program from water treatment companies, including chemicals, water-treatment expertise, equipment and comprehensive 24/7 system monitoring and service. The end user benefits because he pays for an end solution: a clean, efficient heat transfer system with instantaneous notification of system upsets and immediate corrective action.

The water treater benefits, too—in several ways.

First, by having remote Internet access to the equipment on demand, water treaters now have the ability to make system adjustments without actually traveling to the site. This virtually eliminates the need for visits "just to check up on things" or to deal with "reports" of system issues that could have been corrected with a simple phone call. That is, they could have been corrected if only there had been remote visibility of the entire system.

Second, because there is timely notification of system alarms or trends through auto-alarming and auto-reporting features, the water treater is now capable of providing a higher degree of service to the end user than his competitor.

Third, the water treater benefits by being able to take advantage of centralized expertise. With the ability to troubleshoot field problems from the home office, companies can rely on a centralized body of equipment and application experts leaving their salespeople to focus more on selling chemicals and growing their business. **P&S**

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Guest Column

The Internet – What Does it Mean to Most Pump Companies?

Ron Yates, President & CEO, The Walchem Group

Explosion of Internet usage is presenting new and creative ways to interact directly with customers. Most pump companies are still trying to figure out what it all means to them, in a practical sense, and *how* to deal with the new technology. At the same time, issues that can be quite troublesome to most companies also are surfacing. These include a sense of loss of control over sales channels, and what to do about years of infrastructure that have relied heavily on distribution.

Of course, an even more complicated trend is the increasing integration of technologies such as sensors, instrumentation and pumps. Interest in remote monitoring, electronic controllers and sensors, along with other smart devices integrated with pumps, will require application and development of new technologies. Emphasis on software rather than hardware will achieve more efficient operating systems, seamless information retrieval and systems consolidation, if not miniaturization. Migration to these combined technologies is new to many in the pump industry. It requires knowledge and perspective inherent in the fields of instrumentation, software and telecommunications. The impetus for this combined technology will come from systems thinking and optimization—the need to address fewer qualified operators in the field, the need to make product application more efficient and reliable, and the need to use available information as knowledge, which can then be translated into value. A broader perspective and more nimble thinking than merely dealing with traditional pump industry issues will be mandatory.

The Latest Industry *BuzzWord...*

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Email Status Reports, Historical Data and Alarm Notification

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