POWER SAVING DEVICES - Discussion

Q : Can anyone suggest power (Electrical Energy) saving devices available, which are suitable for manufacturing industries (automotive) and process plants (Heat Treatment). It will be further helpful if the expected percentage reduction is mentioned.

A #1 :

Don't get hung up on saving energy. Worry about saving money instead. Many products claiming to save energy cost so much to purchase and replace the existing equipment that you never get your investment back. Anything that you replace with an "energy saving" item, should have a payback period of no more then 5-7 years, including the cost of the installation. Anything beyond that and the savings are very dubious.

Don't forget to include in your calculations how long a device is running. A motor that is running only a few hours a day is usually a poor choice for replacement with a more efficient unit.

One of the biggest things you can do is turn off things that are not needed. It always amazes me how many things run continuously that don't need to. I once did a retrofit on a system that had a big fan (30 HP IIRC). It ran about 20 hours a day, 6 days a week. By turning it onand off as needed, it now only runs a few hours a day, saving about 90% of the energy it would otherwise have used. Replacing the motor with a higher efficiency unit would never have come close to that kind of savings.

In a lot of places conveyors run all the time, even when not needed. Look at them one by one and see if there are periods of time they are empty. If so, switch them off during those times. Obviously, its not worth the effort if the empty times are only a few minutes long a couple times a day, but if a conveyor is unused most of the time, shut it off when its empty. Be careful with overhead conveyors running through furnaces though. Its usually a good idea to leave them running all the time while the furnace is hot. You may be able to put a VFD on some conveyors and run them slower when appropriate, even if you can't total shut them off. This will save some energy, although its hard to calculate just how much.

Lighting circuits can be controlled too. A common way is for motion detectors to be used. They come on when motion is sensed and shut off if no motion is sensed for some period of time. Make the time period reasonable though. I do not like having my crossword puzzle break interrupted when the men's room lights go off.

Compressed air is extremely expensive. Air leaks need to be found and repaired. Using air to cool cabinets (such as vortex coolers) is much more costly then using electric AC (but in some cases is worth the extra expense). In either case a thermostat is a good idea to reduce the run time of either the air operated cooler or the AC. Often air blowoff is used to get rid of shavings or coolant. The air blowoff should be turned on and off as needed, rather then left on all the time.

Insulation can be a big deal. Some places I have seen uninsulated steam pipes that have traps installed every 100 feet or so to collect the condensation inside the pipe. The traps are often running almost continuously. Insulating the pipes is relatively inexpensive and could save a lot of steam, and steam = BTU = $$$. Consider insulating unused faces of air conditioned cabinets with 1" foam in high heat areas. I heard that one plant used expanding foam insulation to insulate behind sheetirons in their control panels that were air conditioned and installed foam insulation on the other sides. Supposedly, the cost of the insulation and the electricians time to install it was recovered in less than a year.

Water cooled air conditioners are generally somewhat more efficient then regular AC. If you have cooling water available, use them. It may even be worthwhile to just use city water and run the used water down the drain.

Its also often possible to recycle water within your plant. Water that is waste from one process is often fine for use in your cooling tower.

Set the thermostat down in winter and up in summer when no people are in an area.

Sometimes its possible to recover waste heat and use it for other purposes.

Replace filters on a regular basis. It takes more energy to push liquids or fluids through a gummed up filter than through a new one.

Get creative.

Lastly, its a good idea to do some checking on things you do change. Putting a recording watt-hour meter on motors for a month or so before and after changing them out to a more efficient model will give you a good idea of what you are really saving as opposed to what the motor saleman promised you. Don't be too shocked if your savings is far less than expected. Most motors are not real efficient unless run at full load and very few motors are run at full load in the real world.

A #2 :

Before you rush in to power-savings schemes, you need to know where your power is going. How much load do you have? What is your idle load? What is your power factor? Are your buss bars running at 20% or 80% &c &c.

If your lighting systems are old, then replace them. If your power factor is horrible, then do something about it. If you draw tons of power even when the lines are "down", then fix it. If too many switching loads (computers, VFDs and so on) are causing problems, then isolate them.

Then look into ultra-efficient motors and so on.

We just spent a morning with Schneider Automation discussing their Square-D line of power monitoring equipment. I would suggest you do the same thing.

A #3 :

Industrial electric motors represent the single largest end use of electricity in the United States. The Department of Energy recently estimated that 25 percent of the electricity sold is consumed by industrial electric motors. These motors are used to power production processes and heating, cooling and ventilation systems. I would investigate the use of "energy efficient" motors and/or VFD's on some processes that can go into sleep or low speed mode during light load conditions.

A #4 :

Some methods of energy saving need money investment and many don't. You can modify lighting wiring so that excess light is not switched on. Could be the lunch break or after shift hours. Or you can fix more ceiling glass panels that provide you more sun light and less of electrical. If you can modify your process or use specific machines you can save energy. example- small heat treatment furnaces for small volume parts as most of the energy reuired is to heat the chamber. Pre heating in batches and To cycle more parts as it suits your process. If opening and closing furnaces cause quality problem you can add flame curtains. You can use air compressors in on/off than continous modulation mode. You can save 30% energy. Switch off unnecessary compressors automatically. Do not operate compressors at air pressures that you do not need. Instead of 120 PSi may be 100 PSI is sufficient for the whole plant. Install air regulators for cleaning air guns. 40 psi should be more than enough for general use. If you are a HV consumer, you pay for the kva charges. If our overall power factor could be improved to 0.95, you save on the KVA charges. Install capacitor banks or individual capacitors. Saving electrical energy is not only electrical engineer's job but every body's. Just walk through the plant and ask yourself if you can do some thing about every thing. You will lots of ways. One unit of electricity saved is one more unit produced.