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"Advanced and reliable technology solutions at an affordable cost"

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Ideas for Articles of Interest?

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The Controller

A LOGIC Technologies, Inc. Publication

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Let Logic Technologies, Inc. Save you Money!

by Russ Nagel

Your facility is wasting thousands of dollars each month! This money will be wasted month after month unless you do something about it. There is a proven, reliable solution to this problem! Your competition is doing it, so why aren't you? Someone needs to step up to the plate and present this issue to management. Otherwise, your competition will continue to maintain their advantage. They will lower prices, then take business and market share away from your company. Like I said before, there is a reliable, cost effective solution to this problem. I'll spell it out for you in this months issue of THE CONTROLLER from Logic Technologies, Inc.

Management in every company is constantly preaching about saving money by reducing utility bills. I have already (June 2009) discussed a feature built in to your operating system that can save you tens of thousands of dollars a year. Understanding and using the VG - <I>nhibit function, along with

temperature scheduling, can save your company thousands of dollars. There is another way to reduce your annual power consumption costs by thousands, maybe even tens of thousands of dollars each year.

The solution I am talking about is using a VFD, or Variable Frequency Drive. A VFD changes the speed of a motor (fan motors in our case) so that the motor turns only as fast as necessary to get the job done.

In a typical industrial refrigeration environment, we turn fans on. They run at full speed and consume the maximum amount of power. Then, we turn them off when some controlling parameter, which really isn't the value we desire, is reached. We wait for the controlling parameter to reach another value (again, not the value we want to maintain). Turn the motor back on, and start the (full power, full costs) process all over again.

Doesn't it make much more sense to have a refrigeration system that constantly works to maintain an exact setpoint (temperature/head pressure)? Wouldn't you want a system that avoids the on/off,

on/off process that bounces around a setpoint with a deadband range? What if this system, that works to maintain an exact setpoint, was more energy efficient than the on/off control process you are using now? Let's take a closer look at the promised energy savings and how they occur.

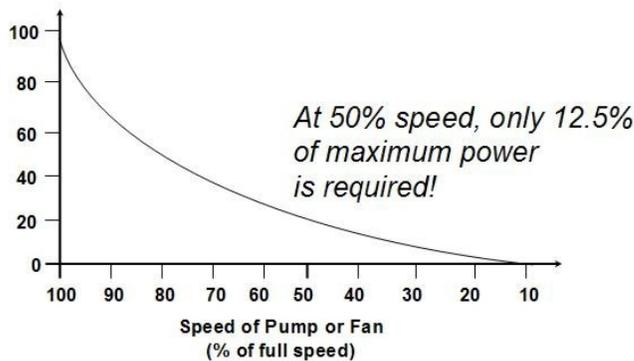
Electric motors consume power based on the amount of work they have to perform. In this case, the work is moving air across the cooling coils of the evaporator. This

what you pay for) consumed, the reduction is even greater!

The power consumed by a fan follows the "cube law" in relation to speed. Actually, it is an inverse cube law, which is very different from the "cube law". I don't see how anyone could confuse the two! What this "cube law" means in numbers is this. The power consumed by a motor turning at 50% of full speed uses only 12.5 % of the power consumed when the motor is turning at full speed! That's

keep your evaporator and condenser fans running at a target rate of 50% full speed at all times. Unfortunately, in real world applications, fans seldom run at 50% of full speed. You can see by looking at the graph in the figure, even a reduction in speed to 80% of full speed results in significant energy savings. Our control system allows us to limit evaporator fan speed. Our experience shows that fans set at 83 percent full speed will maintain room temperatures, and power is reduced significantly.

The "cube" power law



At 50% speed, only 12.5% of maximum power is required!

The load, in terms of Kilowatts (which is what you pay for!) decreases as the cube of the load speed.

work translates to a torque load on the motor. When the fan is on, it's turning at full speed, doing the maximum amount of work, and consuming the maximum amount of power. An interesting thing happens when you slow the fan down. If you reduce the fan speed from 60 hertz to 30 hertz, you reduce the torque load to 25% of what it was at full speed! A 50% reduction in speed equals a 75% reduction in torque! Additionally, in terms of power (kilowatts, which is

a huge reduction in power for a 50% reduction in speed. This reduction in speed is actually accomplished by reducing the frequency (in hertz) of the power fed to the motor. **Example:** If your fan motor consumes 500 watts of energy at full speed, it will consume 62.5 watts at half speed. With such a large reduction in power consumed, wouldn't it make sense to try and run your motor at 50% all the time? The control algorithms developed here at LOGIC Technologies Inc. are designed to

There is a significant energy and costs savings to be gained by using VFDs on your evaporators and condensers. Studies done by an energy consulting firm have shown VFDs on evaporators have reduced power consumption by 61 to 86% and can pay for themselves in an average of three years.

Logic Technologies, Inc. has twenty years of experience implementing variable frequency drive solutions in industrial refrigeration applications. VFD control software for evaporator and condenser fans is part of our standard control software. While our software can send a control signal to almost any brand of VFD, we prefer Mitsubishi. Our many years of experience has proven Mitsubishi VFDs to be the most reliable brand we have used. Additionally, our Mitsubishi communication drivers allow us to go way beyond simple speed control. We can monitor parameters such as power

consumption, actual frequency and alarms. We have the knowledge and experience you need to implement your VFD power savings solutions.

Get That Message Across!

by Russ Nagel

Is your maintenance team scattered over seven days and 24 hours to cover facility operations? If so, you can have a difficult time communicating with other members of your team. Of course, if it's really important, you will do whatever you have to do to reach them immediately. What if you have important, but not urgent, information you need to pass along to the other team members. Suppose you wanted to let your night shift know the newest issue of THE CONTROLLER has been posted on the bulletin board. While that is certainly important information, it's not urgent. They can wait till they get in for their normal shift to read it.

Your refrigeration control system allows you two great ways to communicate with other people on your maintenance team.

1. Instant message.
2. Login time message.

Instant message will cause a message to appear on the screen they have used to login on immediately. Log in time message will show them a message when they login to any computer. Let's talk about instant message first. If you are leaving for lunch, and you want someone to take a thermometer into the freezer and get a temperature reading, instant message is the way to do it. Provided of course, that person is

already logged in and you know they'll see the computer while you are gone. While at the main screen, select F5, F3. You will then see a list of who is logged in to the system. Type in that persons login name, exactly as you see it on the screen, then type the message and hit the enter key. The message you typed will then show up on the screen they used to login.

At this point, or earlier perhaps, you may realize you have somewhat of a limitation with this process. Only one person can be logged in to a computer at a time. If the only access you have to your control system is the panel built in to the cabinet, you won't be able to use this feature at all. If you have one remote computer that everyone uses all the time, and your control panel is in the engine room, you may have limited ability to use the instant message system as well. You must have two different computers (one remote, and the main cabinet) people can login to and readily see any messages. If your maintenance manager has a computer in his office and he is logged in to the refrigeration system, you can easily send him an instant message.

There is another method of sending messages that works well for those people that work odd hours. The key to making this system work is to make sure the off hour folks (actually all personnel should login when their shift starts) are in the habit of logging in when they start their shift. Even if you have two people starting their shift at midnight, make sure both of them login. This way, they both have the opportunity to receive their messages. To send login time messages, go to F5, F2. If you know their login number you can enter it here. If you don't know their

login number, select the <?> button and hit enter. You will then see a list of all the authorized users for this system. You can then select their name by using the mouse. On the next screen, select <M>essage. Begin typing your message. Once you are done typing your message, hit the Esc key. When that person logs in they WILL receive the message.

It may take a bit of effort to get everyone in the habit of logging in when their shift starts, but afterwards, you may find this is a great way to communicate with others on your team.

The idea for this article came from John Gallagher at Wal-Mart in Pottsville PA. For Johns winning suggestion, his will receive a MOA switch and a temperature sensor, saving his company \$70.00.

Your Analog Formulas

by Russ Nagel

Note: This is a brief look at the subject of analog formulas. A comprehensive discussion will appear in future issues.

From time to time, people call and are concerned about the formulas, for analog signals, used to convert the raw value to a meaningful number we can read and understand. To see what I am talking about, select F1, F1 then choose a sensor to look at.

Once you choose a sensor, select <C>alibrate or press the c key. Under the word <F>ormula, you will see a line that starts with the word Norm. In most cases, you will see a formula that looks like:

(!io[%io]-819) * 0.0763125

In the first part of this formula, the characters between the (), are going to be the same with any 4-20mA signal. A temperature sensor will not have the -819 within the parenthesis. This part of the formula is reading the raw value from the input register and making an adjustment so we can start reading at 4mA instead of 0mA. The second part of the formula, what we refer to as the multiplier, is what will change according to the range of the sensor. The multiplier is calculated by dividing the range of the sensor by 3276. 3276 is a number related to the resolution of the analog input. For example: If your sensor is a 250 PPM NH3 sensor, your calculation would look like this:

$$250 / 3276 = 0.0763125$$

0.0763125 is your multiplier and will be the number to the right of the * symbol in your formula.

Try this on your own with a 100 PPM NH3 sensor. Compare it with what you have in your system. Some of you may have formulas that don't look anything like what I have talked about here. It's Okay, there are some other IO systems that may have different formulas.

Backup Your System

by Russ Nagel

Backing up your current system settings to the flash drive is a step you need to be aware of. This process is important because once a change (temperature set point for instance) is made, it's easy to forget what you have done.

In the unfortunate event that your hard drive stops working properly, or you have to switch to your flash drive, you'll need your flash drive to have the most recent operating parameters stored on it.

You need to backup to your flash drive EVERY TIME you make a change to your operating parameters. Changes such as temperature setpoints, changes to defrost scheduling or vessel pressure, are all changes that need to be saved to your flash drive. As a precaution, you should consider backing up your hard drive drive on a weekly basis. In order to back up to your flash drive, take the following steps from your main screen:

F5,F5,F4, No to Floppy, Yes to Flash, Drive ID is 6 (or 5, the system defaults to the correct value), F for full backup, Make .dat and .pgm files = Y.

Keeping your flash drive current will save you large amounts of grief at a time when you need at least one thing to work out well.



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