



A Cintas Corporation White Paper

Clearing the Air on A/C Unit Maintenance

Extend the Life of Units to Reduce Energy Costs and Consumption

About Cintas Corporation:

Cintas Corporation (NASDAQ: CTAS) is a leading business to business services provider, specializing in corporate identity uniform programs, first aid and safety, fire protection, restroom cleaning and supplies, cleanroom resources, carpet and tile cleaning, promotional products and entrance mats for businesses throughout North America, Latin America, Europe and Asia. For more information, visit www.cintas.com.

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Hoteliers invest relentless time, effort and money to provide guests with a satisfying stay. From delivering exceptional customer service to ensuring clean, spotless rooms, deep cleaning guest room air conditioning units doesn't always top the priority list. However, it should. Beyond premature unit failure, poorly maintained A/C units can contaminate indoor air quality, spike energy costs, and emit foul odors. They can also harbor mold spores and debris, causing allergies and other health issues that can discomfort guests.

Hotel operators are often hesitant to invest in advanced A/C cleaning technology due to limited budgets. However, according to *Green Lodging News*, a dirty packaged terminal air conditioner (PTAC) often has to work twice as hard and consume twice the electricity to reach the desired room temperatures of demanding guests.¹ This can cause electric bills to skyrocket. Furthermore, A/C units are expensive to replace and repair, so it's important for hotels to properly maintain them. Investing in a professional cleaning service actually saves the hotel money due to significant energy reduction and longer unit life.

To help hoteliers understand the A/C coil cleaning process and its impact on energy consumption, Cintas recently conducted a series of studies. The first study compared two different PTAC cleaning systems at the same hotel, and the energy savings achieved through each system. The second study compared the efficiency of cleaning Vertical Fan Coil units in-house against using an outsourced provider. In this white paper, we will cover the results of these two independent studies while demonstrating the impact that well-maintained A/C units can have on a hotel and provide tips for improving unit life.

Study I: Two Leading PTAC Cleaning Systems Face Off

In April 2013, a midscale hotel, located in Henrico, Va., piloted a test between two service providers to determine which could most effectively clean PTAC units while lowering energy costs. The analysis was conducted by Eric Ryan Corporation, a leader in energy management. The 103-room hotel charged Cintas Corporation and one of its top competitors with the task. Both companies were asked to clean the units in 50 rooms, while the amperage data was measured and logged in 10 rooms.

Methodology

To execute the study, a HOB0 data logger using a current transformer was placed on the electric circuit feed. The PTAC was then programmed to take amperage readings every two seconds. The current was monitored while the unit operated to satisfy the guestroom thermostat which was lowered 1-2 degrees. When the thermostat was satisfied and turned off the PTAC, the end time stamp and wall temperature were recorded with a Black & Decker

¹ <http://www.greenlodgingnews.com/Use-Steam-Cleaning-Keep-Your-PTACs-Running-Efficiently>

Thermal Leak Detector. The test was performed both before and after the units were cleaned, and measurements were collected for energy consumption, airflow, coil temperature and humidity. Once the measurements were recorded, the data was downloaded using Onset Corporation BoxCar Pro v4.3 software. The data was then evaluated to determine the energy savings that were achieved from each company.

Energy Savings Results

The study revealed that Cintas significantly reduced energy costs over its competitor. Cintas saved the hotel \$37.30 in energy per room, totaling **\$3,844** in savings for the entire hotel. In contrast, the competitor saved \$4.71 per room, producing a total savings of \$485. In total, Cintas was able to save the property **\$2,305** more than its competitor. Below are the results certified by the Eric Ryan Corporation:

Attribute Tested	Cintas Results	Competitor Results	Variance
Airflow	+ 334 feet + 39.9%	+ 139 feet + 13.2%	Cintas 140% Better
Coil Temperature	- 9.9 degrees - 21%	- 5.5 degrees - 12.7%	Cintas 80% Better
Humidity	- 2.02 - 4.4%	+ 3.8 + 9.6%	Cintas 153% Better
Energy Reduction	65%	8.2%	Cintas 693% Better
\$ Energy Savings Per Room*	\$37.30/room	\$4.71/room	Cintas Saves \$32.59/room more

*Savings are from cooling season only and don't include heating season. Additional savings will be realized during heating season.

The following day after the initial study, Cintas re-cleaned two of the PTACs which had been cleaned by the other company to see if they could make them even more efficient. Cintas was able to reduce energy usage 31 percent more. Below are the results:

	Pre-Reading	After Competitor	After Cintas
Room Energy Cost	\$36.52	\$33.52	\$23.48

The PTAC Cleaning Process Comparison

While both companies share the ultimate goal to effectively clean coils and lower energy costs, their processes differ greatly. The competitor in the study used a truck mount unit that is primarily designed for carpet cleaning. This is a traditional approach that only cleans the coil and the base pan. In some cases it requires the unit to be removed from the wall and cleaned off-site in the truck. This process can be risky as removing units can cause issues, including drips

on carpeting which can result in mold issues if not properly treated. It can also increase the risk of damaging walls and doorframes in guest rooms, as well as damaging the unit itself.

The Cintas A/C coil cleaning process uses a KiaAC machine designed specifically for in-room coil cleaning. To prevent spills and eliminate any damage to the guestroom, a tarp is placed on the floor and the unit is placed in a tray to be cleaned. The six-part deep cleaning process is certified as a “Green Process” by the Green Clean Institute and includes:

1. **Complete Coil Cleaning** - Coils are washed using FinClean, a non-acid, EPA-registered cleaner. Applied at 70 psi, the foaming cleanser penetrates deep between the coils and fins to push out hard-to-reach debris.
2. **Air Conditioning Pan Cleaning** – Using an 18-inch wand with directional tips to detail the pan, Cintas technicians are able to reach all of the tight areas to remove material build-up and malodors to eliminate odor.
3. **Drain Line Treatment** – This process treats mold and mildew often found in A/C condensation pans. It breaks down sludge and biological build-up to prevent overflow and clogging.
4. **Unit Disinfection** – Cintas uses an EPA-registered Sani A/C product that kills 99.9 percent of all bacteria, mold and mildew to improve indoor air quality. This greatly improves the guest experience for those who suffer with asthma and allergies.
5. **Pan Purge Strip Insertion** – To fight bacteria re-growth and keep drain lines clear, Cintas inserts a pan purge strip that can keep the pan clean of mold and mildew for up to six months. It also delays the recontamination process.
6. **Filter Cleaning** – During this step, removable filters are cleaned and sanitized to maximize airflow and prevent recontamination.

Study II: Measuring the Energy Efficiency of Cleaning Vertical Fan Coil Units In-House vs. an Outsourced Service Provider

In the second study, an upper-upscale hotel in Woburn, Mass. tested the impact of two different coil cleaning systems on the overall energy use in guestrooms. The test was used to determine whether Cintas has a more effective cleaning process than the hotel’s internal cleaning process, which would result in lower energy costs. Cintas and hotel staff cleaned five rooms on the same floor of the 284-room property. The tests measured energy performance before and after coil cleaning. Additionally, three hotel staff-cleaned rooms were measured after Cintas re-cleaned the rooms.

To ensure consistency with processes used in the first study, the second test was also administered by Eric Ryan Corporation.

Methodology

To execute the study, a HOBO data logger was placed at the supply air register of the guest fan coil unit. It was programmed to measure the supply air temperature every five seconds. The temperature was monitored while the unit operated to satisfy the guestroom thermostat that was raised 2-4 degrees and a timing device started when the thermostat went up. A Microlite digital temperature logger was placed adjacent to the guestroom thermostat to measure the temperature increase while the fan coil was operating to satisfy the 2-4 degree increase in the thermostat set point. The identical process was used in each room tested.

The test was performed before and after the guestroom fan coil units were cleaned and re-cleaned. When the thermostat reached the desired temperature, the fan coil unit turned off and the HOBO data logger downloaded, but the digital thermometer was able to stabilize and determine the final room temperature. The final measurements were recorded and the data was downloaded from the logger into a computer using Onset Corporation BoxCar Pro v4.3 software. The recorded times and heat delivery measurements were then evaluated.

Coil Cleaning Systems Reduce Energy Consumption

The study revealed that fan coil units cleaned with the Cintas system increased the heat delivery to the rooms by 25.8 percent. Because the airflow delivery was more efficient, this reduced the amount of energy required from the hot water boiler system. The estimated annual savings in natural gas for the 284 guestrooms is \$15,052. The annual savings for the fan coil blower motor located throughout each guestroom is \$1,964. This results in a total annual energy savings of **\$17,016**.

In comparison, the annual natural gas savings of hotel rooms cleaned by the hotel's staff members was \$3,578. Combined with the estimated energy savings for the fan coil blower motor, the total annual energy savings was **\$4,072**.

In the three rooms Cintas re-cleaned, there were additional improvements to the airflows in the fan coil units. The additional annual natural gas cost savings for the three rooms was \$36.91, \$23.01 and \$41.58 respectively. The estimated annual fan motor energy cost savings was \$5.05, \$3.15 and \$5.69 respectively. Using these annual savings for the three re-cleaned guestrooms and extrapolating the savings to the 284 hotel guestrooms results in an additional natural gas annual savings of \$9,608 and an additional electric energy annual savings of \$1,315 from the Cintas ChemTron cleaning system.

Maintenance Pays

When properly maintained, hotels can expect their PTAC systems to fully function for seven to 10 years. In fact, According to *Green Lodging News*, hoteliers can extend the life of their units

by three to five years simply by using a service company to maintain their units.² This is because clean units can transfer air more efficiently at a faster speed.

A clear-cut sign that your A/C unit requires immediate attention is loud noise. When not properly cleaned, the unit has to work a lot harder and longer to cool the room, causing both increased noise and annoyance to guests. Cleaning frequency depends on climate and property type, but to avoid issues, A/C units should be thoroughly deep cleaned at least once per year. However, filters should be cleaned on a routine basis. Hoteliers should also ensure that the area around the unit, both inside and outside, is clear of objects like curtains and furniture. This will allow efficient airflow throughout the room. Lastly, if a hotel room smells bad, hoteliers should never try to mask the odor with deodorizing sprays. Instead, investigate to find the source of the odor because it could be coming from the A/C unit and poorly affect indoor air quality.

A/C Unit Maintenance Summary

While not always top of mind, A/C units greatly impact the operational success of a hotel. One of the major benefits is reduced energy consumption. As revealed in the Eric Ryan Corporation study, hotels can save thousands of dollars in reduced energy costs, simply by investing in a proper deep cleaning of their units on a routine basis. It also reduces the need for replacement parts and pricey service calls. The benefits greatly outweigh the cost of the service, and the results create a fresh and healthy atmosphere for both employees and guests. In addition, because A/C units have small, delicate parts, it's important to enlist the help of a professional service provider to ensure that they are cleaned thoroughly with the proper equipment and EPA-registered cleaners to protect the air quality.

According to the J.D. Power and Associates 2014 North America Hotel Guest Satisfaction Study, among all problems experienced by guests, dirty rooms have the greatest negative impact on satisfaction³. By properly caring for their A/C units, hoteliers can enhance the cleanliness of their property by dramatically decreasing noise, removing odors, eliminating stale air and preventing the growth of mold and mildew in guest rooms. At the end of the day, clean A/C units save hoteliers time and money and provide guests with a better stay.

² <http://www.greenlodgingnews.com/ptac-cleaning-energy-savings-made-easy-with-help-of>

³ <http://www.jdpower.com/de/node/5261>