Reducing HVAC Costs

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The following article is written to help Facilities Managers devise a plan to reduce cost, extend equipment life, and improve equipment reliability. The total cost of owning and operating a rooftop HVAC unit is comprised of:

Installed unit cost. _____
Cost for energy to operate unit. * _____
Cost for PM.* _____
Cost for repairs. * _____

Total HVAC cost: (Add 1-4) _____
*During the life of the unit.

Take the total cost and divide by the number of years in service. The result will give you your unit cost per year. The industry standard for the useful economic life expectancy of a rooftop HVAC unit is 12 to 15 years. The goal is not to spend more money, just to spend your money differently and wiser. By following these suggestions you will increase your maintenance activity efficiency, ultimately spending less money and experiencing fewer breakdowns.

In the above exercise you see that a Roof Top Unit (RTU) is expensive to purchase, maintain, operate, and replace. Because of this, we continually look to ways to reduce life cycle costs and improve reliability. Now is the time to introduce a comprehensive preventive maintenance program.

Comprehensive Preventative Maintenance (PM)

A comprehensive preventative maintenance program is the type of maintenance manufactures recommend. Breakdown maintenance is not only disruptive to your operations, but surveys indicate breakdown repairs cost three times the cost of a comprehensive preventative maintenance program.

There are many benefits of a comprehensive preventative maintenance program:
Increased sales because the customer is more comfortable and is willing to spend more time in your store. Even if the customer does not buy today, the exposure to your line will be impressed in the customers memory and will set up the opportunity for future sales
Increased employee productivity by providing a comfortable, clean area to work in. Indoor air quality is important for both the employee and the customer. By introducing outside or fresh air into the store you will flush the Volatile Organic Compounds (VOCs) present in new merchandise, carpeting, packaging, etc. If your air filters are changed regularly and the proper amount of outside or fresh

air is introduced into your store, your employees will be healthier. When an employee feels good, he will be more productive and more helpful to your customers.
Providing a comfortable workplace can reduce employee turnover. Many stores have installed incandescent lighting to make the merchandise more appealing but have not calculated the additional heat load that the lighting puts on the cooling system. If an employee is uncomfortable on the job he might begin looking for better working conditions.

Rooftop units should have a minimum of four preventative maintenance checks each year, including one cooling startup and one heating startup. The checks would include one belt replacement, if applicable, and four filter changes.

If the air conditioning unit and duct system will allow higher efficiency pleated filters, consider putting them in. Usually you can use a two-inch pleated filter in roof top units under 30 tons. The pleated filter will give additional rigidity that will protect the filter if it gets wet.

Once a year, have coils, the condenser and evaporator cleaned with a low-cost hand sprayer. First "brush clean" the coil if necessary. Then, using a low suds detergent such as "Simple Green" at the proper dilution strength, clean both coils and rinse. The evaporator tends to be "self rinsing" in the cooling mode. Cleaning the coils with a hand sprayer should be sufficient if other preventative maintenance has been performed at recommended intervals.

Yes, there are coils that are eight rows deep that can only be cleaned properly by a power or pressure washer. The pressure washers have their place on a neglected piece of equipment or at longer time intervals. They also take more time to set up on the roof and consume more chemicals, causing costs to go up.

Megometer Check
At least once a year take a megometer reading of the motors and compressors. This is a quick, non-invasive procedure and will give you an indication of the condition of the compressor windings and refrigerant. If you get low readings you can change either or all of the following: filter-driers, refrigerant and compressor oil. By doing this, you will extend the life of the compressor.

Comprehensive Preventative Maintenance will:
Extend the useful economic life of your units.
Reduce your energy costs.
Reduce your breakdown repair costs.

Preventative Maintenance Checklist
The following preventive maintenance checklist is consistent with major manufactures.

Two Mid-Season Inspections (February and August)
Replace all air filters. (Preferably Pleated)
Inspect and adjust belts and blower.
Inspect and lubricate blower bearings.
Clean heating, evaporator and condenser coils.
Verify heating/cooling systems are operable.
Clean condensate drain, trap, and pan.
Check thermostat calibration.
Verify economizer dampers are set and operable.

Cooling Start-Up
Replace all air filters. (Preferably Pleated)
Replace blower belt(s).
Inspect and lubricate blower bearings.
Clean heating, evaporator and condenser coils.
Verify heating/cooling systems are operable.
Check refrigerant and compressor oil levels on compressors with sight glass.
Check and adjust all operating and safety controls.
Check compressor(s) and motor(s) using a Megometer
Clean condensate drain, trap, and pan.
Verify economizer dampers are set and operable.

Heat Start-Up
Replace all air filters. (Preferably Pleated)
Inspect blower and belts.
Inspect and lubricate blower bearings and motor.
Clean heating, evaporator and condenser coils.
Test operation of heating systems. Emergency heat if heat pump.
Verify heating/cooling systems are operable.
Check and adjust all operating and safety controls.
Clean condensate drain, trap, and pan.
Verify economizer dampers are set and operational

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The Right PM Program For You

Certainly by following a comprehensive PM program you will be taking steps to reduce repair costs and increase the life expectancy of the equipment. However, keep in mind that the recommended checklist should be your minimum standard. It does not mean that you shouldn't increase the service levels of your PM program that will further reduce repair costs. There are many "Low Cost" PM programs that look attractive to any facilities manager. However, these programs will most likely have an negative impact on your repair costs.

Talk with your service provider for ways to implement the right program for you and your company.

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