

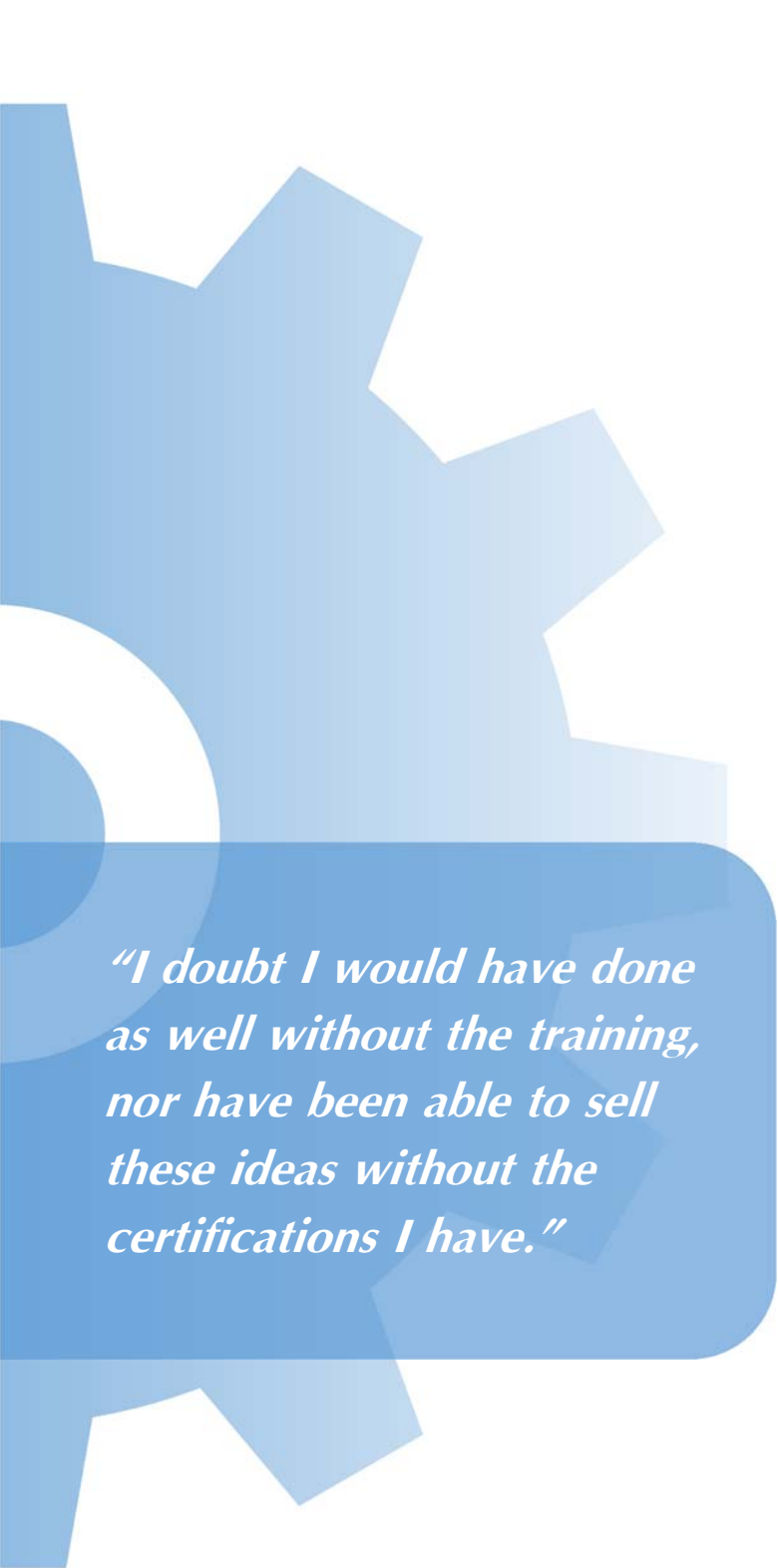


# MLA-II certificant spearheads city-wide lubrication program

**Pursuing 25% longer asset  
life at water treatment  
plants in the dusty heat of  
the American Southwest**

Arizona is not known for an abundance of natural water sources that are readily available for the hydration of its population centers and cityscapes. So, in a dry-locked metroplex like Phoenix, the sanitary processing of relatively scarce water is paramount—a perpetual man-versus-nature struggle that directly impacts the region's ability to grow and thrive.

Accordingly, with aging machinery assets at four water treatment facilities and many dozens of potable water wells, recharge wells, and pumping stations, the Phoenix suburb of Chandler has taken a proactive stance by hiring an ICML-certified lubrication and oil analysis expert to develop predictive maintenance programs that will extend the reliability and service life of these assets. And, though his



proposed solutions will take several years to implement fully across the board, the benefits and efficiencies were felt almost immediately at the inaugural plant where he is based.

### Recognizing the Need

When Richard Hunt, MLA-II, MLT-II, was hired by City of Chandler, he knew that overall predictive maintenance (PdM)—even beyond lubrication enhancement—was an area of great interest to the reliability management team. In fact, he was hired specifically because the utilities group had determined from prior exposure to various PdM resources that they would be in over their heads without a specialist like Hunt.

“It all started as a training thing,” recalls Hunt, who currently serves as Chandler’s Sr. Utilities Predictive Maintenance Technician. “Sometime in the 80s, all the technology shifted. The electronics world came in and started making instruments that were readily available, easy to use by everyone. Infrared cameras: you used to have to pull around liquid nitrogen to keep the camera cool, and it was \$100,000 to buy. Well, now you can buy an infrared camera for under 1000 bucks and make it work for most applications. And the same thing with machine vibration: you used to have to bring several suitcases of equipment and basically be a PhD to understand the data. But the digital age made everything so much easier and programs so much simpler to use.”

He says reduced costs and increased ease-of-use made various monitoring technologies accessible to a broad spectrum of factory personnel, so training became more commonplace, especially because of cross-functionality.

“Most technology manufacturers realized that there

*“I doubt I would have done as well without the training, nor have been able to sell these ideas without the certifications I have.”*

isn't any single technology that's best, so they all complement each other," Hunt explains. "So, when you go to an infrared class they'll indicate that infrared can help with lubrication by detecting temperature changes, but then they are also quick to point out that other technologies can be more effective in lubrication practices, such as ultrasound and oil analysis. Ultrasound can detect bearing noise level and sound quality and help with determining whether a bearing needs lubricant, but it will not tell you the condition of the lubricant. And for this you need oil analysis. And so on."

With an eye toward PdM, one of the city's electricians did acquire an infrared camera for thermographic use at the plants, and several employees attended external

training to learn how to use it.

"During one of these classes, Chandler management absorbed the message about complementary technology tools and decided the maintenance team should be doing more than just infrared, because they could be doing better maintenance or extending the life of the equipment even further by implementing additional programs," recalls Hunt. "They just didn't know how."


The city's subsequent attempt to expand the asset condition monitoring program in-house proved eye-opening and challenging.

Says Hunt, "The maintenance superintendent at the time acquired a portable oil analyzer and anticipated this



*Before Hunt's involvement, longer-term storage used to involve a roof and a cage but still allowed exposure to dust and weather.*





*“We all know  
that lubrication  
is the most  
controllable  
thing you can  
influence.”*

would save thousands of dollars by testing oil and changing on demand. The salesperson indicated that if they did this then they wouldn't have to change the oil until the unit says so. Unfortunately, what they failed to realize was—as simple as the unit is to operate—there are dozens of parameters that should be looked at, not just the three that this instrument was reporting. So, it still required deeper lubrication skills to perform and analyze, which they didn't have in-house.”

The utilities group soon decided their best option to design a comprehensive program was to hire a PdM-oriented person from the private sector who could hit the ground running.

“Management already had an idea of what they wanted to see, but they just didn't know how to get there, and that's where I came in,” says Hunt. “I came from an industrial background, where I already had training and certification in vibration, ultrasound, infrared, as well as oil analysis and lubrication tech. They thought it was a good fit, I thought it was a good fit, and so I came on board in 2015. I was the first and only predictive maintenance tech in the city at the time.”

### **Low-hanging fruit and a wall of dust**

As a certified Machinery Lubrication Technician and Machine Lubricant Analyst, Hunt was already familiar with the current science and best practices for matters of lubrication and oil analysis. His responsibilities would now include the health of a broad scope of machinery assets that included pumps, fans and blowers, mixers, gear reducers, belt presses, and more. Hunt initially directed his attention to the Pecos Surface Water Treatment Plant (PSWTP) where he was based, and he

readily identified some conditions that could be rectified with quick fixes.

“One of the things I looked at that seemed to be the easiest thing to do—basically the low-hanging fruit where we could get the best bang for our buck and have the most impact—was lubrication. I just saw a ton of things that we could easily fix with relatively low dollars,” he says.

For instance, Hunt found that there was no consistency to the selection of lubrication types or brands across all machinery. Fluid sampling was nonexistent, so oil changes were simply being scheduled according to calendars rather than conditions, leading to inefficient usage and labor costs. Furthermore, most of the oil inventory was stored outdoors—a less than ideal situation, given the Arizona heat and dust storms. Covered cages offered little more than shade.



*Some drums used to be "stored" in the Arizona sunshine during regular changes, sometimes for over a month at a time.*

“Everything was outside, either in the cage with a cover where they were holding the drums, or tucked into various corners of the maintenance shop. And some of our plants were using a lot of five-gallon pails, just being stored outside.”

Of course, temperature fluctuations naturally caused issues with condensation.

Hunt recalls, “In one instance, we wanted to take a clean sample of reference oil and we went to pour it out of the pail into a sample bottle, and we found out that a third of the container had water in it. And that was a pail they were using regularly, so we're not even sure if they had been filling the gearbox up with water, because all they do is just take the funnel and throw it in and—well, you know.”

Even the sealed oil drums were no match for regional dust storms.

“You'll get a big dust storm come in and dust goes everywhere, even in a sealed container. You can open it up and see dust because it's so fine that it finds its way into everything. So, we changed drum filters and filter carts from 10 microns down to 3 microns because we were seeing high levels of particles below

10 microns in our oil samples, all because of the dust.”

The plant had been depending on OEM breathers, which proved to be insufficient at best.

“When a sandstorm or haboob comes through, it's just a wall of dust that gets picked up in the desert and comes through and it's like fog. You can't see ten feet in front of you. You could look and see a pile of dust all around the fill tubes or fill ports in the ‘insect screen’ breathers. All those breathers that manufacturers put on are not much more than insect screens because they only go down to 40 micron, the size of a hair. But we've got contaminants going down to below 4 microns, and it's mainly all silica from the sandstorms.”


Hunt applied his expertise to conduct an audit of conditions at all four plants and mapped out some recommendations. He even touched base with the local rep of a reliability equipment vendor to conduct its own courtesy assessment, and that vendor's findings corroborated his own. This is where he noticed his ICML certification bolstered his position.

“The training and certification provide a means to be an authority in the subject,” he says. “Mostly, it has to do with the fact that the training and certification establish that you're competent and well-trained and qualified. And then top that off with the reliability equipment vendor providing similar results, matching up to what I was saying almost word for word, along with



*Joe Maestas, MLT-I, uses a hand vacuum pump to collect an oil sample from the 250 HP motor of a vertical turbine well, while Richard Hunt, MLA-II, greases the motor bearing with the help of an ultrasound device to monitor for optimal amount.*





some success stories from other water and wastewater plants across the country, and everything just clicked. Between the two of us, we were able to get the ball rolling.”

**“Keep it clean, dry, and contaminant-free.”**

Since then, Hunt has been able to establish a clean and organized lubrication storage room at the PSWTP facility, bringing all drums and containers indoors. This room includes color-coded asset lubricant requirements, containers, and—perhaps most important—climate control. He also identified and documented bearing grease frequencies and volumes and started sampling asset fluids so that oils are now tested and changed as conditions require. And he has been swapping in desiccant breathers with 2 micron filters to combat the dust more aggressively.

“We get most of our oil in 55-gallon drums, and we implement those drums only by using drum pumps with filters on them,” he says.

Having switched from a calendar- to condition-based schedule, Hunt now sends

his fluid samples to a third-party lab for testing. He says the benefits outweigh the cost of this new practice.

“While we save on oil and labor costs, external testing has higher benefits than just oil and labor. We can now understand our machine health. We believe we can get at least 25% more useful life out of the assets by paying attention to the lubrication needs,” he predicts.

**Addressing culture through training and tenacity**

Just because Hunt initiated these improvements at PSWTP did not mean that his budding lubrication program would persist. He understood that sustained success would constantly face shifting priorities of municipal funding, as well as the *status quo* mindset among longtime colleagues and suppliers. These are culture issues that make it challenging to move forward even with a lubrication champion like Hunt.

“One of the challenges with the city is they make decisions on a different timetable and with different priorities than the private

sector,” says Hunt. “The last job I had was in an engineering firm, where one of their groups was responsible for contract-out operations for water and wastewater plants. So, nothing I’m doing now is really any different than before. But back then, working contract-to-contract, the municipality customers had little interest for long-term asset care because many contracts were on a three- to five-year life cycle, while improvement efforts like lubrication often require much longer commitments to develop and sustain. Whereas now, with Chandler directly allowing me to implement some of these things, the city is looking at it as, ‘How long can we keep this equipment running?’ And I think most industries now are looking at it this way.”

Such a long-term view directly impacts budgeting and prioritization, especially as the physical assets age while Chandler’s population expands. One might expect a program that can prolong machinery life and service without sacrificing operational efficacy would be an easy sell, but there are stumbling points getting everyone up to speed.

“Some of our physical plant is 30 years old and in replacement, and some of it is not. Even with the lubrication, the challenge is trying to get the crew to put the breathers on and put the sample ports on. They don’t think they need to do oil analysis, because they change the oil every year, so they think there’s no need. And I would say, ‘That’s not really why you do an oil analysis.’”



*Oil is now stored indoors in a conditioned space. Note the presence of drum pumps, filters, breathers, and color-coded signs.*





*“The cost of certification is best seen as an investment, because ICML is a recognized authority in lubrication.”*

Hunt frequently finds himself trying to educate his fellow workers and managers.

"Sure, you're changing the oil," he tells them, "but sometimes you could be changing perfectly good oil, or you could be 10 months behind the ball. There are a lot of factors involved in trying to get them to understand why we need to test the oil and why we need to put the breathers on, why we should have sample ports, or why we should even sample the oil at all."

Not everyone in the division needs to be ICML-certified, but Hunt properly anticipated that education of all decision-makers would help everyone to function together toward lubrication excellence and make it easier for his recommendations to be funded and implemented.

"The city reorganized in the past year, and one of the people they hired was an operations manager to oversee the treatment plants' maintenance and operations. And he came from an engineering firm with a good background in asset management, and he's really focused on the predictive maintenance and the reliability, so he's been a big proponent of pushing the systems."

Hunt found that having an operations manager familiar with PdM concepts made it easier to secure backing for his proposals as he moved them through the management chain, and thus this manager has been integral to his efforts and successes.

"It's still a lot of selling," says Hunt, "but an approval that used to involve several conversations can oftentimes now be reduced to just one before management says, 'Let's run with it.'"

But to spread comprehension and acceptance of new lubrication practices and PdM thinking up and down the managerial board still requires additional effort.

Thankfully, Hunt—as a self-described “persistent nag”—is up to the challenge.

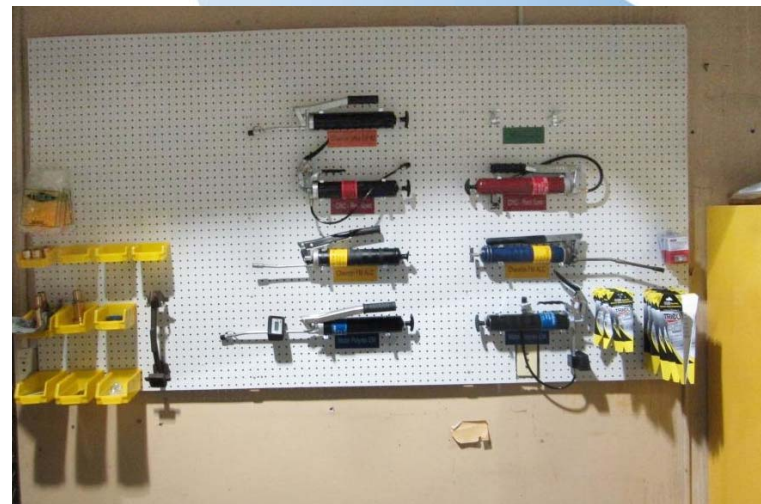
“One of the things we realize is that the programs only work if people understand what we're trying to do,” he states. “So, we're trying to secure best practices training on all lubrication, where everybody in maintenance has to attend—whether they want to be certified or not, whether they touch lubricants or not—so that when we tell even the lower and mid-level managers that they need to buy a breather, they're going to understand why. For right now, we're telling them and they look at it and say, ‘Well, that's going to cost money.’ And we can tell them why, but sometimes getting the same information from a complete stranger in a training class is often better than getting it from your own team.”

Given his emphasis on its importance to the lubrication program's success, Hunt hopes to secure this managerial training sooner rather than later.

“It's relatively inexpensive, but it's a matter of coordinating it and then ‘highly encouraging’ it. I prefer to make it mandatory, unless there's a critical downtime. We did this recently when we had the city send all the managers to root cause analysis training with one of the vendors in Phoenix. And I'm a nag. I'll just keep nagging people to death because I think that's the importance of it. And I don't mind doing that.”



*In the PSWTP facility's new lubrication storage room, Hunt stipulated that each transfer container is to be color-coded, labeled, and dedicated to one fluid.*



*Grease gun storage area today. Each unit is labeled with color code, type of grease, and volume per stroke.*





*Richard Hunt, MLA-II, and Joe Maestas, MLT-I, service a 125 HP motor on a vertical turbine booster pump.*

It's not just the managers who could benefit from training, but also the hands-on people interacting directly with the lubricants.

"One time I was pouring oil into an asset with a transfer container using a single-use, disposable funnel, and the well tech watching me said, 'Here, use this funnel, it'll work better.' And he took a large, open funnel and rapped it up against his truck to knock the dirt and debris from it. I said, 'Nah, I'll stick with my disposable.' So, yeah, we're trying to get people to use disposable funnels instead of reusable plastic or metal. We try and get the idea across that funnels are only used for draining oil, not for filling."

"Some of the mechanics get mad," he continues, "because we may fail oil they recently changed due to high particle counts or contaminants. We have occasionally found the particle count after an oil change to be higher than it was when we failed it."

To keep everyone on the same page, Hunt works hard to manage expectations. "We have set up methods and instructions on how the oil should be changed and expect these to be followed," he explains. "If the procedure is done as written and it fails, then it's up to us make adjustments to make it work. But we let the mechanics know that





*A brine concentrator blower lube loop receives proper care and attention from Joe and Richard: Joe collects an oil sample while Richard greases the motor bearing with ultrasound guidance.*

if they veer from the procedure and it fails, then they have no one to blame but themselves. It may appear we are beating up on these guys, but doing it right or doing it well is not always easy or popular.”

As new PdM practices are adopted, Hunt says it becomes easier to get management and other staff “to follow the decisions we make about changing the oil, because if it's wrong we'll adjust it and make it work. Our position with them is, ‘We’ve gone to the training, we’re certified in doing it, we’ve learned best practices. This is the way we want you to do it because this will get you the longest asset life.’”

### **More certifications = easier expansion**

Thankfully, though it may be hampered occasionally by funding or scheduling issues, the City of Chandler does support training, within reason.

“I realized the importance of good training years ago, and the need to continue learning and applying best practices is non-stop,” says Hunt. “Everyone who touches lubricants needs to be trained and certified in it. The city really supports sending people to training, especially if it's local. That's why, when Noria had a class in Mesa [another Phoenix suburb], we could send all those people out.”

In this case, “all those people” were lubrication techs from all four of Chandler’s water facilities. In 2017, they attended Noria Corporation’s independent, three-day, formal training course that covered content from ICML’s Body of Knowledge for MLT-I certification, and then they all sat the exam for certification.

“We were fortunate that I could convince management to send mechanics from all the plants to the training. Being in the trades my entire career, I know that certification shows a level of knowledge in the subject.”

In addition, one of Chandler’s senior mechanics based at the Ocotillo Brine Reduction Facility, Joe Maestas, recently accepted a role as a PdM technician to work with Hunt across all the treatment plants. Maestas earned his MLT-I certification in the summer of 2017.

*“Passing the ICML exam gives you a sense of pride that you accomplished something that not a lot of your coworkers have.”*

With these newly certified personnel now involved with the program, Hunt anticipates smoother acceptance as he coordinates expansion of his PSWTP enhancements to Chandler’s other water plants.


“If and when you pass the ICML exam, it gives you a sense of pride that you accomplished something that not a lot of your coworkers have,” he says. “And it provides you a level of confidence knowing that you demonstrated at some point in time in your career that you were able not just to answer the questions, but to actually know the material, to have the competence and confidence that you know what you’re talking about.”

### **A model of innovation and efficiency**

In keeping with the city’s long-term thinking, Hunt keeps his eye on the bigger picture with regard to the value of certifications.

“The cost of certification is best seen as an investment, because ICML is a recognized authority in lubrication,” Hunt explains.

“When you have those kinds of certifications, when you come up with an



analysis or recommendation to do something, it's easier for others to believe that what you are saying is accurate. It's like, 'Hey, you have the training and you have the certification. You must know what you're talking about because you are certified.'"

Furthermore, Hunt recognizes that the economic impact could be substantial as his certified team expands practices through all the plants, water wells, and pumping stations.

Says Hunt, "The city has adopted a 50-year asset plan, while most of the machinery in the water and wastewater field has an expected life span of around 20 years. So, the 50-year plan basically anticipates having to replace all the assets twice. But if our lubrication program can extend the asset equipment five years—from 20 years to 25—then we're only replacing it all once instead of twice in that 50-year time. So, how much

is a treatment plant worth, \$150 million? So, if we can gain those five years just by doing better oil practices... We all know that lubrication is the most controllable thing you can influence."

While Hunt might be considered a trail-blazing ICML certificant, he is still humble about it all.

"Other municipalities may contract with consultants to come in and do this kind of work, but they generally don't hire people on payroll to do it. So, I think Chandler is one of the few municipalities—if not the only one—in the Phoenix area that has a predictive maintenance focus to this extent."

"In a 10,000-foot view," he concludes, "I would like to see us be the role model for other municipalities for doing the right thing, wanting to replicate our efforts in their cities. So, I don't mind. Somebody's got to start it, so it might as well be us." **ICML**