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DELIVER ON THE PROMISE OF WATER

Emerson's **Durgesh Jha** discusses how a focus on reliability and analytics is helping water and wastewater facilities navigate a brave new world.

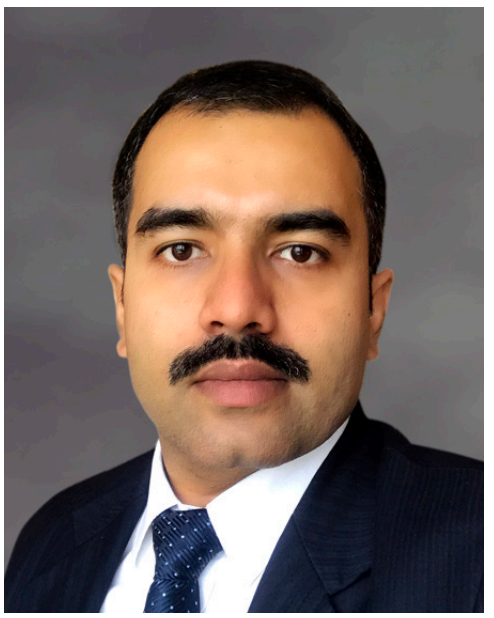
As the COVID-19 pandemic swept the world, water still needed to flow to customers across the globe. To keep critical infrastructure operating at the levels needed to meet customer expectations, plants had to find ways to maintain operations when far fewer personnel could be in the plant. Now those same changes are supporting a water and wastewater industry that is also rapidly evolving to meet new standards of automation, doing more with less while improving sustainability.

Durgesh Jha of Emerson's reliability solutions business describes the change as an inflection point, as companies redefine project scopes to include Digital Transformation with suitable software and hardware that will carry their operations across the next decades. Whether in groundbreaking greenfield innovations or brownfield modernizations and expansions, a new focus on reliability databy integration of digital technology—and the visibility it brings across the enterprise—is now at the heart of every project decision.

Q: How did the global pandemic impact the way water and wastewater organizations view reliability?

A: When the COVID-19 pandemic hit, many water and wastewater facilities were already in the process of moving from route-based maintenance to continuous, wireless condition monitoring. In most cases, the more mature the automated condition monitoring process in a plant was, the better organizations navigated the pandemic.

In the Middle East, for example, a massive percentage of plant personnel are expats. Many of the organization's most critical people were stuck in their home countries and could not travel back to the site. And even with personnel still in the country, new, leaner shifts meant route-based asset monitoring was difficult at best. The plants with a solid foundation of wireless sensors installed, however, could remotely access the data and still regularly monitor their equipment (Figure 1).



DURGESH JHA leads Emerson's reliability solutions business for the Middle East & Africa (Image Courtesy: Emerson)

Q: What is driving the overall push towards more reliability in water facilities?

A: All water and wastewater facilities have assets, some that are buried assets and some that are visible. These are the physical components of the facilities and can include: pipes, valves, tanks, pumps, wells, hydrants, treatment facilities, etc. The assets that make up a water or wastewater system generally lose value over time as the system ages and deteriorates and must be upgraded. Costs of operation and maintenance will increase as the assets age. Then, the utility may be faced with excessive costs that it can no longer afford.

At the plant level, today's facilities are facing continually increasing customer demand, while often running with fewer people and lower budgets. Satisfying those growing customer demands means assuring asset reliability. If your assets keep breaking down, you're likely to have interruptions, or, if you don't have interruptions, that likely means you are running excessively high emergency maintenance costs, which in turn are passed on to customers.

Industrial Internet of Things (IIoT), data analytics, mobility and workforce collaboration represent new opportunities for significant reliability, efficiency and safety improvements for water and wastewater utilities, enabling them to extend the useful life of their infrastructure investments.

In recent times technologies enabling high reliability have dramatically decreased in price. Wireless sensors and edge devices with built-in analytics software are not only affordable to procure, but most can be installed by a plant's in-house personnel, eliminating the hurdle of expensive projects (Figure 2). In most cases, the return on investment is high and fast. Maintenance due to a breakdown is often five or ten times more expensive than predictive maintenance activities. By minimizing the cost of maintenance and optimizing the performance of fixed assets, saved costs pay for the initial investment very quickly.

At the enterprise level, they are also trying to meet customer expectations, but from a very different perspective. Today's water companies are expected to be top-notch providers to customers. Customers not only expect to have water flow when they need it, but also to be able to see critical metrics: how much water they consume, the percentage of other customers using more or less water than they are, statistics broken down by date, time, and more. Providing customers with this data requires analytics from the top down. If the corporate office cannot easily access that data, they certainly cannot pass it on to customers.

To meet these needs, enterprise-level personnel are combining the wireless sensing devices in the plant with out-of-the-box process data analytics software that collects and interprets operational data and information scattered across the plants and water network. The first benefit is better insight into plant activities and performance to help the corporate office make better business decisions for the entire enterprise. Then, as we mentioned above, many of those benefits trickle down into user interface advancements they can offer their customers.

Q: What about industrial cases? Are industrial water users seeing benefits of increased sensing and analytics?

A: There are many reasons industrial water users are turning to sensing and analytics to digitally transform their operations, but the two biggest are increased efficiency and sustainability initiatives. This empowers plant and

Figure 1: Wireless sensors, like Emerson's AMS Wireless Vibration Monitor, help plants continue to monitor asset health even when short staffed (Image Courtesy: Emerson)

maintenance crews to act before equipment failure occurs which helps in reducing maintenance and operations costs.

In many of the plants using water for industrial purposes, big pumps and motors run from electricity generated by gas-fired turbines, which are often old, and typically are no longer as cost-effective to run as they used to be. Every bit of lost efficiency on those systems comes with a cost, so reliability teams are moving away from purely protective systems to embrace wider-ranging predictive maintenance.

Advanced predictive maintenance software and wider-scope advanced analytics provide both the plant and the enterprise with granular detail about how plants are operating, enabling them to track, trend, and modify performance to capture every efficiency gain possible. Now, instead of waiting for a piece of equipment to exceed its vibration threshold and trip, maintenance teams receive alerts on their mobile devices as soon as asset health begins to degrade—typically with root cause analysis built in—enabling them to plan maintenance during scheduled outages to avoid disruptions to operation.

It is also true that the world is changing and industry is adapting to meet that change. More and more organizations are adopting sustainability pledges to choose positive practices to reduce their use of electricity and water. Embracing digital transformation can unlock a vast number of incremental efficiencies that will make net-zero a reality. For existing infrastructure, data-based analytics solutions can optimize energy and chemical use. Water utilities can use artificial intelligence-powered software solutions that create digital replicas of the water system using real-time sensor updates, past performance, usage data, weather feeds, and predictive technology to address some of the key challenges like:

- Energy consumption reduction
- Environmental impact due to sea water intake infrastructure and brine discharge
- Reducing desalinated water production cost
- Membrane performance improvements including membrane fouling
- Sudden and variable sea water conditions (algal blooms)

Q: Can you think of recent cases where Emerson saw a customer embrace better reliability practices, and, can you shed some light on reasons behind their decisions?

A: The move toward more reliable operations is happening in thousands of plants across all industries. In terms of water facilities, one large water provider we worked with experienced an unexpected top-down push for improved reliability. The corporate office wanted more and more data to help them make better business decisions around sustainability and predictive maintenance, but found the plants were not prepared for implementation.

C-suite executives wanted to implement robust analytics at the corporate level. However, when they tried to connect to their data sources, they found plenty of process data, but many of the rotating assets were still relying on legacy protection equipment, so they were missing much of the vibration and temperature data they needed. Also, old legacy systems often kept data in silos, making system integration and interoperability a big hurdle.

Fortunately, the wide range of sensing and edge analytics devices available today made it easy for the plants to quickly instrument the equipment the corporate office needed to monitor. Moreover, because they standardized on control, reliability, and analytics software and equipment from Emerson, integrating the two systems was easy, eliminating the extra time it would have taken to create custom configuration to

Figure 2: Edge analytics devices like Emerson's AMS Asset Monitor are easy to install right at the asset (Image Courtesy: Emerson)

connect a variety of third-party solutions.

Q: What are some suggestions you would give an organization looking to increase its pervasive sensing and condition monitoring technologies as part of a digital transformation initiative?

A: There are many wireless sensing solutions available in today's market, but not all are designed with the same capabilities. The key concept to keep in mind is that condition monitoring technologies should make reliable operations easier to accomplish. If a solution is too complex or can only be installed and maintained by system integrators using complex custom configurations, it likely will not last across the lifecycle of your equipment, nor is it likely to generate fast return on investment. Start small, as this provides opportunity to learn from the process and with measurable results in hand, making it much easier to determine costs and savings to be expected from a larger scale deployment.

Figure 3: Providing personnel with intuitive, readily-available tools helps improve visibility across the plant (Image Courtesy: Emerson)

Look for solutions that are built with easy digital connectivity in mind. The more disparate systems you have, the more training it takes to bring users up to speed, and the more complexity you will face as you patch and upgrade them. Your asset monitoring solution and analytics software platforms should be designed to easily connect to the control system architecture to ensure that personnel can access everything they need using a similar interface (Figure 3).

Also keep in mind that the number of assets in your plant today likely is not the same number you will have in five or ten years. Choosing asset monitoring solutions that support a large number of tags will enable you to keep everything in one system, and easily scale as your operations grow.

In terms of analytics, choose analytics software solutions providing actionable knowledge and insights, whether it is a full analytics platform or an edge solution with on-board analytics. Data is always valuable, but solutions that provide decision support—by combining tracking, trending, and root cause analysis—will provide the greatest contribution to improved operations.