



Commercial Office Retrofit Doubles HVAC Cooling Capacity with 5-month ROI



“The germicidal UV-C energy improved HVAC/R heat transfer efficiency so much so that the same temperature was achieved using just 40% of the previous energy used,”

-Miki Minic, Chief Engineer, Jones Lang LaSalle

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Miki Minic knew immediately how to solve the indoor air quality issue at the 227,000-square-foot Miami Class A office complex.

The veteran building engineer was in his first week with the global real estate giant, Jones Lang LaSalle (JLL), when he told supervisors he could significantly slash HVAC/R energy use at the 12-story Harbour Centre at Aventura office complex.

Minic had already done so at a 413,000-square-foot office complex across town five years earlier. In fact, he used the results from the previous project to prove his daring claim: he could improve indoor air quality (IAQ), restore cooling capacity and save enough energy in the process to pay for the upgrade within a year.



Miki Minic (Right) explains how Germicidal UV-C energy improves IAQ

“All of our air handlers were running flat out trying to keep up with our set points,” recalls Minic, chief engineer with Jones Lang LaSalle, which manages the office complex.

“Once we measured the static pressure drop across the coil, we knew that the fouled evaporator coil was responsible for our soaring

cooling costs and that we could restore HVAC efficiency with the addition of Ultraviolet-C (UV-C) lamps.

In the end, a post-project audit documented a 43.7% increase in one air handler’s airflow levels following the UV-C installation, which also reduced energy use enough to pay for the upgrade in just five-months—an impressive return on investment.



The RLM Xtreme fixtureless UV-C lamp system generates up to twice the ultraviolet irradiation levels as fixtured lamp systems.

The audit showed not only an increase in airflow, but also a 48.3% reduction in pressure drop, indicators that cooling capacity was restored to near original-design specifications. Minic estimates that the addition of UV-C lamps will save the Harbour Centre more than \$70,000 in HVAC energy costs each year.

A fact that is sometimes missed, says Minic, is that when you restore cooling capacity by 43%, tenants enjoy their comfort 43% faster.

In other words, the fouled coil was taking 43% more time to deliver the same air temperature before the UV-C retrofit than after.

Moreover, the germicidal UV-C energy improved coil heat-transfer efficiency to the point where the same temperature could be achieved using just 40% of the previous energy used.

The Use of UV Lighting

The UV-C wavelength has been used extensively since the 1990s to improve IAQ, and later to

improve heat exchange efficiency, boost airflow and reduce maintenance.

The germicidal wavelength eliminates microbial and organic materials buildup on HVAC cooling coils, air filters, duct surfaces and in drain pans.

However, it is the technology's ability to potentially slash between 10 to 25% of HVAC energy use that drives nine-out-of-10 UV-C installations.

According to the U.S. Department of Energy (DOE), Minic is not alone in targeting HVAC/R as a potential source of savings, as this equipment accounts for 30 to 50% of a building's total energy use – a figure that may be even more pronounced in southern, humid climates such as Florida.

"There are many benefits of UV-C," says Minic. "Most important is the improvement to air quality, so tenants enjoy cleaner, healthier air. Absenteeism due to the airborne spread of unsafe microorganisms via HVAC systems is almost eliminated.

Moreover, equipment life is improved, downtime and preventive maintenance expenses like cleaning the coils, drain pans, and the purchase of coil and drain treatments, etc., is significantly reduced."

The Harbour Centre Installation

The existing AHU's were 16 years old and offered limited access to the evaporator coils. As a result, the project's contractor recommended use of the RLM Xtreme™ high-output 360-degree UV-C lamp system from UV Resources.

This modern UV-C system installs in about half the time of conventional fixtures and offers

flexible configurations such as those required at Harbour Centre.

"The overall transformation in efficiency was incredible," remarks Minic, who estimates that the project energy savings yielded a five-month ROI. "Airflow levels increased by 43.7% in one air handler, or roughly 6,000 CFM – nearly doubling CFM capacity.

What's even more impressive is that we drastically increased air flow levels and saw a 48% improvement in pressure drop across the coil, or the Delta(Δ) P. Normally when you raise air flow, pressure drop across the coil increases. The decrease demonstrates the level of coil fouling in AHU #7."

ROI Exceeded Expectations

As with any major capital project, return on investment is a critical metric for Jones Lang LaSalle Management to share with the building's ownership.

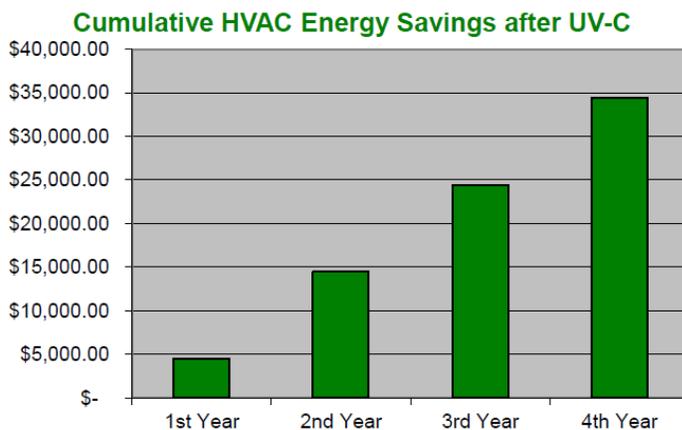
"The biggest surprise in the data, was the significant pressure drop (Δ P) across the coil," explains Minic.

"In other words, if we did not add UV lighting, our AHUs would have continued to consume more energy to achieve the desired temperature."



The test AHU retrofit was such a success that UV-C lamps were retrofit on each of the Centre's 11 other air handlers.

As for Minic and Jones Lang LaSalle, they are evaluating similar retrofits for three other office buildings it manages in Miami and Ft. Lauderdale.



About the RLM Xtreme

The RLM Xtreme fixtureless UV-C lamp system generates up to twice the ultraviolet irradiation levels as fixtured lamp systems, making it one of the most effective germicidal irradiation solutions available today.

With the industry's highest UV-C fluence (dosage) and easy mounting options, the near-universal applicability of the RLM Xtreme is ideal for high-volume coil irradiation and on-the-fly treatments. The system can ship as an "All-in-One" package with four of the most popular fixturing components in a single order.

The RLM Xtreme's unique LampClamp™ and Dual LampHolster™ allows UV lamps to "slip-in" place so they overlap one another, thereby reducing the cost to stock multiple fixtures and lamps

How it works

Coil-irradiation systems are installed within HVAC air-handling units and duct runs. As air-conditioning equipment ages, its ability to maintain designed coil-leaving air temperatures and humidity levels decline.

Predominantly, the culprit is reduced coil-heat-transfer efficiency, or the ability of the AHU's cooling coil to remove heat and water from the air. Evidence shows this drop in performance can occur within five years of startup, due to the buildup of biofilm on coil surfaces. Of course, there are energy and other cost penalties associated with coil fouling, such as fans and chilled water systems consuming more energy to compensate for lost coil capacity.

A system installed for coil irradiation can also have a secondary benefit of eliminating up to 30% of airborne pathogens on a first-pass basis (and these concentrations are further reduced by each subsequent pass or "multiple dosing").