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Pioneering Energy Modernization

THREE YEARS LATER

BY ALVARO MENDOZA

n mid-2015, FLCAJ took an in-depth look at how one progressive condominium association used technology to modernize the treatment of their 27 neighborhood pools. The title of the June article was Pembroke Pines Retirement Village—Overcoming Aquatic Challenges with Self-Funding Modernizations. The association used a unique self-funding approach to address and resolve typical operational pool shortcomings.

Their West Palm Beach-based management company, Cenville Recreation, an award-winning industry leader in condominium energy conversions of all types, recommended that they investigate a proven pool modernization program used in leading municipal pools.

While we don't need to revisit the entire article, many thought it would be interesting to revisit the modernization three years later and see how it all turned out.

- Can you provide a quick recap to the modernization?
- Overall, how did the conversion work out for the facility versus the claims?
- Did the modernization hold up and have the savings continued as planned?
- What were the positives and negatives?
- How did the modernization eventually affect the patrons?
- Would the management company dare to duplicate the conversions in other facilities?

Read on. You may find the details are interesting and quite surprising.

A QUICK RECAP OF THE **SELF-FUNDING** MODERNIZATION

- The Pembroke Pines' sprawling facility has a central clubhouse pool and 26 additional smaller area pools covering over a square mile.
- · While the pools were not huge, they were serving 1,200 bathers with a total of 1.5 million gallons, at 6,000 gallons per minute, with 200 hp of pump power.
- They faced typical issues with manpower; supervision; dated



ALVARO MENDOZA, PRESIDENT OF COMMERCIAL ENERGY SPECIALISTS (CES)

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mechanical systems; high chemical costs; significant potential liability; accelerated degradation of equipment; high water and energy costs; and Health Department scrutiny including closures, patron complaints, and sensitivity to irritants.

- They had a pressing yet unbudgeted need to upgrade their aging mechanical systems.
- They installed a complete Phase I solution from Commercial Energy Specialists (CES), using a three-year lease or EMA (Equipment Maintenance Agreement), with little out of pocket money. The solution included the following features:
 - Direct monitoring/control of water chemistry 24/7
 - Direct control of circulation/filtration pump with energy-saving motor control center
 - Direct monitoring/control of water level and water consumption
 - Direct control of temperature on all area pools
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 - Conversion to safer all-in-one tablet chlorine feeders

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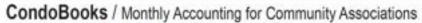
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HOW DID THE CONVERSION WORK OUT FOR THE FACILITY?

As you might know, not all technology stories have a happy ending. In fact, there are thousands of failed attempts around Florida, in which residents and boards had high hopes for successful results or miracle savings. Why? There is a lot that can go wrong, as some modernizations are not well planned, are not based on proven technologies or do not portray realistic results, and are not properly executed and/or properly maintained. Progress can be risky, and the old CES motto that the primary concern with being at the "cutting edge of technology is staying ahead of the blade" can be very relevant to many modernizations.

Conversely, there are many hundreds of highly successful projects, and the common thread is they require a fair amount of teamwork. One needs to start with a good game plan, and then use reliable equipment and proper installation. Ultimately, it needs to be supported with good maintenance and a commitment to the long term.

SO, HOW DID THE PEMBROKE FACILITY DO?

Three years later, the Pembroke facility did quite well

indeed. Here are some quick points highlighted by a few quotes from the condominium and management company.

Labor Savings: The facility has "developed" a leading inhouse program, which replaced a less structured and strategic approach. There are now fewer but more proficient employees and less payroll but quicker responses to issues.

The flat screen in the maintenance office provides a quick, comprehensive overview of all pools and parameters at a glance, and the Century Village Maintenance Director (CVMD) reviews the vital signs from all 27 pools first thing every morning. He directs staff to solve potential issues before they actually become an issue. They can see how dirty each of the filters are and estimate when they will need to be cleaned, so they have fine tuned their pool care strategically with a minimum of effort and labor cost. The daily service visits to each pool are quicker as the chemistry and water level are already correct, and they know the status of vats and filters, so there are few surprises. They take a quick reading with their digital test kits, the same as used

by Department of Health (DOH) officials, perform proactive physical or filter cleaning, and move to the next pool.

The CVMD reported that they have gone from a larger staff (as high as seven) to a staff of four pool techs, and they are looking at some new CES technology to help them with the physical cleaning of the pools. Automated robotic cleaners are being tested on several pools and could help them trim hundreds of man-hours from this final labor-intensive role.

The Cenville Recreation Management Company Vice-President and Regional Engineering Manager (CRVP) adds, "Each morning the staff has a complete and total picture of each pool via the flat screen. This saves time and money by alerting the staff to problems, so they can prioritize their daily routes and fix issues before the pool is pushed out of balance. The ability to have a clear picture of any imbalance or water loss saves on manpower and allows the pool techs to be at maximum efficiency."

Energy Savings: The CES/FPL energy-saving model was purposely conservative with substantial estimated savings of 52kW peak load reduction. According to FPL, this would account for 459,000 kWh energy reduction a year, or more than \$41,000 of electrical savings. The model estimated that the pumps would run at 90/80/70 percent of normal power depending on the time of day. But both FPL and CES were too conservative.

To collect on the \$10,000 rebate, CES and the Pembroke Village had to validate the savings. This meant remotely connecting to each pool, verifying DOH flow rates were being adhered to, and tabulating the kW power applied to the pump at that time. This was repeated for each pool and a spreadsheet for all 27 pools was reviewed with FPL representatives. The results were surprising. The overall composite energy consumption for all pools was 48 percent of normal power in the middle of the day. At that rate, the electrical savings would be closer to \$100,000 a year.

The CRVP adds, "The costs savings reach past the chemicals into the electrical bills, by providing a more regulated power schedule and load. Century Village has seen a marked reduction in their energy bills. The Executive Vice President and CFO were among the first to see the cost saving in electricity. As the systems were installed into the three Century Village locations, the monthly savings were significant and were reflected on the monthly electric bills."





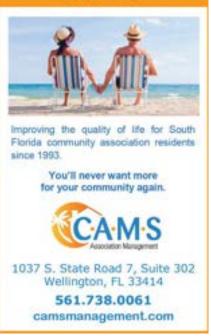




Water Savings: We'll come clean and admit that adding water consumption monitoring in the original modernization was the board's idea. It seems that they had been previously presented with large water bills—some for more than \$10,000 when some pools silently leaked, unbeknownst to all. So we added water savings to the original package, but didn't anticipate the full impact of the feature.

Several months later as they were starting up a pool after planned resurfacing and renovation, we found our answer. CES received email and text alerts of a potential water-loss issue. We took note when the alarm repeated itself a few hours later. We called the CVMD to report the alarm. He replied that there wasn't a leak because the pool was just refinished; however, he agreed to test remotely overnight. We remotely





shut off the water fill and monitored the water level. The next morning the pool level was down 13-inches, and we contacted the CVMD, who drove to the pool and said, "We have a leak!" They immediately closed the pool, and called the contractor, who found a cracked pipe. The pool reopened a few days later. After that, we all became a big fan of water consumption monitoring and control, as this saved another potential \$10 thousand surprise water bill.

Another benefit was the digital water level control, which is normally handled by a toilet-valve type device. Those devices used to stick sometimes and overfill the filter tank, which then sent pool water out to waste. Digital water level control resolved those issues as well, although water savings weren't documented, just noted and appreciated. Also, a precise water level leads to better skimming of leaves, which don't sink and require manual vacuuming to remove. So, the pools are generally easier to keep clean.

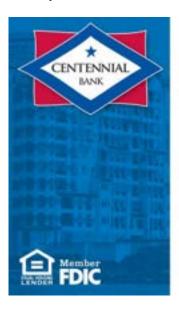
Pembroke Century Village Maintenance Director (CVMD) noted that the annual water consumption was trimmed significantly, and the 2014 cost of \$200 thousand was reduced to \$72 thousand by 2017, a savings of millions of gallons and \$128 thousand. How? By monitoring consumption via the BECSys5 and being immediately alerted of any issues, they resolved the unacceptable water bills. Once the pool consumption was brought under control, the team went further. By comparing the pool consumption, which was separated from the main meter via the BECSys5, they were able to isolate and resolve any additional water consumption issues on the same meter. The site is instantly alerted about leaks going forward.

Chemical Savings: The original modernization did not change the liquid chlorine (sodium hypochlorite) and dilute muriatic acid system, but provided pinpoint control with alert notification of any out-of-range levels. Historically, this accounts for 30 percent of normal consumption, while ensuring DOH compliance 24/7. Over the past three years, the consistency of chemical readings has resulted in perfect scores during DOH inspections, with consistently reliable readings in between. In short, they are maintaining near minimum, yet DOH compliant, levels 24/7 and are maximizing chemical savings per the bather load.

A few months later the site had to revisit permitting and insurance for their on-site large chlorine storage tank, and they looked for a better solution to lugging gallons to each site and refilling containers in each pool room. While the control system alerted staff as the tanks were getting low, it was still a lot of handling and labor.

The site was offered a solution—an all-in-one system that provides all the chlorine, calcium, bicarbonate, and stain prevention additive—in a single Pulsar tablet, while using 1/10 of the normal muriatic acid consumption. Some pool facilities don't even monitor or correct calcium or alkalinity, and that's a problem. Why? Low levels of these, as normally introduced by the city water supply, produce undersaturated or aggressive water that attacks pool finishes, severely reducing the life of the finish and causing periodic expensive refinishing projects. The site converted to a Pulsar all-in-one solution at no cost, using a factory program, and has experienced considerable savings in all these chemicals, while ensuring proper water balance.

According to the CVMD, they were previously using 6,000 gallons per month of chlorine property-wide and were able to reduce it to 1,500 gallons every six to seven weeks with the original modernization. Also, the site was



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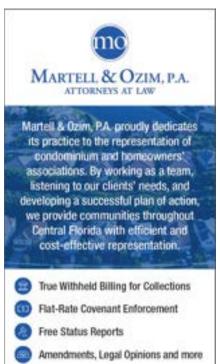
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using 190-gallons of muriatic acid per month, and that has dropped to about 80 gallons. Normally, chemical automation provides 33-40 percent savings, but at 60-75 percent these savings are astounding—especially while ensuring perfect DOH compliance.

The conversion to the Pulsar tablet added yet another dimension to the savings. Since the tablet provides calcium, bicarbonate, and stain prevention, it severely cut the cost of balancing and specialty chemicals. The self-shocking feature of the tablet helped cut consumption as well, and they only use about 150-180 pounds. of tablets a week to service all 27 pools, or much less than 10,000 pounds a year. Compared to 6,000 gallons a month of liquid bleach, 72,000 gallons/year...this is a huge savings. The Pulsar conversion, along with great pool management, was also significantly responsible for the huge drop in consumption of muriatic acid.

HOW DID THE MODERNIZATION HOLD UP, AND DID THE **SAVINGS CONTINUE?**

Three years later, the systems are reportedly holding up well. The site reports that CES's pump/VFD technology has helped them lose fewer pump motors than before, and the proactive maintenance program appears to be much more cost effective than a more reactive approach.

The CVMD mentioned that one of the key attributes of the modernization was stabilization of their budgets. He says, "An improperly managed pool can result in a large budget line item, and unexpected incidents further disrupt a typical budget. This conversion has successfully stabilized the pools from a budget perspective, and patrons and management can expect a certain repeatable cost with few aberrations. Properly managed, this type of program can offer very valuable consistency to the operational budget."

According to the staff, the savings not only continued, but also have been continually refined, so they are getting deeper into their efficiency model, and further lowering their costs, while improving the end product for the patrons.

As the systems aged, maintenance has naturally increased; yet the simplicity of the design, along with the low cost and availability of the maintenance items, has kept the upkeep costs low. The CVMD notes, "We're replacing simple feeder tubes, hoses, and chlorinator o-rings and seals, not exotic and expensive components. The fact that such a simple and reliable design can produce such savings is terrific."

WHAT WERE THE **POSITIVES AND NEGATIVES?**

Many of the positive attri-

butes of the modernization have been previously reviewed, but there are additional positive effects of holding perfect chemistry 24/7, along with monitoring water, power, temperature, filter soiling, and more.

DOH relationship: The facility previously was more difficult to manage, and equally as difficult to inspect for DOH officials. Pool violations or closures on unannounced bi-annual DOH inspections were more commonplace and reached up to five per visit. No more...the last DOH violation per the CVMD was mid-2015, a perfect record for the past 24 months. Moreover, any potential customer complaint to DOH is now handled differently, as the CVMD can forward digital chemical logs for the days or hours in question. The DOH official can then review the minute-by-minute readings, and can dismiss the claim with confidence. The relationship with DOH is better than ever.

Algae Blooms: As with many south Florida pools, algae used to be a huge issue for the Pembroke Village. With so many pools and so much overhanging vegetation, it was a real time-sponge for the maintenance team. The CVMD reports that they haven't experienced a single bloom in over two years, and he credits the pinpoint chemistry control and the fact that any out-of-range condition immediately alerts him and his staff. Corrections or emptying vats are quickly resolved, so there's no opportunity for issues to develop.

One of the few negatives dealt with a power issue. Incoming power to most of the pools was fine, and the motor control center with a variable frequency drive (MCC-VFD), which controls the pumps to required DOH flows and saves energy, was able to protect the motors against minor power spikes and surges. On a few of the pools, the power was so bad that it even damaged the protection equipment. Luckily, the pumps were spared. The MCC-VFD had tracked the unacceptably extreme incoming voltage swings, and the power company was presented with a list of out-of-range power readings. After they were not able to resolve it to the Village's satisfaction, CES and the CRVP collaborated on a resolution, and an additional power-conditioning transformer was added to those affected pools. It has resolved the issue 100 percent, confirming that any negative can be efficiently and permanently overcome.

Overall, the modernization has received very positive reviews from management company executives, site administrators, pool technicians, and patrons. The CRVP adds, "As the Vice President and Regional Facilities

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Manager for all three locations of Century Village, I have enjoyed a partner-ship with CES for more than 20 years. During that time, I was involved with the inception of the chemical control system offered to us by CES. Century Village offers their residents 45 commercial pools, and our staff is responsible for all pool maintenance. Between me, the administrators, and the pool maintenance staff, we have seen firsthand the benefits of installing and utilizing the chemical control system."

HOW DID THE MODERNIZATION AFFECT THE PATRONS?

According to the CVMD, patron response has been very positive. "How did the pools get so blue?" is a common poolside question, and there have been positive comments on lack of eye and skin irritation. Customer complaints have gone to near zero.

Pool closures from DOH, algae shocking, out-of-range conditions, and recurring repairs have also gone to near zero, as the staff has a far more proactive approach. The CVMD comments, "We've gotten ahead of the maintenance, and now can focus on proactive maintenance instead of going from issue to issue, never seeming to get it under control. The pools are always open and are clear, blue, and safe. We service 15,000 patrons in Pembroke alone, and it's important that they can go to any pool, at any time, and be 100 percent assured that the water is at the same exact chemical level, is appealing, complies with code, and is safe and free from irritants and bacteria."

The patrons are also enjoying relief from runaway bills for water, chemicals, maintenance, and power, since they ultimately pay the bills.

WOULD THE MANAGEMENT COMPANY DARE TO DUPLICATE THE MODERNIZATION ON OTHER FACILITIES?

A short time after the highly successful modernization in Pembroke Pines Village, the sister facility at the Century Village West Palm Beach location became interested in learning more. They have one indoor pool and 10 outdoor pools on site, and are a smaller property than Pembroke, but they

still service 400 bathers with a total of nearly 700,000 gallons of water, flowing at nearly 2,000 gpm using 60 hp of pumps. They were experiencing the normal issues associated with traditional pool care. Information was provided at workshops with the board and a town hall presentation with interested residents. There was a very progressive and energy conscious board, and they proceeded with a trial installation on the indoor pool. After monitoring the savings and enhanced water quality first hand, the board approved installation for all pools. The site had some additional issues, as there was no 3-phase power in the pool equipment rooms. No problem. CES provided "phase converting" motor control cabinets and converted the existing single-phase power to 3-phase so that power savings would be possible.

The savings have been just as dramatic as the Pembroke property, and they encompass the chemical, maintenance, energy, labor, and liability areas.

A year later, the Century Village at the Boca Raton location also became interested in the possible benefits and savings. They



have one indoor pool and 17 outdoor pools, and have a considerable total of nearly one million gallons, serving nearly 550 patrons and flowing at 2,500 gpm, with almost 100 hp of pumping power.

They have a very progressive on-site energy program including LED lighting conversions and boiler and motor efficiency programs, and they always appear ready for more. They, too, wanted to take a direct look at the technology, and a trial system was installed on both indoor and outdoor clubhouse pools. The board reviewed the savings and improvement in water quality, and then approved the full implementation for all pools. Those installations were completed in early 2018, and the early savings reports are excellent. They are once again experiencing comprehensive savings similar to the first two properties and look forward to many years of great water quality at a fraction of normal operating costs.

THREE YEARS LATER—A TECHNOLOGY HAPPY ENDING

Since many technology stories don't have a happy ending, this project stands out as a huge success, which was repeated on two additional properties. The savings have exceeded Century Village's, CES's, and FPL's expectations, and are stable month after month. It's just a better way of running things.

This type of Phase I modernization provides a baseline and is just a start to the overall modernization of any pool system. A new national health code, Model Aquatic Health Code (MAHC) spearheaded by the Centers for Disease Control (CDC) will be further refining public pool requirements in the future. Century Village will be ready.

Century Village has already begun implementing Phase II modernizations. These include permanent media filters, ultra-violet disinfection, and saline chlorination on designated sites. They are also investigating other emerging technologies, such as secondary filtration with in-pool robotic cleaners.

The success of modernizations, as noted, is based on teamwork. One needs to start with a good game plan, and then use reliable equipment and proper installation. Ultimately, it needs to be supported with good maintenance and a commitment to the long term. Century Village committed to this strategy and has become a model leader on how to succeed in improving services for patrons, while lowering their overall energy footprint, and saving a great deal of money.

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