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**Shortages Highlight the
Importance of Training and
Delivered Performance**



ALSO IN THIS ISSUE:

**Utility Influences on HVAC Industry
Electrification**

HVAC System Performance Simplified

Contractor Spotlight: DiFilippo's Service

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Charting a Course Toward Mutually-Assured Success



Mike Weil is editor-in-chief and director of communications and publications at National Comfort Institute, Inc. Contact him at ncilink.com/ContactMe.

Sometimes it takes a shortage to make you appreciate the importance of your suppliers. This is true no matter if you are a consumer trying to replace a non-functioning air conditioner or furnace, or an HVAC contractor trying to get equipment and parts to help your consumer customers.

Shortages impact distributors trying to find sources of products to help their contractors. And manufacturers feel the pinch as they struggle to get the raw materials necessary to build products distributors, contractors, and consumers need.

It's during such difficult times where working together across the supply chain becomes more important than ever. It's a time to recognize the power of partnerships.

Why? Because strategic partnerships benefit everyone. There is an old adage that says two heads are better than one. Instead of finger-pointing because consumers are left waiting until equipment

These distributors have their contractors' backs.

And manufacturers, who partner to facilitate product delivery, have the distributors' backs because their mission is to design the best, most efficient equipment.

They then deliver that equipment in a timely manner into the supply chain. I like to think of this as "Mutually-Assured Success!"

Charting a course toward renewed partnerships and mutually assured success is the theme of our November 2021 issue.


In our cover story, we talk with two distributor organizations working hard to have their contractors' backs by helping to keep them trained and supplied to the best of their ability. These distributors back up their partnerships by focusing on targeted sales to their regular customers until supply issues clear up.

Read how Behler-Young and Comfort Air are doing these things in *Distributors Focus on the Future* at ncilink.com/DFoF.

Next, check out our Contractor Spotlight on DiFilippo's Service at ncilink.com/DWay2 and see how loyalty to those who "brung ya to the dance," pays off for this residential and light commercial HVAC company headquartered in Paoli, PA.

And finally, **High-Performance HVAC Today** Publisher Dominick Guarino shares his thoughts on how the entire HVAC Industry can and should work to get through this crisis together. His *One More Thing* column can be found at ncilink.com/Together.

Supply chain collaboration and strategic partnerships are fundamental to improving business during both times of crisis and good times.

Working together, the entire HVAC Industry can overcome anything and come out stronger than ever. 

DURING HARD TIMES, WORKING TOGETHER ACROSS THE SUPPLY CHAIN IS MORE IMPORTANT THAN EVER.

orders come in, isn't it better to work together to help each other solve consumer issues?

For most contractors, especially those dedicated to the high-performance delivery method, their success depends on their ability to find and address consumer comfort issues. They have the consumers' backs.

For distributors, their mission is to develop a top-flight of contractor customers who not only buy a lot of equipment, but install and service it correctly to eliminate wasteful callbacks and warranty claims.

In turn, contractors buy more and install more.

Written by HVAC Professionals for HVAC Professionals

DOUBLE-ACTING GAS BAROMETRIC DAMPERS

Most contractors who deal with oil are familiar with single-acting barometric dampers. They are used to control the over-fire draft pressure of the burner. This pressure controls the amount of air entering the oil burner and maintains stable combustion. Controlling air on gas equipment should be just as important!

The **Field Controls Double-Acting Barometric Type MG-1 Damper** differs from its single-acting cousin in that not only does it control updrafts, but it also relieves downdrafts.

The original reason to relieve downdrafts was to prevent standing pilots from blowing out. Other than water heaters, there currently aren't many standing pilot appliances. But the double-acting baro-

metric damper is still helpful.

Its ability to relieve downdraft or positive pressure is beneficial because a safety spill switch can be added to turn off equipment if there is a downdraft, or more importantly, if the flue is restricted or blocked.

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This controls combustion air to the burner allowing the proper amount of



fuel to be supplied by maintaining the outlet draft pressure. If the draft drops too low, flue gases will spill from the barometric damper and trip the safety switch.

The same holds true if the flue becomes restricted or blocked.

On sealed flues, such as on induced draft equipment, this also regulates combustion air to the burner. It can also maintain equipment efficiency when there is excessive draft.

Hard to believe that such a simple device can do amazing things!

For more information on the **Field Controls MG-1** or to order the double-acting barometric damper, visit the NCI store at ncilink.com/MG-1.

— By Jim Davis, Senior Instructor,
National Comfort Institute



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From 2018 to 2021: Revisiting the DiFilippo Way

When it comes to DiFilippo's Service Co. (Paoli, PA), taking care of customers requires integrity, honesty, and a service mindset that overshadows competitors in their market area. In 2018, *High-Performance HVAC Today* profiled Vince and Laura DiFilippo and their then 47-year-old company (Read that spotlight here: ncilink.com/DWay).

Three years later, the world has changed. We thought it would be inter-



Laura and Vince DiFilippo

esting to go back and learn how those changes have impacted the company.

Some things have **NOT** changed, including the couple's continuing laser focus on keeping themselves and their team well trained and educated.

Their emphasis on servant leadership also has not changed: they have a thing called the *DiFilippo Way*, a cultural method for teaching servant leadership through better communications, education, and training.

What **DID** change is the world! The COVID Pandemic changed everything

and took the company down a bad path when it came to sales.

According to Vince DiFilippo, 2019 was the best year in the company's history. He says they finally seemed to have turned a corner by having all the right people on the team, for having the right systems in place so they could take better care of their customers than ever before, and demand for their services were "through the roof."

"With the pandemic in the news every day, we found people calling us to cancel appointments because they didn't want us in their homes," he says. "Things got so bad that I had to lay everybody off except key people: me, my wife Laura, and my general manager. We alternated office staff day-to-day.

"I couldn't sleep for weeks," he adds. "It was heartbreaking."

INNOVATION SAVES THE DAY

Like many small businesses, DiFilippo's applied for a Federal PPP loan and got it, which helped Vince and Laura begin bringing some people back. Even so, they could not generate enough business to bring everyone back, so they had to get creative.

"We did something we never did before," Vince explains. "We innovated and began cross-training two of our installation technicians to become sales techs. The pandemic gave us the time to do this by using our existing training lab (built in 2017).

"That saved us. Today we no longer

have specialists. We have techs. Period. Our technicians do both installs and service."

He adds that the beautiful thing is they can now operate with four fewer people than they did in 2018.

This innovation not only saved the company, but they are on track to hit \$2.1 million in gross sales in 2021. Vince says that is the goal, and they are nearly there. How? Well, with four fewer people, they lowered their overhead. They also rotate weeks for service and other weeks for installations.

"This makes us way more productive," says Vince.

The pandemic forced Vince and his general manager back into trucks and into the field, with Vince focused on selling. He managed to hire a new technician, "sight unseen!"

"This was a first for me. It was the first time I hired someone without meeting him, and I did it completely over the phone and by email.

"He is a military guy who served in the army where they trained him in HVAC."

He just completed his 90-day review. Vince says they gave him another raise and that he's working out.

"Military guys are the way to go. This tech knows his stuff, and he's disciplined, clean-cut, and polite. He demonstrates all the attributes he learned in the military. We started him at a ridiculous rate just to get him on board."

OTHER CHANGES

Speaking of salaries, because COVID put so many people out of work, companies across the board have been seeking ways to attract workers. DiFilippo's service is no different. According to Vince, salaries in the greater Philadelphia area have skyrocketed.

He says, "Demand for workers is through the roof. I believe that is good, and I don't mind paying more for a good tech. But what this change has also brought about is an intense increase in contractors stealing people from each other."

He shares an example of how one competitor approached one of DiFilippo's service techs in a gas station and offered him a \$5,000 signing bonus!

"I think this will only get worse because so many people are retiring now. As an industry, we haven't done enough to attract younger people into the HVAC trades. And the ones we do get have a completely different idea about work ethic.

You really can't talk about changes since 2018 without bringing up issues with the supply chain. For DiFilippo, 2020 was all about trying to hang on, manage operations with way fewer people, and focus on servicing existing clients.

In 2021, the issue became an inability to get equipment and tools in time to provide the same level of service to which his customers were accustomed. The result was the loss of several long-time customers.

"We had to rethink our operations in another way," he adds. "We started to pull parts from the equipment we were tearing out so we could use them temporarily while waiting for new parts to come in. I get a signed proposal from

the client agreeing to give me the job and okaying us to use used parts or used refrigerant just to get him going until the new parts arrive."

THE DIFILIPPO WAY

Vince DiFilippo says many of his competitors were working through shortages by changing suppliers or picking up other product lines.

"Our proposals to homeowners guarantee certain efficiencies. Part of our proposal is a printout of the AHRI sheets showing the efficiency. We can't get an efficiency match-up for a Trane coil, a Trane furnace, and an American Standard condensing unit. Our reputation is on the line, and I'm not going to do that to my clients. So there were opportunities. But I wouldn't do it. The DiFilippo Way is set in stone: quality service, integrity, and honesty are the cornerstones of our success."

Instead, in those cases where he couldn't get product in fast enough for client needs, DiFilippo would encourage his customers to look elsewhere. He knows it's important they get their air conditioning back online.

So he'll say, "Let's get you fixed, and then we can revisit doing business together after your 1-year warranty runs out. You can always come back to us."

TRAINING

Another aspect that differentiates this company from many of its competitors is its technical team's amount and type of training.

"Being certified by National Comfort Institute (NCI) is a top priority for us. The good news is that NCI managed to go virtual with those certification classes and tests, and we took advantage of that," Vince says.



DiFilippo's Service uses a virtual-reality system as part of its overall training regimen.

"But with COVID, our shortage of staff, and our scheduling issues, training fell off in 2020. We committed our strategic planning in January 2021 to bring back training at least twice a month."

In addition to NCI training, Vince invested in [Interplay Skilled Learning](#) – a virtual reality system with modules that each of his techs can take at any time. With its virtual reality headset, DiFilippo techs can keep practicing what they learn in a live class with its hands-on approach."

This all helps the company in their quest to get better at High-Performance HVAC contracting, especially when it comes to combustion analysis and carbon monoxide safety.

OTHER INVESTMENTS

Because it is so hard to find good techs and train them on the craftsmanship of HVAC contracting, Vince has been looking to technology to help simplify things and enable him to broaden the scope of his hiring and be more productive in the field. One such tool is the [Zoomlock](#) press-type re-

frigerant fittings.

He says this tool enables his techs to avoid the need for brazing and everything that goes with it.

"Now with Zoomlock, anybody can do it, and it's fire-free which simplifies installations.

"We also try to take advantage of all the built-in diagnostics and monitoring that manufacturers build into their equipment. All a tech needs is to know what the codes mean, which makes them more productive.

"So we are investing in diagnostic equipment and tools that will make the technician's life in the field easier."

They've also invested in a product from Emerson called the [Sensi Predict](#) monitoring system.

According to Vince, this moderniz-

es his maintenance agreements while adding more productivity in service by streamlining processes.

"Sensi has 10 sensors that monitor the HVAC system 24 hours/day, seven days/ week. If there's a problem, it sends us an alert," DiFilippo says.

"This helps us to reduce our maintenance agreement visits from two times per year to one because we're continuously monitoring our customer's entire HVAC system.

"What this does is help us operate with less manpower and yet do more tune-ups.


For DiFilippo's Service, every new system they install gets a Sensi Predict.

AN EYE TO THE FUTURE

Like everyone in the HVAC Indus-

try, manpower is key to continued growth. Vince sees taking a proactive and creative approach to working through workforce and supply chain issues as key to his company's future success. From salvaging and recycling parts from furnaces to adding inventory to help customers with emergency needs, the DiFilippo team is looking for ways to serve their customers better.

As Vince tells it, "That is the DiFilippo Way. Not the Industry way. And we will never waver from that."

For these and other reasons, **High-Performance HVAC Today** has selected **DiFilippo's Service** of Paoli, PA, as this month's *Contractor Spotlight*. Congrats to the entire team. 

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Distributors Focus on a Future with *Delivered Performance*

The world has changed. The broad stroke of the COVID-19 pandemic forced every industry, business, and family to look at and approach their worlds in very different ways from the past. In the HVAC universe, everything from how contractors work in customers' homes to working through supply chain shortages and other issues requires more patience, creativity, and a forward-thinking focus.

One thing is becoming clear: distributors see a much bigger need to look beyond selling equipment toward building a team of contractors who deliver performance to their customers.

REDUCING CALLBACKS AND WARRANTY CLAIMS

It's not like this is a new concept. For example, among the most significant issues, both distributors and manufacturers alike have faced for years, are high warranty claim numbers, the impact of callbacks, and of course, relationship building.

At **Behler-Young**, a 90-year-old, third-generation HVAC distribution company headquartered in Grand Rapids, MI, the contractor commitment is readily apparent. Tony Pino

is one of three product managers with more than 25 years at Behler-Young.

He says that warranty issues are "always a thing" only resolved through training. But the onslaught of the pandemic forced everything online, and

they needed to find new ways to keep their contractors not only working, but doing things right.

"Right off the bat," Pino says, "We partner with the best of the best here in Michigan. These are the contracting companies whose management embraces training and who, as a result, have fewer warranty claims, reduced callbacks, etc."

"Equally important to us as a distributor is providing high-end training to help create contractor confidence in the products we sell, in us as a distributor, and as a partner."

Michael Shiveley of **Comfort Air Distributing**, Centennial, CO, agrees. "Our primary goal is to reduce warranties, and we do that by providing general education on how to do static pressure measurements and testing as well as focus on how a specific HVAC brand works. The more educated the contractor, the fewer warranty calls we get," Shiveley adds.

"And of course, having fewer callbacks increases their performance ratings and leads to how often people call them."

EDUCATION AND TRAINING PRIORITIES

Tony Pino says he likes to think of training as an important ally on the service side. Contractors buy parts and tools to do that servicing, and Behler-Young wants to see them do that work properly.

"The training that NCI provides helps us bring both ends of the technical side of the business together in the middle. If we have good service, good support for the contractor, and good training, then all things come together," he explains.

At Comfort Air, Michael Shiveley points out that there are many business and technical upsides to having a robust and trained contractor customer base. "But for me," he explains, "When a contractor or a tech begins to understand and



accept that testing and measuring is the best way to ensure customers receive what they pay for, you can see it in their face, and it's like a light bulb goes off.

Shiveley adds that training and education go beyond just their best customers.

"It certainly is in our best interest to focus on those guys who've been properly trained and certified. But we also need to serve other contractors as well. We try to help those contractors understand the importance of training and get them more involved in it. The mission: to try and get them into practicing high-performance HVAC service and installation delivery."

COVID-19 & THE SUPPLY CHAIN

Joe Kelly, Behler-Young's senior vice president, says their management team meets regularly to discuss the short and long-term business outlook.

"It's not like we are prescient," he says, "but there are indicators that help us decide how to respond to market issues before they happen. With COVID-19, we managed to put ourselves in an inventory position that was significantly better than our peers in Michigan. Our inventory is up 40% year over year. We are fortunate to have been in that position before the pandemic blew up and things locked down. Still, maintaining that size of inventory has been a challenge.

"Tony Pino, as a product manager, is out there acquiring products from our manufacturers, and he has two peers that do that as well. Today we are also going to nontraditional resources to find products that our contractor customers need.

"We're leveraging the strength of our



relationship and size with our current manufacturers, and we're also rethinking our strategy."

"This means today we need several sources to have some level of security for our contractors and their customers going forward," Kelly says. "The good news is that other suppliers have stepped in to help fill voids where they can."

At Comfort Air, Michael Shiveley says they took a slightly different path.

"Management at Comfort Air anticipated supply issues and pre-ordered a large inventory to meet the needs of our contractor customers. We did this through a strong partnership with our manufacturer, and we did not go outside that partnership for equipment.

"With product lead times being what they are, sometimes months, pre-ordering the way we did saved our bacon and helped our customers."

Kelly says, "With the shortages, we suddenly had many new best friends who want to buy. But we can't sell to everyone right now.

"We must learn to say no, and we take care of those who brought us to the dance — our existing customers. And that's probably been one of the most challenging things to manage over the last 18 to 24 months."

PREPARING FOR TOMORROW

When it comes to the future, the discussion returns to training. At Comfort Air, Shiveley says the importance

of a high-performance approach to HVAC comfort delivery is more critical than ever. He says that contractors who are NCI trained and certified are vital to his company's future.


"They are better organized, focused, and prepared to deliver to customers what they want: Comfort. Peace of Mind. Efficiency. To do that, they must test, diagnose, and resolve issues beyond just the equipment. That leads to more sales.

"High-Performance contractors will usually get more work because they are building amazing reputations in the marketplace."

But there are challenges. According to Behler-Young's Tony Pino, training the next generation of contractors is one of the biggest. He says that means convincing owners to invest the "lost opportunity" time to put techs into classes, to pay them more when they reach certification levels, and more.

Kelly adds that partnering with organizations like NCI — "whose courses and the training are among the best in the industry — is the key to tomorrow.

"They bring best practices to contractors, which reinforces and completes the message that we're trying to send with our internal training and education."

Simply stated, at least with distribution outfits like Behler-Young and Comfort Air, delivered performance is a big part of tomorrow: from a distributor and contractor standpoint. 



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Manager & Instructor,
National Comfort Institute, Inc.*

**Tuesday, February 1
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Why HVAC Companies Are Losing Technicians

*Speaker: Rob Falke, President,
National Comfort Institute, Inc.*

**Tuesday, February 1
3:30 -4:30 pm**

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Utility Influences on High-Performance HVAC/Electrification

There is a growing trend in some areas of the U.S. to “electrify” homes by getting rid of gas appliances and replacing them with high-efficiency electric alternatives. These efforts tend to be concentrated in the same areas where climate change concerns are top of mind, and that’s no coincidence. These are the same areas where decades of accommodative policy have allowed cleaner sources of electricity to outpace fossil fuels like natural gas, coal, and oil for electricity production.

This grid cleanup has made it possible for buildings to reduce their carbon footprint by switching from combustion to electricity for cooking, water heating, and space heating. Policymakers in these areas have recognized this and are making a big push for building electrification, especially in homes.

At face value, encouraging the switch to electricity seems like a no-brainer to policymakers trying to figure out how to curb emissions. With efficient electric technologies, homes in areas with a relatively clean grid can produce fewer emissions using electricity than by burning gas to heat their home, water, and food.

As the grid shifts toward renewables like solar and wind, the benefits become even more significant. However, there is more to the story that isn’t at the forefront of these policy decisions. Let’s take a close look at some tough questions

with a specific eye on heat pumps for space heating and how you -- as a contractor -- can help customers who want to switch to navigate the potential pitfalls.

HOW WILL SWITCHING IMPACT CUSTOMER BILLS? ISN’T ELECTRICITY EXPENSIVE?

Nationwide, electricity is more expensive than gas per unit of energy from the meter. This price discrepancy is largely offset because heat pumps are about three times as efficient as furnaces as they produce more heat with less energy.

On average, the energy costs for heating with a heat pump versus heating with a gas furnace are about the same. In some areas, folks will save a little money. In other areas, they’ll end up paying more with a heat pump, depending on electricity, gas prices, the climate, the construction of their home, and other nuances.

Heat pumps are not a slam-dunk energy efficiency measure that will

pay for themselves in a couple of years. Natural gas prices will likely increase more quickly than electricity going forward, so the monetary benefits should improve. That said, most customers wanting to switch to a heat pump will do it for other reasons like environmental benefits or the opportunity to gain air conditioning if they didn’t have it before.

When discussing a potential electrification job with a customer, be sure you have your message

Heat pumps are not a slam-dunk energy efficiency measure that will pay for themselves in a couple of years. Natural gas prices will likely increase more quickly than electricity going forward, so the monetary benefits should improve.



right and don't overpromise on utility bill savings.

ARE HEAT PUMPS REALLY AS EFFICIENT AS THEY CLAIM TO BE ON PAPER?

They can be if done right. Heat pumps are more sensitive to poor design, installation, and maintenance than furnaces. They require more air-flow per Btu than furnaces, so you must pay careful attention to equipment and duct sizing when replacing an existing furnace. Heat pumps also need the proper refrigerant charge to operate at their design capacity and efficiency.

To ensure customers are comfortable and get what they think they are paying for, you must realize that simple like-for-like box swaps won't get the job done. You need to carefully consider the sizing and condition of the existing duct system along with the home's heating and cooling loads to determine if upgrades are necessary or if there is an opportunity to downsize and use the existing ducts.

ARE HEAT PUMPS AS RELIABLE AS FURNACES?

Heat pumps have more moving parts and more complex controls than furnaces, so naturally, more can go wrong with them.

The result is they don't last as long on average. Proper routine maintenance is necessary to keep heat pumps working efficiently for as long as possible. It's essential to make sure your customers understand this and offer a service plan with every heat pump you install.

CAN HEAT PUMPS KEEP CUSTOMERS COMFORTABLE IN AREAS WITH COLD WINTERS?

Heat pump technology has come a long way in recent years. In the past, most heat pumps couldn't heat a home when outside air temperatures dropped below freezing and therefore required gas or electric strip heaters for backup.

Equipment design improvements have lowered the minimum operating temperature for most heat pumps. Some are designed especially for cold

climates and can operate with high capacity and efficiency even in subzero temperatures.

Keep this in mind as you select equipment and look for units that provide the best match for the climate in your area.

It's always best to eliminate the need for supplemental electric strip heat, both because it is expensive to operate and requires more electrical panel capacity that may be in short supply in an electrification job.

A good resource to find equipment that performs well in cold weather is the **Northeast Energy Efficiency Partnerships (NEEP) Cold Climate Air Source Heat Pump List** (ncilink.com/NEEP).

WHAT HAPPENS TO CUSTOMERS IN A POWER OUTAGE?

In cold climates, heating can be the difference between life and death for your customers. Losing heat can also lead to broken pipes and catastrophic damage to a home; it's essential to consider how your customers will heat

their home if they live in an area that regularly, or even occasionally, sees winter temperatures below freezing. How they heat their homes is especially important if the area is prone to power outages.

You can power furnaces with small portable generators, so dual fuel systems with a furnace that can be manually or automatically turned on in an emergency can make a lot of sense. A wood stove or a gas fireplace that doesn't require any electricity to operate might be an even better solution.

Unfortunately, many utility programs that incentivize heat pumps require eliminating gas furnaces and fireplaces and may even require eliminating the gas service. If this is the case for any of your projects, consider recommending a whole-home generator to power the heat pump in an outage situation.

Be sure to work with the electrician installing the generator to ensure it is properly sized. This is not just for the heat pump operating wattage and the rest of the home, but for the higher current when the heat pump first starts up.

The specification you'll want to look for is the *Locked Rotor Amps* or LRA for the compressor. Add this value to the rated *Full Load Amps* or FLA for the condenser and evaporator fans and multiply by the minimum voltage to get the minimum generator wattage needed to operate the heat pump safely.

Energy efficiency policy in some areas has led to utilities pushing for electrification of homes, including their HVAC systems. Many don't realize that switching from a furnace to a heat pump is not as simple as it sounds. Highly knowledgeable and trained con-

tractors are vital to the success of these utility programs.

If you see an increased demand for heat pumps in your area, it pays to maintain a keen focus on performance, keeping in mind the specific nuances and complexities we've discussed here.

Suppose you feel your business could benefit from additional training on some of these topics. In that case, I en-



courage you to check out the following courses from National Comfort Institute (NCI) to help you enjoy even greater success in helping your customers make the switch:

- **Performance-Based Selling** will teach you how to tailor your message to customers and give them confidence that you'll help them avoid the potential pitfalls of switching to a heat pump. Find more information on the in-person training here (ncilink.com/PBS-InPerson) or the online live version here (ncilink.com/PBS).

- **Airflow Testing and Diagnostics** will help entry-level technicians measure and learn the importance of proper airflow and duct sizing. The in-person class information is here: ncilink.com/ATD. Online, live class info is here: ncilink.com/ATDOL.

- **Refrigerant-Side Performance** helps you take refrigerant gauge pres-


ures and temperatures into account when charging the system. It helps you see the total impact, including on the airside. For in-person class information, go to ncilink.com/RefSP. The online live class information is at ncilink.com/RefSide.

- **Duct System Optimization** provides you with a close look at proper duct sizing and how to renovate a

duct system so it will have the capacity to handle the required airflow for heat pumps. Training information for the online live class is here: ncilink.com/DSOOL. For the in-person training, go to ncilink.com/DSO-IP.

- **Residential System Performance** provides a deep dive on field-measured system performance, so you have the knowledge and tools to prove

performance in a heat pump retrofit. In-person class info is here: ncilink.com/RSP. Online Live class info is here: ncilink.com/RSPOL.

The electrification movement is coming. It's not a matter of when. You need to keep abreast of the activities in your local area and stay on top of what your local utilities are doing to incentivize consumers to make the move to all-electric HVAC systems. 



Ben Lipscomb, P.E. has more than 16 years of experience in the HVAC industry, including laboratory and field research, Design/Build contracting, and utility energy efficiency program design. He is National Comfort

Institute's director of engineering and utility programs and may be contacted at ncilink.com/ContactMe.

HVAC System Performance Simplified

Part of being a High-Performance HVAC contractor is testing, diagnosing, and repairing poorly performing HVAC systems. Have you considered everything that goes into HVAC system performance?

A lot in this phrase must come together to make a system work like it's supposed to, and it can be overwhelming if you forget the basics.

Let's take a simplified look at HVAC System Performance. I hope it helps you remember how special what you do is. Applying these ideas will help your customers better understand what separates you from your competitors.

HOW WOULD YOU DESCRIBE HVAC SYSTEM PERFORMANCE?

How would you explain HVAC System Performance in one sentence? I believe you can summarize it as the finished results of your knowledge, craftsmanship, skills, and attention to detail. It's what makes your installations work better than others.

Some in our industry assume that if you size and install equipment properly and then connect it to properly designed and tight ducts, you've done your job. Can it be this simple? The rubber meets the road when you **verify** your design. HVAC system performance testing gives you the ability to verify that your designs work.

For decades, NCI (National Comfort Institute) studies have shown that when you take measurements on installed systems, the typical results across the United States show that the system op-

erates at only 57% of the equipment's laboratory-rated efficiency. This concept is unknown to many in the HVAC industry and especially to the average homeowner.

Once NCI-trained contractors make system repairs, the results often show an immense improvement in system performance. Many contractors report achieving nearly 90% of the equipment's laboratory-rated capacity or better after completing system repairs. It's almost impossible to get this level of improvement by only changing out equipment.

The distinction between the equipment and the system is essential to recognize and one we often miss. Let's break the concept into two parts to simplify HVAC system performance: the HVAC system and performance.

The rubber meets the road when you *VERIFY* your design. HVAC system performance testing gives you the ability to verify that your designs work.

DEFINING THE HVAC SYSTEM

An innocent assumption many in our industry make is that the *HVAC equipment* is the *HVAC system*. This belief creates the misconception that all HVAC contractors have the specialized skills

needed to install an HVAC system correctly. The same assumption also leads to the belief that efficiency and comfort result from the equipment and have little to do with the installed system.

Industry marketing has conditioned us to focus on equipment instead of other design and field conditions that make up the true HVAC system.

This mentality is bolstered by the fact that anyone can use efficiency values such as SEER, AFUE, and other equipment-related ratings to

define the efficiency of the installed system. Through this lens, everyone in our industry ends up looking like they all offer the same product. That leaves a homeowner to decide between companies with the lowest price or the nicest salesperson.

Service techs aren't immune to this thinking either. It's common to see exceptional technicians fail to solve problems ranging from freezing coils to tripped safety switches because they are focused on the equipment. The problem isn't always a refrigerant leak or bad TXV (Thermal Expansion Valve). Instead, issues can be with other components, such as the duct system.

VARIOUS HVAC SYSTEM COMPONENTS TO CONSIDER

While mechanical equipment is a vital piece of the HVAC system, additional components make a big difference. Here are several to consider:

- Properly sized and installed duct system
- Duct insulation R-values
- Duct tightness
- Grille and register selection
- Condensate drain and safeties
- Thermostat wiring/control settings
- Electrical wiring and breaker size
- Refrigeration line sizing and installation

- Proper refrigeration charge.

Without testing to verify that these system components perform as intended, the results can be disastrous.

A substantial loss in the equipment's

al issues. This realization can empower you to get back to your roots of providing comfort solutions instead of focusing on equipment replacement alone.

Keep in mind, once you remove a



rated efficiency and shortened equipment lifetime often will result when we assume these components always function as designed.

Think about this: you custom design and build each system you install. YOU select each of its components. These qualities set you apart and establish your brand identity. That is tremendous differentiation for you to capitalize on.

MAKING A MOVE FROM EQUIPMENT TO SYSTEM

Once contractors and technicians realize that HVAC equipment is an HVAC system component and not the entire HVAC system, they can address actu-

piece of equipment from a laboratory environment and place it in someone's home, every variable the equipment was rated under just changed. If you don't consider these variables, you typically can't fulfill the promises made to a customer.

THE RESULTS OF PERFORMANCE

Once you understand the difference between the equipment and the system, it's time to look at what makes it perform. It's often easier to look at the results instead of diving into all the principles that drive performance. If everything works as it should, your systems will deliver the desired results. However, if the results aren't there, it's

time to see which principle was overlooked.

A well-performing HVAC system will provide energy-efficient comfort into a safe and healthy environment. If your systems consistently deliver these results, there's a good chance you're doing the right things.

However, if you can't say your results are consistent, consider the last time you measured and calculated the following:

- Static pressures
- Airflow
- Temperature
- Btus.

For decades, NCI's motto has been, *"If you don't measure, you're just guessing."*TM

These measurements are the keys

that unlock system performance. Without them, the invisible traits of an HVAC system stay invisible. It is your job to make these traits visible and use them to ensure your HVAC systems perform as intended.

For more resources on how to add these traits to your company, check out the *PATH to Performance Series* (ncilink.com/PATH) in *High-Performance HVAC Today* magazine (hvactoday.com).

THE BTU DISTRIBUTION NETWORK

My friend and colleague, Paul Wieboldt, uses a retail comparison to simplify the HVAC system performance explanation. He teaches us to think of HVAC equipment as a Btu factory. It's

the heart of the Btu production process since Btus are the product the factory delivers. There should be systems to ensure it runs at 100% of its capable output or consider it inefficient and wasteful as with any factory. We can say the same about HVAC equipment.

It doesn't end there. Any factory that produces a product must have a distribution system to deliver that product to its retail outlets. Btu distribution is the duct system's role, and it delivers the product from the Btu factory to the retail outlets. The retail outlets are the supply registers that deliver conditioned air to the building.

There will always be losses in the distribution system, from the factory to the retail outlets. The losses can include misplacement, theft, or lack of



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tracking the product. When contractors move beyond just addressing the Btu factory (the equipment), they see the entire distribution network's effect on the system. If the product never makes it to the retail outlets, the factory will eventually go out of business and shut down prematurely.

CONSIDER THE AMAZON EXAMPLE

Most of you reading this have probably used Amazon to order something. Some of you may even be Amazon Prime members and subscribe to their other services.

Amazon has fulfillment centers that make the distribution process as simple as possible, focusing on providing exceptional customer service. They aim every upgrade they create at mak-

ing things simple and easy for the customer. Like all companies, they make mistakes. But they do their best to make your experience a good one.

I recently bought a phone case for my wife, and it wasn't what she wanted. I goofed. So, I got to return the phone case. Their process was simple, fast, and accessible. Once the return was complete, I received verification that everything was done and to my expectations.

I knew what was happening throughout the process. Amazon **verified** they took care of me.

Verification is also the best way to ensure your HVAC systems are fulfilling your customer's expectations. You can verify the installation is a success and communicate it to your customers.

Use your static pressure, airflow,

and temperature measurements to share these results.

Like Amazon uses simple and easy-to-understand ways to show you they fulfilled their commitment, you can also prove to your customers that their HVAC systems deliver energy-efficient comfort into a safe and healthy environment. **NCI**



David Richardson serves the HVAC industry as Director of Technical Curriculum/Instructor for National Comfort Institute, Inc. (NCI). NCI specializes in training focused on improving, measuring, and verifying HVAC and

Building Performance. If you're interested in learning more about airside performance, contact David at ncilink.com/ContactMe or call 800-633-7058.

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GET YOUR NOVEMBER 2021 POWER PACK TODAY

This month we provide you with more content focused on combustion safety.

Some of the tools included each month may not normally be accessible with your membership subscription package.

However, you can access these tools through this Power Pack portal during the current month.

Here is what the November 2021 Power Pack includes:

- **How to Perform Draft Interference Testing (Recorded Webinar)**
- **Carbon Monoxide Visual Inspection Form (Download)**
- **SafeMaxx™ Carbon Monoxide Test Report (Download)**
- **Heating System Temperature Measurement Procedure (Download)**
- **"Cold Feet?" Heating Postcard (Download).**

We think you'll find these tools and training materials very helpful as you continue to grow your High-Performance HVAC business.

Be sure to share your November PowerPack with your entire team. Go to ncilink.com/PwrPak to access it today.

If you have any questions or are unable to access any of the tools in this pro-

gram, please contact us at 800-633-7058.

LIVE FALL TRAINING IS BACK AND STRONGER THAN EVER!

Ladies and gentlemen – National Com-

fort Institute (NCI) cutting-edge training is back. It's live and in person. And it is better than ever. Now is the time to get your team ready for Fall and Winter. You will find all the training and expertise you need to solve customers' comfort issues without guessing.

NCI's certification courses, like Duct System Optimization and Combustion and Carbon Monoxide Safety are scheduled throughout the U.S. Find out why NCI says, "If You Don't Measure, You're Just Guessing.™"

Here is a list of just a few of the courses being held across the country:

Duct System Optimization and Residential Air Balancing Certification Program

- Nov. 9-11 in Houston/Jersey Village, TX
- Dec. 14-16 in Milwaukee/West Allis, WI

Residential HVAC System Performance & Air Balancing Certification Program

- Nov. 2-4 in Union City/Atlanta, GA
- Nov. 30 - Dec. 2 in Orlando, FL

- Nov. 30- Dec. 2 in St. Louis/Earth City, MO
- Dec. 7-9 in Philadelphia, PA.

Commercial Air Balancing Training Program

- Nov. 16-18 in Cleveland, OH.

Plus there are many other classes in Combustion Performance and Carbon Monoxide Safety, Hydronic Testing, Adjusting, and Balancing, and more.

You can see the entire Fall/Winter in-person training schedule here: ncilink.com/ClassSchedule.

Furthermore, don't forget that it's a perfect time to schedule On-site training in your place of business.

On-sites let you train your entire team,



from your own offices or training rooms. You can schedule that training for the times that work best for you.

Want to learn more? Just go to ncilink.com/Onsites for more information.

Oh yeah – don't forget that NCI members can use NCI Bucks to help pay for that training. Learn more about the NCI Buck program and how to use it here: ncilink.com/bucks.



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A common topic that comes up in my conversations with contractors and distributors this year is the ever-increasing product shortages.

This has been especially true with higher efficiency equipment, as these products typically use more sophisticated electronics that depend on a shrinking supply of microchips from the Pacific Rim.

Unless you live under a rock, you've probably seen the daily news broadcasts about container ships backed up at ports — especially on the west coast.

These ongoing disruptions to the supply chain have impacted HVAC equipment manufacturers for many months, and they don't seem to be going away any time soon. Eventually things will catch up, but it's anybody's guess when that will happen.

In the meantime, how can distributors help contractors get through this difficult time, and what can contractors do to keep customers happy and provide the best possible products and services?

SHORT AND LONG-TERM STRATEGIES

When you can't get higher efficiency equipment, a good short-term solution is to couple more readily available lower efficiency equipment with air distribution system improvements.

National statistics show the typical HVAC system delivers less than 60% of its capacity at the registers. This dramatically reduces the effective efficiency of any equipment.

By upgrading air distribution systems to deliver 80-90% of equipment capacity you can achieve great savings and comfort improvements even without the highest efficiency equipment. When you couple an Air Upgrade with mid-efficiency equipment, you can achieve the same result at a similar price to their higher efficiency counterparts.

If, for example, you typically sell an 18 SEER 95% AFUE replacement system for \$9,000, you could price a lower efficiency system at \$6,000 and add

air distribution improvements for an additional \$3,000. The net effect is a high-performing system that will deliver a higher effective efficiency at the registers.

The bonus is your customer experiences improved comfort with an upgraded delivery system, their equipment will last longer, and you can achieve higher margins on the additional work.

What's great about this short-term strategy is it sets the stage for the longer-term, once higher efficiency equipment is more readily available. By continuing to include Air Upgrades and duct renovations, your average prices can continue to increase along with significantly higher net profits — and you are adding real value for your customers!


HOW CAN DISTRIBUTORS HELP?

Distributors can support their contractor customers by offering training that focuses on improving installation quality and delivered system efficiency.

Contractors need your support more than ever during these trying times. Rather than shying away from talking to your customers because you don't want to get beat up on equipment shortages, be part of the solution. Show them ways they can make any system they install better.

By being proactive now and working closely with contractors to offer them great support and training, they will be more forgiving. They'll see you as a valuable long-term partner.

It's more important than ever that manufacturers, distributors, and contractors work together to make the most of the products that are available.

I'm excited to see several distributors and manufacturers stepping up to help contractors get through these challenges with training and creative approaches to selling products that are available right now. This investment will create lasting dividends for years to come. 



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UPCOMING 2021 NCI TRAINING SCHEDULE

Combustion Performance and Carbon Monoxide Safety Certification Program

Nov 2-4: Fife, WA
Nov 16-18: Dallas/Carrollton, TX
Nov 30- Dec 2: Sheffield Lake, OH
Dec 7-9: Dayton, OH
Dec 14-16: Lenexa, KS

Residential HVAC System Performance and Air Balancing Certification Bundle

Nov 2-4: Atlanta/Union City, GA
Nov 30- Dec 2: Orlando, FL
Nov 30- Dec 2: St. Louis/Earth City, MO
Dec 7-9: Philadelphia, PA

Duct System Optimization & Residential Air Balancing Certification Program

Nov 9-11: Houston, TX
Dec 14-16: Milwaukee/West Allis, WI

Commercial Air Balancing Certification Program

Nov 16-18: Sheffield Lake, OH

Hydronic Testing, Adjusting, & Balancing

Dec 20-21: Sheffield Lake, OH

ONLINE LIVE TRAINING

Combustion and Carbon Monoxide Online Recertification

Nov 9-10: Sheffield Lake, OH

*** UTILITY SPONSORED TRAINING**

Combustion Performance and Carbon Monoxide Certification Program

Dec 7-9: Los Alamitos, CA

Test & Certify Ventilation Systems and Economizers

Dec 14-15: Los Alamitos, CA

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