

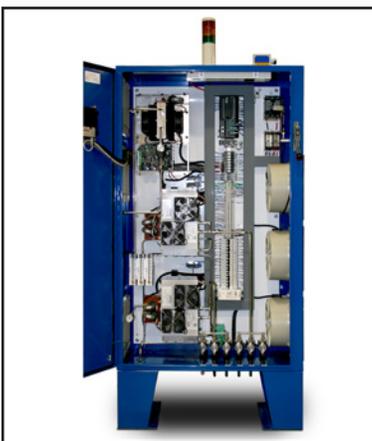
## Ozone System Change Improves Quality, Reliability, and Efficiency for Health Care System's Central Laundry Plant



Installation of replacement ozone system allowed for assurance of sufficient ozone delivery to tunnel washers, while providing new levels of diagnostics and control to help management optimize quality and efficiency. In addition, the plant has benefitted significantly from a much smaller footprint for the new system.

Table #1  
Key Results

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| <ul style="list-style-type: none"><li>• New capability for determining basic system operation</li><li>• New access to important information regarding operations and efficiency</li><li>• New self-monitoring controls; pH sensors; and external oxygen concentrator</li><li>• Much higher level of service response from system manufacturer</li></ul> | <ul style="list-style-type: none"><li>• Remote data logging and troubleshooting with manufacturer</li><li>• Custom, high-range dissolved ozone test kits for easy dissolved ozone calibration.</li><li>• Goods pretty and fluffy; lint re-do's no longer happening</li><li>• No more staining, or increase in re-wash and rag-out numbers</li><li>• Much smaller footprint for new system</li></ul> |
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Integrated, engineered process not only makes ozone, but ensures the washers, ozone generators, and wash water chemistry are all performing together as they should.

Tupelo, MS — Laundry service management for a diversified health care system's central laundry plant here reports major benefits derived from changing ozone system manufacturers. A key factor driving the change was the original system not allowing for measurement or titration of ozone in their tunnel washer, which meant management had no way to determine if the ozone system was operating as it was intended to.

The original system, featuring three corona discharge ozone generators, was originally installed in 2004 to serve the plant's 12-pocket continuous batch tunnel washer. After some original realization of benefits, major difficulties arose, and a new ozone system was installed in 2011 to serve the plant's new five-pocket and 10-pocket continuous batch tunnel washers. The new system features more advanced corona discharge generators, and a patent-pending injection process with 24-hr remote monitoring, data logging, and troubleshooting.

"If you're going to utilize it, you definitely want it to be working, and there was no way to determine that before," said Judy Murphy, RN, BSN, CLLM, Director of Laundry Services for North Mississippi Health Services.

"With the new ozone system, that's no longer a problem, and we've also gained new levels of diagnostics and control to help us optimize quality, reliability, and efficiency."

Allen oversees all operations and related activity for the system's central laundry plant at North Mississippi Medical Center, which receives input from 5 more hospitals, plus 4 nursing homes, and numerous joint venture special outpatient centers, with more input to come from independent health care centers and some hospitality operations.

Total present input of 6.1-6.5 million lbs/yr derives from 16-18,000 lbs/day during the week, manned by 21-22 full-time equivalents (FTE's), and 12-13,000 lbs per day on weekends, with 14 FTE's. Input is expected to double within five years.

"We've been actively researching ways to become more energy-efficient and cost-effective since 2002," Murphy continued, "and our original ozone system was the first pressurized, dissolved ozone system on a tunnel washer in the U.S."

"Now, with the new system, we are very pleased we can not only rely on greatly improved system diagnostics and controls, but also a much higher level of service response from our system manufacturer—both of which are critical for us to provide the pretty and fluffy quality our own customers expect, and the reliability and efficiency standards we need to meet internally."

With the original ozone installation, after some initial balancing and tuning of the system to tweak wash formulas and reduce the amount of oxygen bleach used, the plant realized a decrease in lint production; improved appearance and quality of linen; linen life extension; and savings in chemical usage.

But staining problems began to reappear, with the grey quality reverting back to what had too often been seen before ozone was installed.

"This was of course entirely unacceptable," said Murphy. "Linens and towels have to be as clean and as presentable as possible; both how they look and how they feel. The users expect pristine quality, and we are determined to provide it."

When the manufacturer's service representative was not responsive to the staining issue, nor other concerns with the safety and efficiency of their equipment, taking 3-4 weeks to return calls, a decision was made to bring them in to test their system. The tests revealed that the system was functioning at approximately 20% capacity. As a result, the system was shut down for upgrade or replacement.

In 2009, alternative technologies were actively researched, with the objective of finding a system that would improve on benefits that had been realized previously, while being utilized for both of the new tunnel washers now in use.

As a result, Murphy recommended Guardian Integrated Services, whose process equipment and software were installed in August, 2011, with minimal interruption to the plant's production and operation.

The new system provides ozone to each of the tunnel washers. Among many upgraded features from the previous installation are remote data logging and communication with the manufacturer. In addition, Guardian offers custom, high-range dissolved ozone test kits, which can provide monthly dissolved ozone calibration. Testing can easily be performed by facility staff.

"Our service rep can troubleshoot from a distance, dialing in when he's notified on his cell phone by an alarm, and sending back any needed adjustments" Murphy noted. "He reports to me when he does any-

thing. I haven't had to call him yet. Meanwhile, goods are pretty and fluffy; lint re-do's are no longer happening; and there hasn't been any of the staining, or increase in re-wash and rag-out numbers we were seeing with the old system."

In addition, the plant has benefitted from a much smaller footprint for the new system, which takes up only about one-quarter of the wall that was completely used by the previous system. This freed up much needed space in a small, soiled-linen process area.

Moreover, there are now self-monitoring controls; pH sensors; an external oxygen concentrator; and the system self-diagnostics and fault reporting which allow the Director access to information regarding operations and efficiency that the previous equipment severely lacked.

Murphy, who earned her RN in 1991 and went on to a bachelor of science in nursing (BSN) before becoming a Certified Laundry Linen Manager (CLLM), is now pursuing another step up, to Registered Laundry and Linen Director (RLLD), through a joint program of the Association for Linen Management and Eastern Kentucky University.

"As the Director of Laundry Services for our North Mississippi Health Services system, in charge of its central plant, I am now in more of a manufacturing type of environment, with complex responsibilities in production management," she said. "It reminds me of my experience before I went into health care, when I was assistant to the quality control director for robotics-intensive manufacturing of multi-function industrial bandsaws and lathes, and we had to go through a 17-inspection procedure."

"Today's laundry operations for health care facilities need to have similar levels of quality, reliability, and efficiency, and the new ozone system is a major contributor in helping us to achieve that."

Guardian Manufacturing credits much of its success in ozone applications like NMHS to long-term research and development for its products, and an integrated, customized approach to manufacturing and installing them. That process begins with establishing a preliminary savings estimate based on annualized laundry costs, with the main factors including gas, electricity, water, sewer, and chemicals.

Tom Allen, senior laundry application specialist, noted additional factors in the company's program.

"In our efforts to develop an ozone process for tunnels, it's been very helpful for us to gain hands-on experience with tunnel washers from various manufacturers," he said. "However, the Milnor CBW's, both "G" Series and PulseFlow, have proven to be the best installations for us to date."

"Our patent-pending process application takes full advantage of the consistent water flow pattern within the Milnor. The pumped re-use and counter flows allow us to maintain constant, as well as varied, levels of ozone in the wash and rinse zones of the CBW. Tunnel process parameters such as transfer rate and water flow rate vary for each installation, and accordingly usually require software and hardware modifications for each one."

"Previous ozone systems for tunnel washers were mostly adaptations of OPL ozone systems, and did not have the versatility or controls ability to adequately produce and validate quality results," Allen continued. "Tunnel plant operators live and die by production efficiencies. They cannot afford to take a gamble on an ozone installation, with no real backside performance validations and process monitoring. Therefore, Guardian has engineered a holistic process that not only makes ozone, but one that ensures the washers, ozone generators, and chemistry are all performing together as they should."

Allen explains Guardian's successes across multiple laundry platforms, from simple hospitality OPL's to central tunnel system plants, as deriving primarily from its advanced controls technology.

"We had seen the challenges that were created for laundry operators who had simple, on/off ozone laundry systems," he noted.

"When an operator asked how they would know if a system was working properly or not, the most common answers were that you won't smell the ozone, or that the laundry wouldn't be clean. This was not an adequate solution for a plant processing thousands of pounds per hour, with no human contact until the finishing stations, so it was not good enough for Guardian's product line."

"We have gone to great lengths to engineer a complete system that can be as self-sufficient as any particular application may dictate," he stated. "We've also learned not only to carefully consider the chemistry of the wash water, but the derivation of the soiled goods, and consequent organic and inorganic introduc-

tions to the wash process."

"As a result of our long-term, diversified experience, we're now able to routinely provide a preliminary savings analysis, and also offer a 90-day money-back guarantee for any laundry operation. We are confident that our customers will not experience hidden production problems that would negate overall savings, such as having to process periodically increased stain loads caused by ozone system issues."

Thoram Charanda, senior scientist for Guardian and manager of its research and development laboratory, noted the importance of a reliable, energy-efficient ozone generator.

"We saw from the laundry industry's unhappy prior experience with ozone that without a reliable generator that provides consistent production, great challenges would occur," he said. "If the ozone is not there, you're not going to have good linens."

"We also strive to maximize the amount of oxygen converted to ozone, using the least amount of energy," he continued. "Ozone is converted at the rate of 5 to 10% by weight, aided significantly by an oxygen concentrator that provides a source of oxygen that is consistent at 94%. And the very high frequency is also well above the audible range, so there is no high-pitched whine, which we had learned was an additional complaint about ozone."

For laundry applications, in addition to generator reliability and efficiency, Charanda also noted the critical need for efficient delivery of the ozone into laundry wash water, and the importance of knowing ahead of time the chemistry of that water, including chemicals added to it during the wash process.

"We are injecting ozonated water directly into the wash wheel using a premium Venturi-type system that consistently provides mass transfer efficiency at the level of 90% or more," he said. "Meanwhile, we never assume the water is okay in the first place."

"The key issues are the presence of inorganics like iron and manganese that could react with the ozone and cause problems. In addition, detergents can introduce very complex issues, as can surfactants, brighteners, bleach, and other additives. Our applications experience with the water chemistry, as well as the different types of washing machines, has helped us greatly in our ability to deliver our high level of performance."

Guardian has integrated almost 1000 ozone generators into systems manufactured by the company since 2003. For further information on its Ensure-LCR™ ozone systems for laundry applications, featuring Plasma-Block® advanced oxidation generators, and opportunities for preliminary site analysis, contact Guardian Integrated Services, 2971-A Oxbow Circle, Cocoa, FL 32926, Tel. 321-631-4580, Fax 321-631-4517, laundry@guardianmfg.com, www.guardianisd.com.



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