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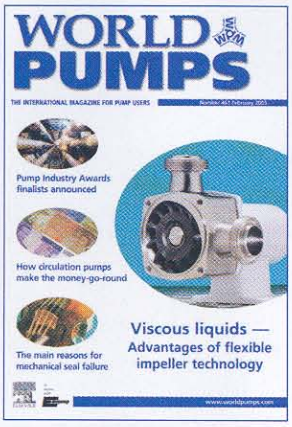
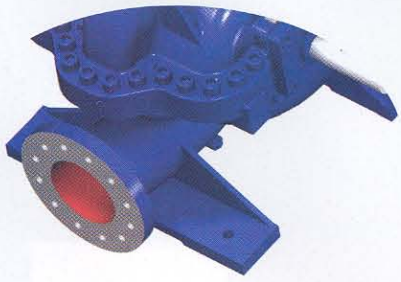


Cover Story

Flexible impeller pumps have a number of advantages over centrifugal pumps in the handling of viscous liquids. On page 26, Martin Ruse of Jabsco, a pioneer of flexible impeller technology, discusses the basics of operation and the benefits of flexible impeller pumps during installation and maintenance. By way of example, the article looks at their success in handling foodstuffs.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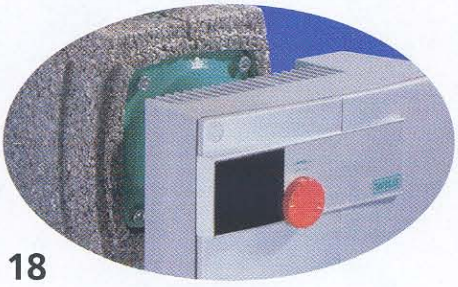
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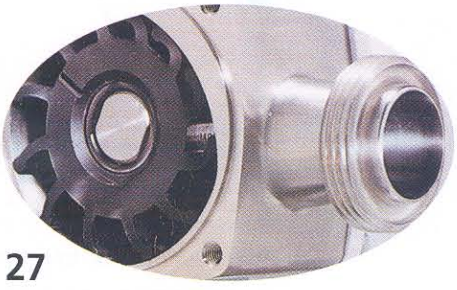
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Preventing equipment failure before it happens

To be able to identify and diagnose equipment problems before they have a chance to manifest into unexpected downtime or catastrophic failure is a desire of many maintenance engineers, as finding the trouble quickly not only saves costly damage to the system, but also dramatically reduces operational costs. Predictive monitoring technologies that flag up problems are not new, but Eugene Sabini, Director of Technology, ITT Industrial Products Group, believes that they have now come of age and are ready to be universally accepted.

Forecasting the weather? It was not possible with any accuracy until we stationed satellites high above the earth to benchmark inputs (system location/movement, winds, pressure differentials, etc) and analyze data received from visual sensors. But even with the highest level of technology offered today, we are at the mercy of climate changes which can catch us by surprise. The results can be more than just a bad forecast; they can actually result in violent storms with catastrophic consequences. Now, let us examine something closer to our own forecasting responsibilities.

Predicting failure

In industrial maintenance, we rely on our human senses: visual inspection, hearing, touch, and smell. Reactions to sense stimuli might include: *that pump seal is leaking, that pump is awfully loud, that pump motor is too hot to touch, I smell something burning.* The technician or operator would alert maintenance or operations management who would then turn-off the affected machine (and the process), inspect it and do repairs. If the equipment had experienced a catastrophic failure it could result in an extensive repair or even replacement, while the possible cause may have been something as simple as a bad bearing. Vibration and temperature sensors in a predictive condition monitoring system could have been picked-up the bearing problem weeks earlier, avoiding a system shutdown; and the repair could have been scheduled to minimize downtime and lost production.

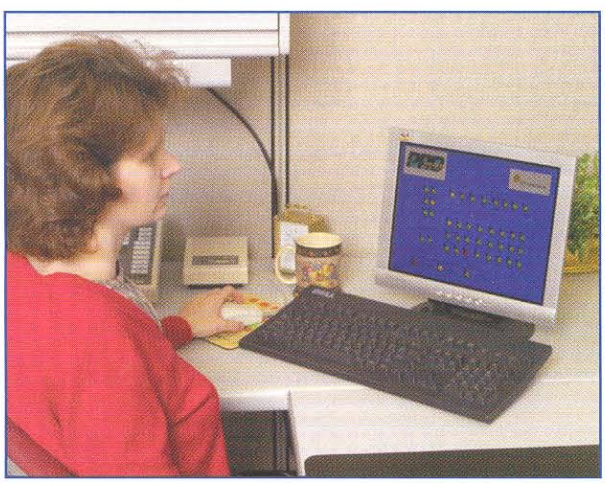

Figure 1. A problem could reside in any of these pumps – but which one? Predictive monitoring aims to take the time and guesswork out of troubleshooting.

Plant optimization has made predictive monitoring essential to bottom line results. Personnel walk-arounds are costly in terms of wasted man-hours, system downtime, lost production and maintenance expense. So why hasn't industry responded by implementing predictive monitoring (PM) on all rotating equipment? The main barriers are cost and difficulty in understanding the technology.

According to *Plant Services* magazine, "organizations are reluctant to invest in new manufacturing technologies because they are not convinced of the return on investment (ROI). In a survey of 500 companies, fewer than 3% of respondents were able to achieve a measurable return on their investment using existing, high end PM technologies.

Industry wants

It is relatively simple to determine the needs of today's industrial plants. Any plant engineer or maintenance manager will include these requirements on his or her wish list:

- Improve equipment reliability through continuous PM, effectively extending equipment life and avoiding equipment failures.
- Install immediate alarming to reduce the chance of failure before the maintenance department can get to the problem. Minimize any downtime through integrated planning and scheduling of repairs indicated by PM.
- Ensure that there is alert reporting that is easy to translate and provides an early warning of impending failure.
- Maximize component life by avoiding conditions that reduce equipment life (ensuring ongoing precision alignment and minimal lubricant contamination, etc).
- Use PM techniques on equipment performance and throughput.
- Expand PM capabilities while minimizing costs. Today, only high-end equipment is monitored due to the high cost of condition monitoring devices.

The future

Today, PM is available at a cost that provides near-term financial returns.

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Operations will increasingly use PM techniques to highlight potential equipment problems. Maintenance personnel will increasingly use these techniques to check the quality of their own repairs (shaft alignments, impeller balancing etc). There will be reduced focus on using PM to predict equipment failure and an increased focus on using these techniques to extend equipment service life.

The concept of remote PM seems simple enough, and the capacity to carry it out exists. Today's state-of-the-art systems can detect an alarm condition and automatically contact the appropriate people via pager, phone, and e-mail. This enables plant personnel to monitor critical equipment in the most unfriendly environments, so that they never have unwelcome surprises. Whether you are a maintenance manager with multiple site responsibility or a contractor, your PM systems keeps you tuned into your plant equipment. And a PM system will head-off many more 'vacation emergencies' than it will cause.

There are many operational benefits to adding PM to a facility's uptime strategy. With the competitive environment that exists in today's global economy, preventive monitoring will become a business requirement.

Attractiveness

There have been tremendous advancements in just a few short years. What is available today that was not at the millennium?

- Increased intelligence – vibration and temperature monitoring.
- Wireless operation – data/alarm transmission and sensor powering.
- Simpler reporting – less reliance on expertise to interpret the results.
- Outsourcing – third-party monitoring decreases costs while providing automatic upgrading.
- Doing more with less – consolidation and down sizing has created more multi-site responsibilities.

Still, new technology continues to be developed which significantly enhances the economic return and predictive capabilities of PM systems. A major advance has been achieved by ITT Industries in the predictive monitoring arena.

Technology implementation

The current way of checking equipment is both obsolete and costly. What's more, it is time consuming, unreliable and reactive rather than proactive. Acceptance and installation of PM technology earlier rather than later will improve your plants efficiency while saving a substantial amount in operational costs. Good management, as with good maintenance practices, is proactive, not reactive.

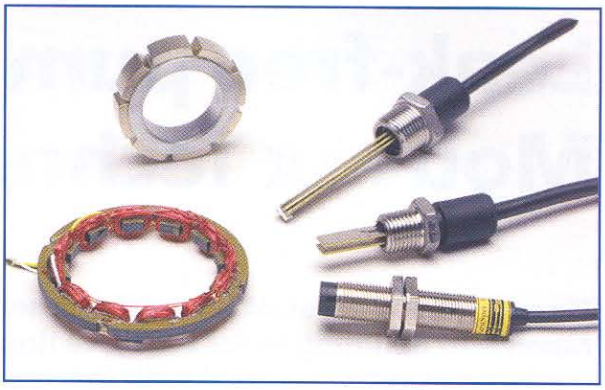

Figure 2. The monitoring equipment is designed to fit easily to an existing pump.

Figure 3. The group sensors from a predictive monitoring system.

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Lamendola, Mark, 2001, *What's New In Remote Predictive Monitoring*, EC&M

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PROsmart

Coming from ITT Industries, PROsmart continuously monitors, analyzes (to pre-stated parameters) and annunciates an alarm when critical criteria are not met. PROsmart continually monitors for changes in bearing vibration, temperature, speed, cavitation, etc. The monitored information is fed via wireless transmitter through a protected Wide Area Network to PROsmart's central computing server where the data is analyzed and compared to the diagnostic rules based program for that particular piece of equipment. Failures can be predicted based on the analyzed information. Alerts or alarms are sent. PROsmart also issues reports on the equipment that can be compared on a period to period (hourly, daily, weekly, etc) basis. The unit is powered by locally available power (or a self-powered option is available), that works 24/7 with alarm and alert capabilities.

PROsmart features

- Continuous 24/7 monitoring — catch potential problems before they become catastrophic
- Wireless communications — minimizes system costs
- Generates its own power supply — no wiring costs, a real solution to remotely located equipment
- Has built-in vibration, temperature, oil level, cavitation, seal leak detection capability, all in one device
- Provides immediate alarms at the equipment location and alerts management via cell phone message, computer and/or DCS
- Condition monitoring and analysis program automatically generates alarm and trend reports
- Reports are accessible at all times from any location via a password protected homepage
- Reduces costs for software, hardware, training and maintenance