

Demystifying HVAC

What To Do When They Cut Your Budget

By Ron Prager

It's no secret that the current state of the economy and the horrific events of September 11th are having a major effect on the retail sector. Sales are down, sales projections are down, and there is an increasing need to cut costs. Consumers are purchasing less, and the retailers who are best able to cut operating costs will be those who survive the present economic downturn.

We are seeing many facility managers being instructed to cut costs. Even if your company has not directed cost cuts, it is the fiduciary responsibility of every manager to examine their present programs for possible cost reduction and cost avoidance. The question is, what measures are appropriate and what measures will actually reduce the costs of maintaining and operating the HVAC Systems in your stores.

Preventive Maintenance:

Assuming that you presently have an HVAC preventive maintenance program in place, there may be some cost reductions possible by making changes to the program that allow you to purchase the minimum service required.

If you don't presently have a preventive maintenance program in place, you will probably reduce your overall costs by instituting a minimum maintenance program rather than responding only to breakdowns.

At minimum, in a typical retail store that is operated twelve hours daily, air filters must be replaced on a quarterly basis. Drive belts must be replaced at least annually. In addition, equipment should undergo a complete operational check and bearings should be lubricated at the beginning of each heating and cooling season. A minimum program must include all of the above. Basically this requires four visits annually. Two visits where filters will be replaced and two visits that include a complete operational check as well as a filter change.

We have seen managers cutting back to 2 or 3 visits annually. This is a mistake, and will lead to increased cost of ownership. The result of reducing the frequency of air filter replacements is:

1. Increased number of condensate leaks
2. Increased number of compressor failures
3. Increased number of heat exchanger failures
4. Increased utility costs

5. Reduced equipment reliability

The work scope listed above is the absolute minimum that your equipment requires. It is far more effective to pre-purchase this work as part of a PM program than it is to purchase this work on a time and material basis as equipment breaks down.

So where are savings possible?

Air Filters:

One discretionary item is the efficiency of the air filters you are installing in your equipment. If you are presently using 30% efficient pleated filters, and your costs must be reduced, you should consider switching to flat air filters. The actual cost of pleated air filter is approximately double the cost of a flat filter. Theoretically, higher efficiency filters reduce the cost of cleaning store interiors and ceilings, and reduce the required frequency of indoor coil cleanings. However, in my experience, and in practical applications, the increased cost of pleated filters is not usually justified. We have seen preventive maintenance costs reduced by as much as 25% by using flat filters in lieu of pleated filters. I am not convinced that the reduction in the cost of cleaning stores and indoor coils can offset the increased cost in air filters in a typical retail store.

Coil Cleaning:

The next possible area of savings is coil cleaning. Some facility managers include annual condenser coil cleaning in their preventive maintenance agreements. Some of you even include annual cleaning of indoor coils as part of preventive maintenance. Condenser coils need to be washed when they get dirty. It's as simple as that. The factors that influence the required frequency of condenser coil cleaning are:

1. The construction of the coils, including the type of fins, the number of fins per inch, and whether the coil is stacked
2. The number of hours of compressor operation each year
3. The geographic location of the store
4. The site conditions such as pollen, proximity of major roads and fields, elevations of equipment, and the direction of prevailing winds

While there is no doubt that a clean condenser allows for most efficient operation, the question becomes when is the coil efficiency reduced to the point that it should be cleaned? A good technician can determine the efficiency of a condenser coil by taking temperature, pressure, and electrical current readings, as well as by checking the amount of sub-cooling occurring in the condenser. We see sites where condenser coils must be cleaned every six months, and sites where condenser coils must be cleaned every six years. Rather than cleaning all coils at the same frequency, the greatest bang for the buck is obtained by cleaning condenser coils when a technician determines that the coils require cleaning and only when a technician makes this determination.

The required frequency of indoor (evaporator and chilled water,) coils is determined by all of the factors mentioned with respect to condenser coils. In addition, the cleanliness of indoor coils is effected by:

1. The efficiency of filtration
2. The percentage of outdoor air entering the system
3. The quantity of air passing over the coil
4. The number of hours of fan operation each year
5. The type of merchandise sold in the store
6. Store traffic

As with condenser coils, evaporator coils and chilled water coils should be cleaned when their performance drops below an acceptable level. This performance level can be determined by a technician measuring, temperatures, pressures, electrical current, and coil superheat. On average, we see the need for indoor coil cleaning every 3 to 5 years. There are of course exceptions.

Drive Belts:

One item that should be addressed annually is drive belt replacement. Drive belts seldom last more than a year, and the cost of replacing a belt during a PM visit is less than \$20. If the belt must be replaced on a service call the cost is more like \$150.00. If that service call is performed on overtime, the cost is more like \$250.00. It is definitely most cost effective to include belt replacements in your preventive program.

Condensate Drainage Components:

Inspection of condenser drive pans and components should also be included as part of your PM program. If these items require cleaning, this service can be approved and performed while the service contractor is on site performing a maintenance inspection. Condensate leaks are a major cause of emergency and after-hours service calls. In addition, leaks can cause heavy financial and material losses as they cause damage to fixtures, ceilings, and merchandise. It is most cost effective to keep the number of condensate leaks to a minimum.

Perform Preventive Maintenance Only Where and When Required:

Make sure you're performing the minimum required service at each store based upon the type of system installed . When a chain consists of hundreds of locations, it is possible that the retailer is paying for service at locations where service is not required. When stores are slated to be closed or relocated, make certain to advise your service contractor of this situation with enough advance notice to cancel preventive maintenance visits , three months prior to vacating the store. Make certain that you know which stores have landlord maintained systems and make certain that they are not included in your PM agreement. Make certain that you know which stores are served by VAV boxes that utilize air furnished by the landlord. VAV boxes that do not contain air filters can be

deleted from your PM program. VAV boxes that contain filters can be set up to receive filter replacements twice each year.

This concludes reducing costs through adjustments to planned HVAC maintenance. The second half of this article will discuss reduction of costs through the way you handle warranty work, proposals, equipment replacement, economizers, thermostats and EMS systems.

Warranty Work:

Most construction specifications require that the installing contractor replace air filters and clean the HVAC unit interiors prior to turning over the store. This is especially important when the HVAC units are allowed to operate during the construction process. Confirm that this work was performed and start PM service three months after the turnover date.

On new stores, the landlord, or the installing contractor is responsible for making repairs during the first year. Due to slow response times, there are many situations where the retailer pays for service response during the warranty period even though the site is under warranty. Put teeth into your construction specifications regarding warranty response within four hours, twenty four hours per day, seven days a week. Add a clause that states that lack of response will result in the retailer having another contractor perform required repairs at the cost of the general contractor or the landlord. (Otherwise known as a back-charge) This should reduce the cost of servicing stores that are under warranty.

I strongly recommend the practice of performing post construction inspections of HVAC systems on new stores. Our experience has shown that retailers often pay for repairs after the warranty period is over to correct work was performed improperly during construction.

Know Your Equipment:

It is most important that you track the age of the equipment that serves your stores and that you be aware of all extended warranties and lease provisions. Compressors and heat exchangers usually cover a five-year extended warranty on parts from the manufacturers. On some equipment these warranties are included within the purchase price of the equipment. On some units, the extended warranties are offered as an option and must be purchased separately when the equipment is purchased. If the extended warranties are an option, make certain that they are purchased with the equipment and make certain that

you obtain copies of the extended warranty certificates when the store is turned over at construction completion. All warranties begin as of the start-up date of the equipment in question. When determining warranty compliance from the date of equipment manufacture, a six month window is usually allowed by the manufacturer.

Sometimes, lease provisions may reduce your cost of HVAC repairs or replacements. There are some leases that require the landlord to pay for the cost of labor to replace compressors. I have also seen leases that require landlord participation on a pro-rated basis when equipment must be replaced during the final 2 years of a lease. You need to know when you are entitled to another party paying for repairs.

It is a good practice to subscribe to the service bulletins put out by equipment manufacturers. These bulletins provide information about defects that have occurred in new equipment on a frequent basis. The problems described may lay the foundation for getting the manufacturer to pay for repairs that may be considered latent manufacturing defects. In addition, manufacturers can sometimes be persuaded to help with the cost of other repairs that may be considered latent defects. A condenser coil that develops multiple tube-sheet leaks during the third year of a unit's operation is a good candidate for replacement free of charge by the manufacturer.

Proposed Work:

It is typical for contractors to submit proposals for the cost of repairs above a certain limit. The facility manager should insist that these proposals are broken down as to the costs of the individual replacement parts and the cost of labor. The proposal should be submitted and accepted on a time-and-material basis not to exceed the proposed cost. When a contractor estimates the cost of a proposed job, he adds the cost of all materials he believes will be required to the cost of the maximum number of hours of labor he feels will be required to complete the work. The proposed price is based upon this maximum estimate of materials and labor. If the proposed work is quoted a flat price, and the quantity of labor or materials is less than estimated, the contractor has increased his profit on the proposed job. If the proposal has been submitted and accepted as "Time and material not to exceed the proposed cost," the decrease in labor or materials yields savings to the retailer. This simple provision should save between five and ten percent on proposed work.

Equipment Replacement

It may very well be more cost effective to replace old inefficient equipment than it is to make repairs. Due to the recent increases in utility costs, and the difference in efficiency between existing equipment and new high efficiency equipment, the cost of equipment replacement may be paid back in an extremely short period of time. Based upon return on investment, where extensive repairs are required, a payback period of three years or less is not uncommon. With interest rates dropping, you may be able to lease replacement units and actually obtain positive cash flow based upon the difference between operating cost savings and the monthly lease payments. Facility managers

should develop a five year plan that targets equipment for replacement based upon age, condition, annual hours of use, type of equipment, and utility rates.

Economizers:

Operating costs and repair costs in most areas of the United States are reduced by the use of outside air economizers. These devices allow outdoor air to be used to cool a space in lieu of operating compressors during periods of reduced outdoor temperatures. It is essential that facility managers make certain that their HVAC contractors are checking economizer operation during PM visits. Contractors should also be instructed to set economizer changeover controls at their most aggressive set points to maximize the hours of economizer operation. It is also essential that the screens on outdoor air conditioners be kept clean for proper economizer operation.

Thermostats and EMS Systems

It is a simple fact that reducing the number of hours that an HVAC unit operates will reduce the cost of owning and operating that unit. Less hours of operation yield savings in utility costs and in repair costs. HVAC components are designed to operate for a predetermined number of hours prior to failing. Reduce the number of hours each year, and you increase the time between component failures.

Programmable thermostats and energy management systems are utilized to minimize the number of hours that your HVAC equipment operates. EMS systems do not allow major adjustments of temperature setpoints or programming by store personnel. Unfortunately, programmable thermostats are the favored plaything of many employees. At minimum, every system serving a retail store should be served by a digital programmable thermostat. If EMS systems are employed, setpoints and schedules should be reviewed quarterly with operations personnel. If programmable thermostats are employed, a memo should go out to all store managers regarding setpoints, schedules, and programming instructions. There is no greater waste of capital than heating and cooling equipment that runs at exaggerated setpoints twenty four hours a day.

The aforementioned recommendations are meant to provide some guidance as to the issues that should be discussed with your HVAC vendor when attempting to accommodate budget reductions. The challenge is to obtain the most bang for the buck without adversely affecting system reliability or increasing repair and utility costs.