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Industrial Communication

Reliable Telemonitoring of Hundreds of Trash Compactors

Remote Communication via Cellular Routers helps improve Waste Management Services and save Costs

For companies with many sites that span wide geographic territories, managing the local waste and the recycling can be challenging. If a trash compactor breaks down, they have to call its provider and arrange for a repair, all while trash, garbage and recyclables pile up. A reliable wireless communication is thus a prerequisite to monitor the operating conditions of compactors.

For a wide range of companies – whether in the retail, property management, public utilities or food industries – the disposal of waste has become a demanding task. Waste Harmonics, based in Rochester, New York, currently serves numerous firms, effectively consolidating their waste disposal regardless of operating location – whether spread out regionally, nationally, or internationally. Waste Harmonics brokers local hauling services and provides a single point of contact. Moreover, the service provider simplifies the payment process and lowers the total costs of the waste and recycling management. For instance, one major supermarket chain with more than 100 locations tasked Waste Harmonics with the coordination of the hauler coverage across all their stores. The supermarket chain rents compactors and balers from Waste Harmonics and pays just one monthly service fee.

Reliable Communication for the Monitoring of Trash Compactors

Unlike most of its competitors, Waste Harmonics owns the compactors, balers, and other equipment typically used by customers to dispose of their waste and recycled materials. According to Mike Hess, president of Waste Harmonics, the competition would rather leave ownership of that equipment to the local haulers, who then have the responsibility for its proper operation, maintenance and repair. "We do it, because it ties us closer to our customers and gives us much more control over the services we provide," states Hess. The waste management service provider thus required a reliable wireless communication to monitor the operating conditions of hundreds of hydraulic compactors around-the-clock, for example in North America. If and wherever a problem arises, customer service can be reached by phone.

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Trash compactors are designed for extreme weather and operating conditions. Thanks to the telemonitoring by means of standard components from Siemens, Waste Harmonics can keep an eye on many operating parameters – cost-effectively and independent of the location. This enables predictive maintenance and fast troubleshooting.

24/7 Data Flow

This additional service helps Waste Harmonics to better position itself in the market. That is why a solution for the telemonitoring of the equipment had to be found. According to Hess, most legacy equipment possessed proprietary timer/ relay control systems with little or no communication capabilities. "If at all, they can only generate a single data point about how full the unit is. We, however, wanted visibility into the control units themselves," he explains. The disposer thus required a continuous, 24/7 data flow about operating conditions to perform predictive maintenance, troubleshooting and a lot more. Hess realized that he and his colleagues had to come up with an entirely new approach. While researching different solutions, the following emerged: If the service provider kept the outdated legacy equipment, the sought after data visibility would only be possible with third-party products. The associated costs would amount to about a million dollars plus 15 percent for recurring license and support fees. Even then, not all data capabilities needed would be obtained.

Standard Components for fast Diagnosis

When the company won a major contract to manage 350 trash compactors across the U.S. and Canada, an economically much more viable solution was finally put into action. "It was crunch time," remembers Hess. "We had just 60 days to get the equipment built, shipped, installed, and operating." The solution is comprised of a programmable logic controller (PLC) of the type SIMATIC S7-1200 and a 3G cellular router SCALANCE M875 from Siemens for the access to AT&T's Jasper Wireless network.

The strategy of the waste management service provider included standard components as an important part of the solution. This was stipulated in the service agreement between the two companies. "We wanted to deploy the exact same equipment, each with the exact same setup, at every single location. This way, if there are any operational issues with the equipment, we can diagnose and fix it very quickly," explains Hess. From his experience, the use of the PLC SIMATIC S7-1200 has proved to be very successful and provides tremendous control functionality. "We also wanted to pair the PLC with a communication module that not only would give us operational visibility, but also the ability to perform telediagnoses and even upgrades as required," continues the expert.

At first, Hess considered using Wi-Fi access at his new customer's locations. The operating data of the compactors would then have been sent back to Waste Harmonics' Rochester headquarters via the Internet. "But we quickly realized that it was not going to work like this," states Hess. This largely had to do with security, which would have required a private network using costly industrial-grade VPN-capable (virtual private network) routers and custom Wi-Fi configurations for each location.

Security first

During a visit to the manufacturing plant of the compactors, Hess confirmed that his security concern regarding a Wi-Fi solution was justified. While on the shop floor, an engineer asked him to watch what would happen, if he powered on his smartphone. Hess observed: "The machine next to us started running, triggered by the engineer's phone. At first glance, I thought that was convenient. But then I realized that some-one using a smartphone could hack into the compactor's control system. As the owner of the compactor, this is a liability I could not assume." This solution was thus eliminated due to the security risk.

Hess also considered hard-wired communication solutions, but in the end decided on using cellular routers. After evaluating a number of candidates, he chose the AT&T-certified SCALANCE M875 3G cellular router. The deciding reasons – among many – were: The easy connection of the M875 to the PLC as well as the integration of the PLC and the cellular router into the machine. The tight schedule could thus be met.

Open Architecture and reliable Networks

The open architecture of the SCALANCE M875 3G cellular router also resonated with Hess' aversion to closed, proprietary components. The costs, too, turned out to be much less than other solutions researched. Last but not least, should service or support be needed, Siemens – together with its partners – provides international coverage. "The ability to call Siemens and always be able to reach someone – no matter where we are – has been invaluable; especially during our rollout," reports Hess. "In Nevada, for example, we had some technical issues that necessitated on-site troubleshooting, and Siemens was ready to send someone right away. Turns out we were able to solve the problem by ourselves after all."

For secure, around-the-clock 3G network services, Waste Harmonics chose AT&T's machine-to-machine (M2M) network, a nationwide platform in the U.S. In Canada, AT&T subcontracts to one of its local network partners. Due to the built-in security functions of the SCALANCE M875 3G cellular router, plus its AT&T-certification and the network's own security measures, an "in-house" private network could be created. Each trash compactor can thus be securely connected to Waste Harmonics' master database running on a mainframe in a data processing center.

Waste Harmonics relies on a Siemens solution with the 3G cellular router SCALANCE M875 and the PLC SIMATIC S7-1200.

Large Cost Savings with improved Customer Service

New visibility into compactor operations enables their telemonitoring and telediagnosis, while at the same time avoiding high capital, communication, and service costs. Thanks to the new solution, large cost savings could be achieved. This, for example, includes 760,000 dollars in upfront capital costs, which would have been incurred had Waste Harmonics opted for third-party installations and the legacy equipment approach. "In contrast, the Siemens solution was just a quarter of the cost. Furthermore, these alternatives would not have given us anywhere near the volume of data we needed, nor would we have had any control over that data," states Hess.

Waste Harmonics also saves more than 100,000 dollars a year in operating costs, since the SCALANCE M875 3G cellular router utilizes AT&T's M2M network as cost-effectively as possible. The company pays just a small fraction of what a cell phone data plan would cost per month. And due to the large number of routers employed by Waste Harmonics, further discounts are obtained. "The alternative solutions would have cost us about 62,000 dollars a year in communication costs over what we are paying now," says Hess. The remainder of the annual operating cost savings – more than 40,000 dollars – is achieved through telediagnoses, which are performed through the network. Problems can be discussed by phone, frequently making on-site servicing unnecessary. "Compactors are designed for extreme weather and operating conditions. With proper maintenance and the kind of operational monitoring we now can perform, there is not much that can go wrong. What happens a lot, however, is that emergency stops inadvertently get pushed, gates or barriers are left open, or key switches are turned to manual. But we now know when these things happen. We then simply call the customer to let them know – which is a great deal less expensive than dispatching a service technician costing up to 500 dollars a visit," sums up Hess.

Monitoring Parameters at a Glance

With the Siemens solution, Waste Harmonics can now telemonitor the following parameters of its compactors in North America – around-the-clock and in almost real-time:

• Oil temperature
• Number of cycles
• Motor runtime
• Hydraulic pressure
• Electrical overload
• Interlock failure
• High temperature warning
• Equipment disconnection
• Equipment reconnection

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