

THE

US

Boiler Report



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YOU SPOKE, WE LISTENED

A new, high efficiency condensing boiler is coming soon from U.S. Boiler Company! The K2 represents the best of what we do. Why? Because it's the boiler designed with YOU in mind. In developing the K2, we conducted exhaustive surveys, interviews, and conferences with contractors and

installing professionals. Our goal was simple...listen to what they say, then design and manufacture a boiler to fit their needs and exceed their expectations.

What about selling it to homeowners? That is going to be easy. Offering high

efficiency, and a high level of features at a value price, the K2 will fit perfectly into the homes and budgets of many.

The K2 will debut in July. When it does, you'll get to see firsthand the boiler that you've been asking for all along. We can hardly wait to show you...

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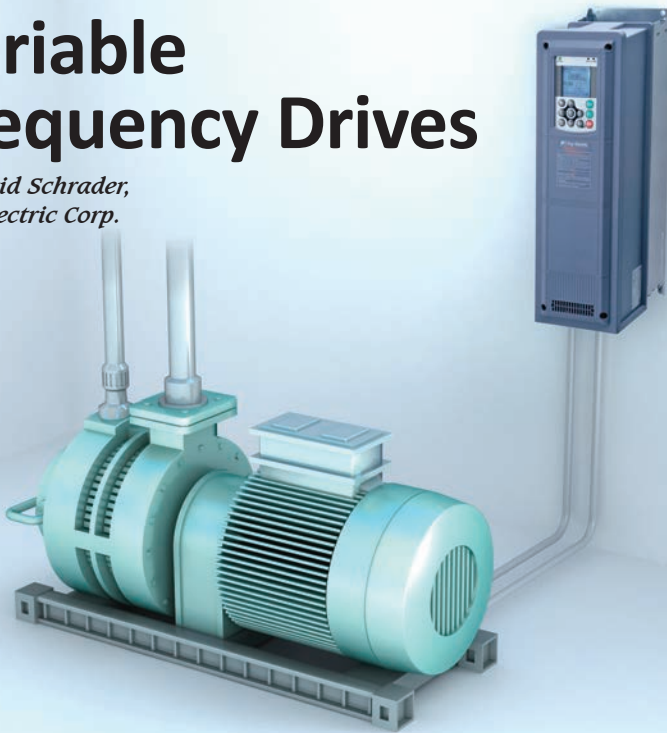
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Variable Frequency Drives

by David Schrader,
Fuji Electric Corp.



If you haven't heard of VFDs, by now you've at least seen the boxes strapped to the motors of large pumps and circulators, or mounted on a nearby wall.

The idea of variable frequency controls dates back to the 1800s, but the actual workable devices started appearing in the late 20th century with development of power transistors and diodes, as well as microprocessors; all of which have played a role in the development of the VFD (variable frequency drive). The variable frequency drive started to make an appearance in the HVAC world in the 1970s, when the technology became cost effective for general applications. There's your history lesson for the month, now what exactly is a VFD?

The best illustration I can give you to explain a VFD is to have you think about driving a car with a brick on the accelerator pedal. The only way then to control the speed of the car is to ride the brake. A traditional

electric motor driving a pump without a VFD is just that. It constantly runs wide open and relies on throttling valves to scale back the flow to meet demand.

If you look at the applications and process of electric motors, you'll see that the majority have been working off of this method. Now think back to the car; we know that it's designed to go 70 MPH, but most of the time in town, it'll be limited to 30 MPH. This is how electric motors need to work; they must run at a reduced level for most of their operating hours. A VFD pedal removes the brick on the accelerator, allowing the system to change speeds according to conditions, as you would with your foot in the car.

When power is applied to an electric motor, it produces torque (a force that causes the shaft to rotate) which in turn accelerates the shaft to a speed based on the applied frequency and the number of poles in the motor. Key to producing torque in the electric motor is the design Volts/ Hertz Ratio such as 230 Volt 60 Hertz (3.83 V/ Hz) or 460 Volts 60 Hertz (7.67 V/Hz).

By maintaining the design ratio of voltage and frequency, the strength of the two rotating magnetic fields produced is maintained, which in turn allows the motor to produce the rated design output torque. The speed of the motor shaft again is determined by the applied frequency and the number of poles in the motor. In other words, the VFD is able to manipulate the speed of the shaft by adjusting the applied frequency (Hertz) while maintaining the Volts/Hertz ratio.

Any application in HVAC that is classified as a variable-torque application is a prime target for VFD control of AC induction motors.

A good example might be a pump used in a closed-loop circulating system. In this application, a small reduction in speed will yield large savings in energy consumption.

Here's an example: If we take a look at an AC induction motor rated for 75 HP and 1,765 RPM base speed, which is in a pump application that requires it to operate 85 percent of time – approximately 7,500 hours annually – with an energy cost of \$0.075 per KWH, consumes 378 MW of power, we would spend approximately \$28,325 annually to operate the motor. As we discussed earlier in our automobile analogy, the motor would be running at 100% speed and we would be "braking" through the use of valves.

If the actual required flow rate was approximately 60 percent of what the pump is capable of generating, and assuming we replace a throttled discharge valve with an variable frequency drive for flow control - to 60% flow - our savings would be 278 MW for a dollar savings of \$20,825 – (Affinity Laws - Cubed Function) giving us a new

– Continues, see "VFD", page 8



Bare Bones BizTips

By
Ellen Rohr

Have you implemented a weekly Sales meeting? Good for you! It's an opportunity to get the Techs together to discuss what works and help each other get better at service and sales.

The problem is that your Sales meeting may be as exciting as watching ice melt. I've been to some pretty painful Sales meetings. Here's a slice...

The Sales Manager (SM) shows up late and the Techs straggle in. Some of them get dressed during the meeting or spread out their invoices so they can finish up their paperwork. The SM may complain about general poor performance by team members. The Techs hear, "Blah blah blah blah blah." Then, the SM turns off the lights and turns on a Sales training DVD. The Techs squint to see the TV, which is the size of a postage stamp and mounted at Everest altitude in a corner of the warehouse. 20 minutes later, the lights go up, the Techs awaken and shuffle off to face their day and customers. Ugh! You can do better. Here are some tips!

Honor and Recognition

Praise in public, criticize in private. Don't nag about poor performance in a group setting. It's irritating and ineffective. For those who are in compliance, or meeting the standard, it's a waste of their time.

Do bestow honor and recognition to the winners! The Sales meeting is a great opportunity to celebrate the wins. Acknowledge the Top Performers

How to have a ROCKIN'



for the Key Numbers...for the week, the month...the year to date. Play games and contests and celebrate great performance. Cheer, high five and give standing ovations.

Show and Tell

Get your team in on the presentation. You don't have to be the know-all-do-all manager. Your Techs can teach each other. Did you notice a particularly great invoice from your daily review of your Techs' paperwork? Ask the Tech to Role Play – with you or another team member – how that service call went down. This is a great way to reinforce 'right stuff' behavior and help your Techs develop their sales and communication skills.

Kick in the Cheer

What if you put together a cheer for your Sales Process? For instance, at Action Plumbing, you could shout...

Gimme an A! A is for *Address* your customer in a respectful, friendly manner.

Gimme a C! – C is for *Communicate!* Ask good questions and listen.

Gimme a T! – T is for *Take the Time* to figure out a Total Cleaning solution.

Gimme an I! – I is for *Involve* the customer in a discussion about their options.

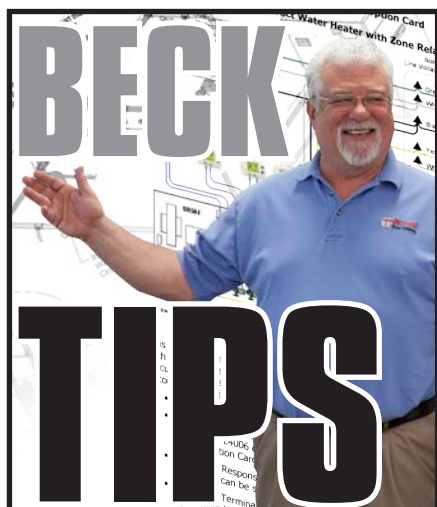
Gimme an O! – O is for *Offer* to do the work today and ask for the OK.

Gimme an N! – N is for ask for the *Name* of a *Neighbor* or another referral.

You could require that a team member present one letter of the cheer each Sales meeting. Encourage them to compete for the most entertaining and educational presentation. They could use skits, props, music and small animals.

Have some FUN at your Sales meetings. Before you know it, you've learned something...and had a human connection with the person sitting next to you.

A business plan can get you all on the same page! Less stress and drama, **MORE MONEY!** Download Ellen's free Biz Planning Video Series at: www.BareBonesBiz.com You can also find "ellenrohr" on Facebook, Twitter and Google+.



By Ron Beck,
U.S. Boiler Company

Over the last two months, we've discussed the OCP which is an acronym for Option Control Panel. This is a control that you - as an installing contractor - can plug in up to three different cards to add options to the IQ control system. We talked about the Low Water Cut-off card which is required by some states today and required on commercial installations. The LWCO cards can be purchased as automatic or manual reset options. The manual reset option is CSD-1 certified for those commercial applications.

This month we'll discuss the Auxiliary High Limit card. This is a secondary limit as the primary high temperature limit is built into the Intelligent Hydronic Control (IHC). This card - much like the LWCO - is also available as an automatic or manual reset limit. The manual reset high limit card is also CSD-1 certified.

The Auxiliary High Limit card is shipped with a half-inch well and is suggested to be mounted into a tee on the supply piping. There is also included a 48-inch sensor lead w/clip. Slide the sensor into the 1/2" aquastat well, install the clip over the wire to hold the sensor in the well. Route the wire to the Auxiliary High limit card and plug the lead into the control. Installation is complete. As you can see, this will save labor



The Auxiliary High Limit Card

installing a secondary limit to a boiler installation.

When the card is installed, I would suggest accessing the card and increasing the high limit temperature to 220°F. This is a secondary limit, not an operating limit. When a cast iron boiler shuts off there will be some residual heat build-up in the boiler. We do not want this activating the Auxiliary limit and opening the switch. If this is a manual reset card, then someone would have to manually reset the card. By raising the limit to 220°F the card will not shut off the boiler. This card default limit temperature is 200°F.

As with the other plug-in cards, the auxiliary high limit can be plugged into any slot location. To access the card

to change the high limit setting you must press the "I" button until you see the proper slot number that the card is plugged into. For instance if the card is plugged into slot number two, you will want C2" displayed.

Next, press all three buttons on the OCP the same time. Hold them until you get an underscore on the third digit location. release the three buttons and use the up arrow key to raise the temperature. After the desired temperature is reached pressing the "I" button will save the change. To exit continue to press the "I" button until you see "bAc" to take you out of the parameter change mode.

In July, we'll discuss the last OCP card; the Outdoor Reset card, which can achieve 10% - 20% fuel savings.



Ron Beck is Outside Technical Advisor and Manager of Training for U.S. Boiler Company, where he's been since 1998. Ron's 34 years of experience in the heating industry include climbing the ranks of a HVAC company, from apprentice to service manager. Currently, he's the de-facto, go-to solution guy for contractors in the field.

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Aire Serv is What's Up in Downstate New York



(above) Aire Serv owner, John Goldberg. (right) The service vans are hard to miss!

Winters are big in the corner of New York that lies between Lake Erie and Pennsylvania; bigger than many other parts of the state. While it's only slightly colder than the eastern side of the Empire State, lake effect snow takes its toll on the roads and service companies alike.

You'll find – if you visit the shop of Aire Serv of Southwestern New York – a few pieces of equipment not customary at HVAC shops. A snowmobile and a John Deere tractor might be most notable. Both are nice to have in rural New York, which is dominated by a beautiful mix of forest and farmland.

Owner John Goldberg grew

up on a family dairy farm in nearby Jamestown. He still farms in his free time, but since making some major changes to his business model a few years ago, that's taken a back seat. In 2010, Goldberg became Aire Serv Heating and Air Conditioning, a nationally-recognized brand.

Business Makeover

From 1999 to 2008, Goldberg P&H was a rough-in, new construction plumbing, heating and cooling firm. When the housing market dove, the company reinvented itself as a service, maintenance and replacement shop.

"We bought the Aire Serv franchise because we were

allotting too much time and effort to maintaining an internet and marketing presence, and not enough doing what we're really good at," said Goldberg. "Now we're focused on servicing and installing equipment, and we let Aire Serv corporate handle the outreach."

"We had to make a move, and it turns out we made the right one," said Goldberg. "Refocusing has allowed us to expand. We have seven employees, and in the busy season we have two extra." Today, the company covers southwest NY as well as Warren and Erie, Pennsylvania.

According to Goldberg, service and replacements make up nearly all of the work they do,

with only about 20 percent of that being commercial. About half of the business is hydronic.

Bread & Butter

Air conditioning, furnaces, packaged rooftop units up to ten tons; Aire Serv of SW New York does it all, but residential boiler retrofits are their mainstay. And of that, most is natural gas-fired."

In early April, the company had technicians at two homes on the same street, doing the same thing; replacing gas-fired boilers. Both homes were roughly 2,000 square-foot ranchers with baseboard radiation.

– Continues, see "Aire Serv", page 6

—“Aire Serv”, continued

Not long ago, homeowners Chuck and Annette Wells went into renovation overdrive. A brick walkway was installed in front, many rooms were repainted and the kitchen was completely replaced. As part of an energy upgrade, the mechanical area in the basement wasn't overlooked. And this one had a small, strange twist.

“It's not too often that you see a three-zone house pumped with one circulator and wired to a single T-stat,” said Goldberg. “The zones in this home were so well balanced that we didn't need another circulator. There's a Grundfos Alpha on the boiler and a Taco 007 on the secondary loop, and that's it.”

The Aire Serv crew offered to install two more thermostats along with zone valves, but the Wells opted not to. After all, they'd been comfortable in the house since 1993,. Two quarter-turn valves were used to ever-so-slightly throttle flow back on the two bedroom zones.

The original cast iron boiler was removed, and a 105 MBH Alpine condensing boiler was installed in its place. For the past three years, Aire Serv hasn't retrofitted a single gas-fired job that didn't include an Alpine.

Big improvement

“We've been using the

Alpine for about five years,” said Goldberg. “But three years ago, we quit using anything else on condensing installations. Before standardizing on the Alpine, we installed Weil McLains and a few Buderus units. For every 30 boilers we'd install, we'd have issues with 20. We now have 40 Alpines in the field, and have only been called back twice.”

Aire Serv technicians all agree; sticking to one boiler makes installation and service easy. Familiarity with the unit allows them to be much more efficient. Given the Alpine's broad line - 80-399 MBH - it's nearly impossible to find an installation that it doesn't fit. If an oil-fired job comes up, the company typically installs a Burnham V8.

Aside from the a few extra bends in the vent piping, the job was uneventful. The two installers were in and out in less than a day. The Wells family was impressed with how quickly the retrofit wrapped up, and they're looking forward to smaller fuel bills next winter.

“It seems that after more than a decade of fighting an uphill battle, the business is now in a really great place,” said Goldberg. “It's a combination of things, but great employees, the Aire Serv brand, and quality products mean that we're able to better serve more customers.”



(top left) Customer Service Rep, Ellen Santiago. (top right) Office Manager, Alicia Lloyd. (bottom) For gas retrofits, Goldberg and Aire Serv techs have standardized on the Alpine condensing boiler. Here, a newly installed 105 MBH unit heats a 2-zone rancher.



Consider Prefabrication

by John Abularrage,
Advanced Radiant
Design, Inc.

There are a lot of advantages to prefabricating portions of a mechanical system, when done correctly. Piecing components together in the shop before delivering them to the jobsite can often be a profitable, time-saving practice that increases quality of work.

Here at Advanced Radiant Design, Inc., we often prefabricate our near-boiler piping onto what we call "control panels". Pumps, zone controls, air separators; everything you'd hang on the wall near the boiler we attach to a sheet of plywood, to be transported to the jobsite later. It can save us upwards of 50 percent on labor costs when compared to assembling components on site.

Doing the work in the shop offers a familiar, controlled environment with all the necessary tools in arms reach. Lighting can be controlled, and you can work on a tabletop, instead of fighting gravity while trying to fasten or sweat components in place.

Productivity is increased by eliminating set-up and tear-down every day, and road time can be reduced during portions of the project that could've been completed at the shop.

On jobs where work can only take place during certain hours, working at your shop can free you from those restraints. This is especially nice when those permitted hours

occur overnight, when the place of business is closed.

There've been times that we've had half dozen or more control panels prefabricated in our shop, stacked against the wall waiting till we have access to jobsites. By prefabricating the panels, we can meet demanding deadlines that might be tough otherwise. For example, if there's a fast-track deadline on a house, and the GC wants the system up and running two days after he gets the mechanical room studded out.

Typically, the quality of prefabrication is higher than what can be achieved in the field, especially if the field installation would be rushed.

Set up for success

But the prefabrication process can have its challenges if it's not done in an organized fashion.

The process works best with consistency. The person who surveys the jobsite and takes measurements should also be involved with the fabrication and installation. They'll have an image in their mind of what the finished product needs to be, and are more likely to catch a problem before it manifests itself.

Speaking of measurements, that's where it all begins. The last thing you want to do is show up on site with a control panel that doesn't fit in the space you're given to work with. Also keep in mind that you'll need to allow enough room to

access the boiler and other equipment that could be in the room, like a DHW tank, water softener, breaker panels, etc.

After drawing an accurate piping schematic of the available space is (I strongly recommend using a CAD program), you can start laying out your components in the drawing. No matter the project, there's always a plethora of ways to orient materials on the board, and it can make a huge difference in regards to the dimensions of the finished panel.

Keep in mind, you need to account for the hangers that will support the piping.

In some situations you'll need to extend pipes slightly to accommodate the hangers. After you're done with your layout, you'll need to double check the entire assembly against the measurements of the mechanical room. Then - and not before - you can fire up a torch.

With a cherry on top...

Don't feel like you can't have fun with a prefabrication project and add some flair? Diamond-plate aluminum in place of plywood adds cost and Wow-factor. You can align zone valves with other components to give your panels a lineal, flowing feel. Or you could polish your copper.

While these changes don't affect the performance of the system, they can go a long way to demonstrate your

high level of craftsmanship while making your client's near-boiler piping a real conversation piece. The lasting impression might lead to some referral-driven or word of mouth business.

Prefabrication isn't a good fit for every job out there, but it can be a great skill to have in your company's repertoire. Most jobs you'll encounter offer the opportunity to prefabricate to some degree. If you'd like to give it a whirl, begin with a portion of the whole system, like a manifold pair and its associated pump. As you develop the shop techniques, the efficiency will follow. The investment of time will pay dividends.

Training

If those aren't reasons enough to consider trying prefabrication for one of your upcoming projects, consider this last advantage; training.

If you have an apprentice among your employees, letting him or her work on a control panel in the shop gives them the opportunity to practice real jobsite skills in an optimal, classroom-like setting. I've found this to be an effective way to let someone new to the trade wet their feet. They'll be learning while contributing, and that's a source of pride for them.

And we all know what happens when we have pride in our work.

John Abularrage founded Advanced Radiant Design, Inc. in 1988. Based in Stone Ridge, NY, the company specializes in solar, hydronic and radiant systems.

– “VFD”, *continued*

annual cost of operation in energy consumption of \$7,500.

Given our 75 HP pump example, and an estimated installed VFD cost of \$15,000, we would have paid for the installed VFD in roughly eight months. We then start collecting the \$1,750 per month in cost savings. This would also reduce the mechanical wear of the moving parts and seals, reducing maintenance costs and extending pump service life.

VFDs are a part of the electro mechanical systems within a facility. They then need to integrate with the power distribution system, the rotating equipment and the building automation systems. Advances by

Fuji Electric in VFD technology has driven driven product enhancements that support simpler integration to the facility subsystems. As an example, our HVAC Drive product has embedded communications capability which has been tested at a qualified BACnet testing laboratory and found to comply with all the necessary interoperability requirements. Embedded building automation communications capability means lower hardware, engineering and start-up costs.

Choosing a VFD control solution for motors spanning power ratings from a few amps to well over a thousand amps is based on the application requirements. If control of the motor speed or torque can yield process benefits, then one should consider using a VFD.

Here at Fuji Electric, we're unique among VFD manufactures for several reasons. We're one of the top engineers and manufactures of the power electronics, which are central to variable frequency drives. In addition, our long history in the design, production and application of VFDs has given us extensive domain knowledge of many electro mechanical systems and sub systems. We've deployed this knowledge in the design and production of VFDs which are recognized as the most robust and easy to apply in the VFD world.

David Schrader is the Business Development Manager for Fuji Electric Corp. and has over 30 years of experience in the design and application of Variable Frequency Drives.

Ron Poniatowski Recognized by OESP

You might remember, back in December of last year, the **US Boiler Report** featured an article about Ron Poniatowski, his experience with steam boilers, and his unyielding support of the OESP “Oil Heat Cares” initiative through countless volunteer hours.

Because of Ron and others like him, countless less fortunate families across Long Island were warm this past winter. At the April Long Island OESP Chapter, Ron's efforts were recognized when he received a plaque for his selfless contributions.

“I'm just one helper out of 10, sometimes 20 on these jobs,” said Poniatowski as he spread the recognition to his hard working peers.

Ron, your efforts are appreciated!



Photo: (left) OESP Long Island Chapter President Matt Spink presents Ron Poniatowski with a plaque recognizing his support.

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