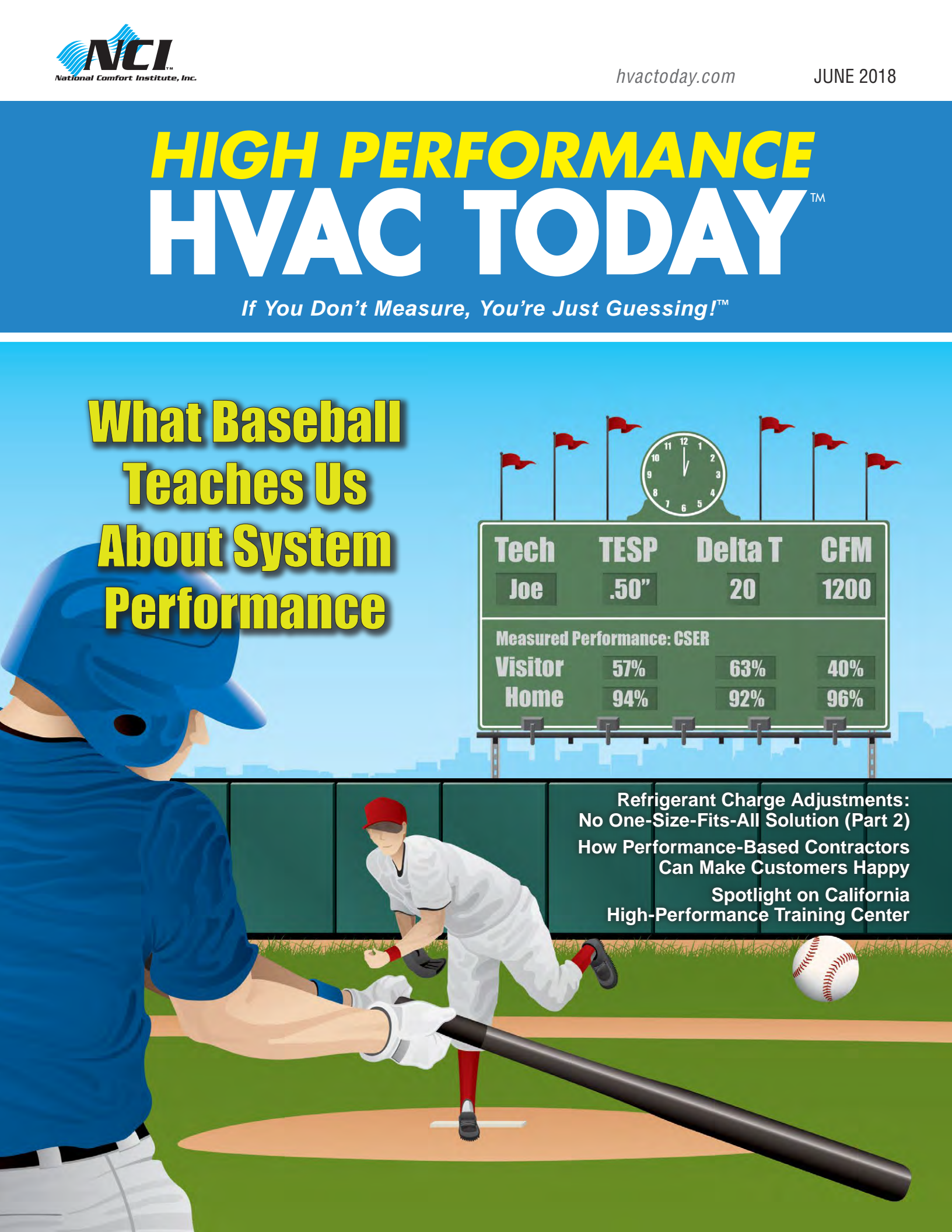


# HIGH PERFORMANCE HVAC TODAY™

*If You Don't Measure, You're Just Guessing!™*

## What Baseball Teaches Us About System Performance



The illustration shows a baseball game in progress. In the foreground, a batter in a blue uniform is in a ready stance, holding a black bat. In the background, a pitcher in a white uniform is in the middle of a pitching motion. The outfield is green, and the sky is blue with a city skyline in the distance. A scoreboard is visible in the background, displaying various statistics and a clock.

Tech	TESP	Delta T	CFM
Joe	.50"	20	1200
Measured Performance: CSER			
Visitor	57%	63%	40%
Home	94%	92%	96%

Refrigerant Charge Adjustments:  
No One-Size-Fits-All Solution (Part 2)  
How Performance-Based Contractors  
Can Make Customers Happy  
Spotlight on California  
High-Performance Training Center



# HIGH PERFORMANCE HVAC TODAY™



**TECHNICAL:**  
**RCA's Aren't a One-Size-Fits-All Solution** *(Part 2)*  
Last month Ben Lipscomb highlighted the history and issues with RCA's. Here he provides thoughts on solutions.

**SALES:**  
**How Performance-Based Contractors Can Please Customers**  
What does it take to increase sales, profits, and customer satisfaction? Drew Cameron explains.



**MANAGEMENT:**  
**Baseball and Performance Testing**  
What do these have in common? David Richardson says "patience, practice, and self-belief." He explains how to apply these principles into your Performance-Based culture.

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# OFF THE WALL? (Genius!)

**ComfortBridge™** communicating technology

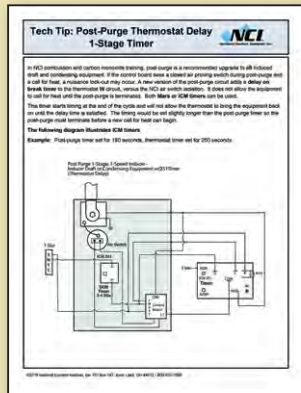
**More Options.** Taking the communicating circuit board off-the-wall and putting it securely inside the HVAC system means that the **ComfortBridge** system is designed to work seamlessly with numerous single-stage thermostats. Imagine using the same single-stage thermostat for all your HVAC installations. When properly installed, **ComfortBridge** technology receives a simple signal from the thermostat and intelligently distributes operational messages between the indoor and outdoor components of a central heating and cooling system.



ComfortBridge technology is engineered exclusively for high-efficiency Goodman and Amana brand heating and cooling systems.



## Monthly Download



This month's download provides you two datasheets with instructions on how to use both a post-purge thermostat delay one-stage timer as well as a post-purge thermostat delay two-stage, two-speed timer.

The two data sheets explain how the timers work, how to set them up, and includes

circuit diagrams to illustrate what needs to be done. Both recommend the types of timers to use.

So go to [ncilink.com/md0618](http://ncilink.com/md0618) to download this Tech Tip today.

By registering for free on NCI's website, you can access this download and many more. Be sure to register today.



## Online University

**Featured this month** is NCI's course on calculating Cooling System Efficiency Ratios or CSERs. This ratio is a score that represents field measured system Btus compared to factory rated equipment Btus.

It details how to use measured system airflow as well as return and supply air wet bulb temperatures to determine actual Btus delivered into the conditioned space.

In this module, learn to calculate CSER on any residential cooling system. You'll also learn about:

- What data must be collected to calculate CSER
- The formula to determine delivered Btus
- What system delivered Btus means in system performance.

Read more here: [ncilink.com/ou0618](http://ncilink.com/ou0618)



## BLOG POSTS

### SELLING 'BEYOND THE BOX' HVAC COMFORT SYSTEM SOLUTIONS



The rapid pace of HVAC tech development can create a price-driven commodity mindset. NCI's David Holt presents a five-step sales process that Performance-Based Contractors™ can use to differentiate themselves and offer customers the very best in comfort, safety, and energy efficiency. Read his blog here: [ncilink.com/5-steps](http://ncilink.com/5-steps)

### CONFRONT THOSE RESTRICTIVE HVAC AIR FILTERS



NCI Curriculum Developer and Trainer David Richardson says techs are taught to diagnose a restrictive air filter with a visual inspection to see if it's plugged. Then, if the filter is dirty, replace it. He asks, 'Could there be more to it?' Richardson provides some answers to these and other questions.

Read this blog post at [ncilink.com/AirFilters](http://ncilink.com/AirFilters).

## There's An App for That . . .

Mobile Apps are everywhere and who knows which ones are legit for HVAC contractors? NCI's David Richardson has found a number of resources for Apps that are pertinent to the Performance-Based Contracting Community™, and we present those here.

**This month**, we feature the **ASHRAE Duct Fitting Database**.

It is available only the [Apple App](http://apple.com) store. There is no word on when an Android version will be available.



Database desktop application. With it you can perform pressure loss calculations for all 240+ ASHRAE duct fittings in both IP and SI units. Features include dynamic illustrations of each design, and the ability to share reports and spreadsheets through email.



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Daniel De Leon  
General Manager, Plumbing Division  
Cissie Wester  
Assistant Service Manager



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Your key to success in Performance-Based Contracting™ is a strong support network – always there when you need it. NCI helps its members overcome the typical hurdles associated with implementing the measured performance approach.

Membership Options: Turbocharge your membership with added learning opportunities and financial incentives.	 High Performance HVAC Alliance	 Learning Excellence Premium	 Learning Excellence Live	 Learning Excellence Online	 Basic Membership
Unlimited Toll-Free Support	✓	✓	✓	✓	✓
High Performance Talk Discussion Forum	✓	✓	✓	✓	✓
Find-A-Certified Professional Lead Generator	✓	✓	✓	✓	✓
i-NCI: Mobile-Friendly Technical & Sales Tools	✓	✓	✓	✓	✓
Hundreds of Technical & Marketing Downloads	✓	✓	✓	✓	✓
Members-Only Newsletter	✓	✓	✓	✓	✓
Article Library Featuring Technical & Business Articles	✓	✓	✓	✓	✓
Live & Online Training and Conference Discounts	✓	✓	✓	✓	✓
Member Rewards NCI Training Bucks on Purchases	15%	15%	15%	15%	5%
Training Incentive Partner Program Dollars	Maximum	Maximum	Maximum	Maximum	✓
NCI Online Store Discounts	✓	✓	✓	✓	✓
ComfortMaxx Air™ - Airflow Testing Software	✓	✓	✓	✓	✓
Unlimited Online University Courses	✓	✓	✓	✓	✓
Unlimited Webinar Access	✓	✓	✓	✓	✓
Bonus Annual NCI Training Bucks Earned	\$4200	\$4200	\$4200	\$1200	✓
ComfortMaxx Pulse™ - Air & BTU Testing Software	✓	✓	✓	✓	✓
ComfortMaxx Verify™ - Full System Testing Software	✓	✓	✓	✓	✓
Free Print Subscription to High Performance HVAC Today	✓	✓	✓	✓	✓
One Paid NCI Summit Conference Registration	✓	✓	✓	✓	✓
EGIA Premium Membership	✓	✓	✓	✓	✓
70% OFF 5-Day 2019 Success Week Bootcamp	✓	✓	✓	✓	✓
Monthly Investment:	\$999	\$750	\$450	\$450	\$100



Scan this QR code or call NCI Customer Care to learn how NCI Membership can take your HVAC business to the next level!

## Join NCI Today!

## GROWTH is a Six-Letter Word



Mike Weil is editor-in-chief and director of Communications and Publications at National Comfort Institute, Inc.

Today's word is "Growth." This six-letter word is not a bad one. In the U.S. today we are in an interesting economic position — some call it a [Goldilocks economy](#) because it's neither too hot nor too cold. Six key economic indicators show growth in jobs, Gross Domestic Product, interest rates, and durable goods orders. They also show year-over-year core inflation is low, and the market seems to be in a healthy, temporary correction mode.

Depending on which side of the aisle you favor, you either give the Trump Presidency credit for this or you don't. However, one thing is undeniable: his administration has focused on creating a better environment for business — large and small. Part of that is because of the war they are waging on regulation, and part can be attributed to a burgeoning consumer confidence.

[Forbes](#) magazine publishes a public "[Trump Economic Score Card](#)" that you can peruse to judge for yourself.

This means the prices you pay for equipment will go up and in turn consumers may opt to repair their old equipment rather than replace it.

In addition, growth could get stymied if Republicans don't do well in the mid-term elections. Down the road, the business-focused changes Trump's troops have made could all be swept away when the next president gets elected. It doesn't matter if that is in two or six years.

That's why growth for your company is so important now. But where to start?

The first step is to think about it in this way:

- G** = Generate leads constantly and consistently
- R** = Retain your top performers always
- O** = Own your mission and strategy
- W** = Worry only about what you can control
- T** = Take advantage of every opportunity to train
- H** = Help your customers to buy your products and services.


For Performance-Based Contractors, these ideas are key to successfully selling and doing diagnostic testing, air upgrades, and duct renovations. By focusing on these things, you can

take advantage of today's friendly business environment.

Even if the political environment swings back toward a more Obama-era energy policy, things won't be so bad.

Think about this: If Democrats gain influence in Congress and

even the White House down the road, and we see a renewed focus on energy efficiency, reduction in CO2 emissions, and so on, this puts Performance-based contractors front and center to be the white hats who will carry out those policies. After all, isn't measured performance what we are all about?

And that, my friends is good for growth as well. Growth is a six-letter word custom made for Performance-Based contractors! 

THE TRUMP ADMINISTRATION IS FOCUSED ON CREATING A BETTER BUSINESS ENVIRONMENT. SO FOCUS ON GROWTH AND TAKE ADVANTAGE OF THIS FANTASTIC OPPORTUNITY

It also remains to be seen how the Trump tax cuts will influence the economy. The hope is they will enhance an already positive economy, freeing up more dollars for consumers to replace their aging comfort systems.

### BUT THAT CAN ALL CHANGE

The impending tariff situation can have a negative impact on HVAC manufacturers and that can cause material prices to skyrocket.



# The Impact of Government Regulations on the HVAC Industry

## DOE ENFORCEMENT STANDARDS AND THE HVAC CONTRACTOR

Written two years ago and going into effect in 2018, Department of Energy

(DOE) Regional Efficiency Enforcement Procedures will impact your HVAC business. To read the regulation behind these procedures, [click here](#).

Recently, manufacturing giant [Emerson](#) surveyed HVAC contractors across the country to find out their understanding of and reaction to these standards. Interestingly, many respondents are focused on growing their business as they navigate these residential and commercial regulations.

While 75% of residential contractors surveyed are aware the DOE developed regional standard enforcement procedures involving contractors, **only 14% understand the requirements** associated with compliance and the risk of non-compliance. The Emerson survey found many contractors are also concerned about the additional work that enforcement creates.

From a commercial perspective, more than half the contractors surveyed are using the impact of new efficiency regulations as an opportunity to offer systems with higher revenues/margins. Respondent contractors said they can provide options to their customers with messages on higher efficiency, payback,

and increased comfort.

Furthermore, the Emerson survey found that more than a quarter of commercial contractors say they are not aware of DOE minimum efficiency requirements for light commercial packaged equipment.

David Hules, director of marketing, commercial air conditioning for Emerson's Commercial and Residential Solutions platform, commented that Emerson strives to stay up-to-speed on the landscape of regulatory changes to better understand their impact, and then help educate the industry on the implications.

## AHRI DOES NOT SUPPORT STEEL AND ALUMINUM TARIFFS

In March 2018, the Air-Conditioning, Heating, and Refrigeration Institute (AHRI) voiced concern and disappointment with the proclamation signed by President Donald Trump to impose additional tariffs on steel and aluminum.

AHRI, whose 320 HVAC manufacturing member companies rely on abundant, economical supplies of steel and aluminum to make their products and equipment, does not support additional tariffs on steel and aluminum due to their impact on manufacturers and consumers.

AHRI President & CEO Stephen Yurek said, "As major users of steel and aluminum, we have been proactive in explaining to the administration that the HVACR and water heating industry would be

negatively impacted by an increase in tariffs, as would the consumers who rely on the products we manufacture."

Furthermore, on May 18th, Jim Walters, vice president of international affairs for AHRI, wrote the U.S. Department of Commerce in response to a Federal Register notice on the Section 232 tariffs and exclusion processes.

He wrote, "The imposition of the steel and aluminum tariffs ... are viewed by a substantial majority of AHRI's members as having an adverse effect on their business performance vis-à-vis the resulting higher commodity costs."

He cited several other member concerns with tariffs including the following:

- Negative effect on competitiveness
- Suppression of more energy efficient equipment for consumers
- Price volatility of basic materials and an inflationary effect on prices in the supply chain from the manufacturers to the consumer
- Unplanned and costly administrative adjustments to conducting business
- Burdensome exclusion process.

All this, he adds, will cause overall pricing to consumers to rise, and ultimately create a 'fix-it, not replace it' consumer mindset. And that will lead to "added stress to the electric grids across the country and compromise national energy efficiency goals," Walters wrote.

Because of this and for several other reasons, AHRI opposes the tariffs and, in his letter to the department, requests that the Administration withdraw the Section 232 tariffs and "explore less distortionary methods to meet the current challenges faced by U.S.-based steel and aluminum manufacturers."

## YELLOW JACKET® P51 TITAN™ DIGITAL MANIFOLD SERIES

This is a four-valve manifold that provides local display of system pressures and temperatures, superheat, and subcooling. According to the manufacturer, the P51 Titan provides HVAC contractors with instant analysis.

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A four-pack of hoses is included as well as two temperature clamps, and a backpack carrying case for safe storage.

For more information, visit the Yellow Jacket

Website by clicking here:

[ncilink.com/0618YJTitan](http://ncilink.com/0618YJTitan).

## WIRELESS SOLUTIONS

SAWIN Pro Enterprise is a service and installation management software package for HVAC contractors. Its mobile options will help you better manage field operations in service, installation, sales,



and inventory control. It enables you to have controlled visibility between the field staff and office.

Some other mobile benefits include:

- Designed for the latest, most cost-effective devices (Apple, Android, Microsoft, etc.)
- Minimized paperwork and improved data accuracy
- Optimized scheduling and route planning
- Better Inventory management from warehouse to field.

For more information, visit the website here: [ncilink.com/0618SAWIN](http://ncilink.com/0618SAWIN).

## August 2018 NCI Training Schedule

### Combustion Performance & Carbon Monoxide Safety Certification Program

Aug 14-16: Bloomington, MN  
Aug 21-23: Medford, MA

### Residential HVAC System Performance & Air Balancing Certification Program

Aug 21-23: St. Louis, MO  
Aug 28-30: Pittsburgh, PA

### Commercial HVAC System Performance Certification Program

Aug 14-15: Cleveland, OH  
Aug 28-29: New Hudson, MI

### Commercial Air Balancing Certification Program

Aug 21-23: White Plains, NY

Visit [NCIlink.com/ClassSchedule](http://NCIlink.com/ClassSchedule) to view the latest schedule of NCI Training events

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# Southern California Gets Boost in HVAC Performance Training

**L**os Alamitos is a small city in Orange County, CA. It is a relatively new city, incorporated in March 1960. This quiet city is home to the U.S. Joint Forces Training Base. It is also home to the National Comfort Institute, Inc. (NCI) Southern California Training Center (SoCal).

Located on Lampson Avenue in Los Alamitos, the training center has been central to teaching and certifying more than 5,000 Southern California HVAC contractors in Performance-Based Contracting testing, diagnostic, and repair processes.

NCI opened its SoCal training center in 2014 with the idea of providing a state-of-the-art facility offering HVAC contractors hands-on and classroom training with certification in residential and commercial systems. Most importantly, the training center is focused on the Performance-Based Contracting™ approach that goes beyond the mechanical equip-

ment and considers the ductwork as vital to the entire system.

A Performance-Based Contractor™ delivers comfort, safety, and energy efficiency with proven documented results. Through what NCI calls total system diagnostics, customers see their system in a new light and better understand the value of the HVAC services provided.

The performance-based approach teaches customers about their HVAC systems in simple terms, identifies real performance issues, and differentiates contractors from their competition. This approach proves to be a great lead generator and profit center for any HVAC business.

## WHAT TYPE OF TRAINING IS AVAILABLE?

Typical NCI technical classes include:

- Residential and commercial HVAC system performance

- Residential and commercial air balancing
- Performance-Based Selling
- Combustion performance and CO safety
- Duct system optimization
- Introduction to hydronics testing, adjusting, and balancing
- Large commercial balancing.

Jeff Sturgeon, senior trainer and manager of the Los Alamitos facility says they also work very closely with local utilities as partners in their energy programs.

"We teach nearly all the classes that NCI offers, as well as classes offered nowhere else in the country," he explains.

"Our Economizer class was specifically developed to support utility programs and the technicians who participate in those programs."

In fact, Southern California utilities subsidize NCI training as part of a state-wide Workforce Education and Training (WE&T) program, according to Sturgeon.

He has more than 30 years of experience in the HVAC industry, and is well versed in all three major sectors: residential, commercial and refrigeration.

Throughout his career he installed and serviced residential, light commercial, commercial, and industrial HVACR systems. He also worked for an HVAC controls manufacturer where he was responsible for engineering, designing, building and installing control panels for a variety of applications.

Sturgeon adds, "We also have a fully functioning hydronic system with dual pumps and cooling towers that allow a real-world training experience for the technicians.

"In addition, the center has split heat pumps, a commercial package unit with an economizer, a split gas-electric unit that is fully operational with a traverse station, a Liebert computer room cooling system, and more.

"The bottom line is the Los Alamitos center's unique layout allows our training staff to train contractors and technicians on fully functioning residential and commercial systems right in the classroom. A significant number of hands-on tasks must be completed as part of the class curriculum."

NCI offers cutting-edge training and coaching programs from both the technical and business, sales and marketing perspectives. On-staff experts like Sturgeon teach classes and work in the field, coaching contractors and working with technicians to solve troublesome problems with both residential and commercial systems. Based on their own industry experience and knowledge, they built seven fully functional simulators in the training center that are instrumental in understanding the economizer itself and its controls.



One of the classrooms in our training center holds up to 30 students. Here Jeff Sturgeon leads a class in Commercial HVAC System Performance.



Pictured here are students performing hands-on testing of a commercial packaged unit.



This student is performing a travers of an economizer intake using a rotating vane anemometer.

## WHAT IS THE LOS ALAMITOS UNIQUE PROPOSITION?

Casey Contreras joined NCI with 10 years of residential, light commercial installation and service experience. He is a field coach based out of the Los Alamitos center who works alongside service and installation technicians. He also works

with utility programs.

"As a field coach, I work with contractors and teach them how to test and diagnose real-world issues and scenarios," he says.

Contreras, who has worked with many HVAC training organizations in Southern California, says the NCI facility is one of



National Comfort Institute opened its 12,000+ square foot Los Alamitos Training Center in 2014. It houses a team of three top notch NCI instructors.



the most current, state-of-the-art facilities he's seen.

"We have everything from residential split systems to commercial package systems. We have systems set up for testing

carbon monoxide and combustion efficiency. There is so much more in the way of hands-on stuff than any other facility in the area. It is set up like a laboratory that includes a large teaching area that

can seat 30 people," he says. "Contractors really can't get this type of training anywhere else."

In his opinion, that is the Los Alamitos center's unique training proposition.

### THE HIGH PERFORMANCE IMPACT ON THE MARKETPLACE

The overall mission of the Los Alamitos facility is help local contractors not only deliver better efficiencies and comfort to consumers, but also to really train them in the skills involved in testing, measuring, and repairing. Contreras says this is what helps make HVAC professionals into true craftsmen.

"We want our local contractors to be proficient and professional," he says. "They need to really understand their craft. Plus, we want to help give them more oppor-

tunities to really improve their work and family life, and keep their technicians on an upward career path."

The proof that this mission is succeeding comes from students themselves. Contreras says students often tell them that NCI training really improves their diagnostic skills and their ability to solve comfort problems. He also says they see their sales closing rates increasing with higher dollar tickets revolving around duct renovations and air upgrades.

"Our students tell us Performance-Based Contracting is making a big difference. When customers really listen to what our trained professionals tell them about their systems, it makes a lot of sense.

"We're finding that to be true in a growing number of cases. Consumers



Airflow measurements with flow hoods are a key component of NCI's High-Performance training.


often get quotes from many contracting firms and if those contractors don't talk about airflow and diagnostics, often they get dismissed and the NCI-trained

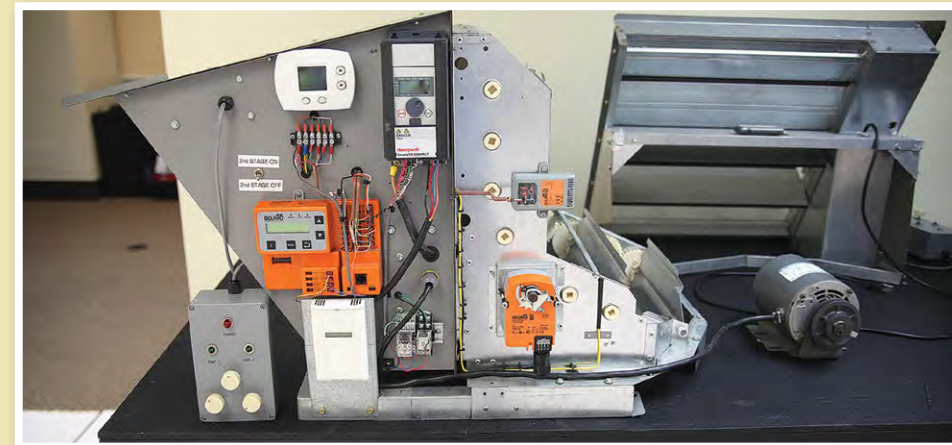
contractor gets the job.

"Obviously, that isn't always the case, but there is an uptick in this happening. Consumers today are more aware of quality and energy efficiency and they truly care about it."

Contreras adds that they see many repeat students who come in for refresher courses or to re-certify.

High Performance Contracting represents a small, but growing sector in the HVAC Industry. The Los Alamitos Training Center is one of two centers in the U.S. dedicated to teaching contractors that if they don't measure, they're just guessing and if they just guess, their customers pay more for less comfort.

Don't take our word for it. Just ask the contractors trained in Southern California. 



This demand control ventilation training station is one of seven simulators that are instrumental in understanding economizers and their controls.

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# Refrigerant Charge Adjustments Aren't a One-Size-Fits-All Solution

## Part 2: The Evidence Against Charge Adjustment

In Part 1 of this two-part series we examined the history of refrigerant charge adjustment (RCA) as an energy-saving measure in utility programs and showed how the results have not been great. The impact of charge adjustment on energy use and savings is too varied, and program designs have not proven very effective at targeting only the adjustments that will save energy.

Does this mean contractors should abandon RCA as a practice altogether? No way! Getting the charge correct is critical to equipment performance, reliability, and efficiency. What we do on the airside effects the refrigeration cycle and vice-versa. If the answer isn't to run around putting gauges on, calculating superheat and subcooling, and adding or removing an ounce of refrigerant or two on every unit we come across,

**PERHAPS IT'S TIME TO REVERSE COURSE. WHAT IF PROGRAMS STOPPED PRESCRIBING SPECIFIC MEASURES, AND SIMPLY ALLOWED QUALIFIED CONTRACTORS TO DO THE WORK THEY FEEL NEEDS TO BE DONE, AND THEN PROVE IT IMPROVED PERFORMANCE?**

then how can we ensure the refrigeration cycle is doing its part within the bigger picture of system performance?

### WHAT CAN WE DO?

If RCA can no longer serve as the foundation for tune-up and maintenance programs, how

can energy efficiency (EE) programs realize the significant savings opportunity in improving the efficiency of existing HVAC systems? Putting programs aside, how should contractors approach refrigeration cycle diagnostics to best serve their customers?

We've gone deep into the reasons why RCA is a bad measure. Interestingly, we also find that each individual HVAC repair or tune-up item has its own set of issues that make them a poor choice if you look at them in isolation.

Coil cleaning produces a marginal benefit that's difficult to detect. Economizer repairs can produce either negative or positive savings depending on many variables such as damper position, changeover sensor type, and control settings. Duct sealing can produce negative energy savings by increasing fan energy and decreasing fan airflow.

To date, utility and regulator response to these challenges has been to dive deeper into the problems, with research. Furthermore, that research has become overly technical in a quest for a silver bullet. Tens of millions of dollars have been spent on this research producing thousands of pages of reports that are too technical for the average utility program manager or regulatory professional to act on.

Perhaps it's time to reverse course. What if programs stopped prescribing specific measures, and simply allowed qualified contractors to do the work they feel needs to be done, and then prove it improved performance?

By prescribing a list of specific measures and attaching deemed savings and incentives to

them, utility programs unintentionally limit the benefits that a skilled contractor can otherwise produce on a system.

A restrictive list of measures tends to encourage business practices that focus on maximizing profit through low cost implementation of as many measures as possible. If instead, programs incentivized contractors to holistically measure and improve the system performance, the benefits could be dramatic.

Such an approach encourages contractors to look for value-added opportunities to improve performance and save energy. Savings become measurable by both contractors and utility programs, clearly supporting the value proposition for customers, utilities, and all stakeholders.

### MEASURED PERFORMANCE IMPROVEMENT POTENTIAL

National Comfort Institute, Inc. (NCI) data for 178 commercial and residential systems, shown in **Figure 2**, indicates that 85% of existing systems deliver less than 60% of their rated capacity to the conditioned space.

Each system was comprehensively tested, diagnosed, and renovated. Improvements to ducts, equipment, and controls resulted in 75% of the systems delivering greater than 75% of their rated capacity to the conditioned space.

Meanwhile, advances in field test instruments and progress on standardizing test methods contributed

to improvements in field performance testing accuracy and repeatability.

The Western HVAC Performance Alliance (WHPA) and the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) are in the process of standardizing field data requirement<sup>5</sup> calculation procedures<sup>6</sup>, and

measured performance, and verified at the building meter, shows great promise in its accuracy, flexibility in application, and ability to reveal previously stranded energy savings."

### SYSTEMATIC REFRIGERATION CYCLE DIAGNOSTICS

Achieving proper refrigerant charge depends on airside heat transfer, in addition to refrigeration cycle dynamics. If the airside is not evaluated prior to checking refrigerant pressures and temperatures, the result is often misdiagnosis.

To avoid this, technicians should first check the cleanliness and condition of the condenser, evaporator, filters, condenser fan, indoor blower, and belt drive (if belt-driven). If any of these components need to be cleaned or replaced, that work should be done before proceeding.

Once the technician checks equipment and assesses, then corrects any issues, they should confirm that airflow through the evaporator is within the manufacturer's allowable range: typically 350 to 450 CFM per ton.

Next, they should adjust pulley sizes or blower speed to achieve this range of airflow before proceeding. If duct systems or other airflow restrictions prevent the airflow from being brought into spec while maintaining blower motor current below the rated maximum amperage, technicians should propose increasing duct system capacity or clearing restrictions.

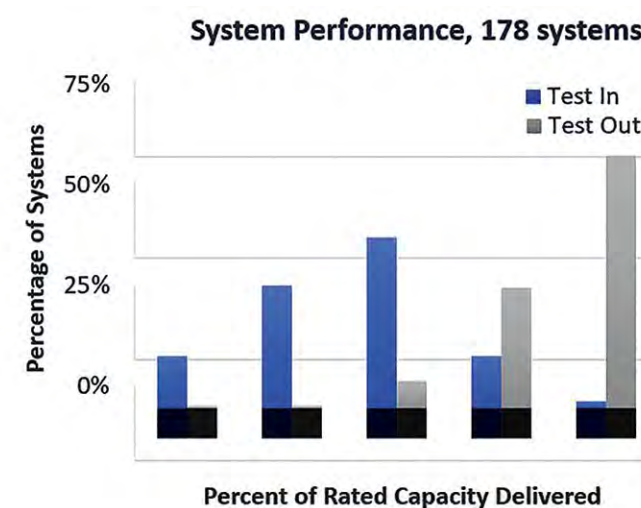


Figure 2: NCI System Performance Data

test methods<sup>7</sup> to measure and score HVAC efficiency and performance in the field.

Measuring system performance before and after a broad scope of system improvements are implemented provides direct data on efficiency and capacity improvements. Contractors can then use this data to estimate annual energy savings far more accurately than the estimates produced by typical deemed savings approaches.

NCI conducted a field data collection project to demonstrate this approach for a utility client and documented the results in a white paper<sup>9</sup>. We concluded that "Predictive savings informed by field-



Once they confirm proper airflow, checking the equipment temperature or enthalpy change can reveal potential issues with the refrigeration side before putting refrigeration gauges on.


With proper airflow, a low delta-T or delta-h can indicate a highly undercharged system. If delta-T, delta-H, and/or BTU calculations are within about 5% of the manufacturer's specifications for the current operating conditions, odds are the charge is correct.

If you know the service history of

refrigerant to a leaking system prolongs the problem and may be illegal depending on how big the leak is. Proper procedures to fix a leak include recovering all refrigerant, purging while brazing, leak testing, pulling a vacuum to eliminate moisture, and recharging with non-contaminated refrigerant.

### CONCLUSION

Clearly the lackluster results and significant documented challenges show that Refrigerant Charge Adjustment (RCA) as a utility program

for measured system performance improvements could regularly produce 20% to 60% increases in delivered capacity and efficiency. Advancements in field measurement instruments and standards enable contractors to accurately and repeatedly measure efficiency and capacity in the field. Data shows that these measurements can be used to estimate energy savings with higher accuracy than traditional deemed approaches. 

<sup>5</sup> WHPA, 2016, CQI Standardized Field Data Specification for Commercial HVAC Installation (2016) <http://www.performancealliance.org/Portals/4/Work%20Product/Approved%20WHPA%20Work%20Product%20-%20CQI%20WG%20Standardized%20Field%20Data%20Specification%2012-14-16.pdf>

<sup>6</sup> WHPA, 2017, HVAC System Performance Assessment Calculation Procedures (2017) <http://www.performancealliance.org/Portals/4/Work%20Product/HVAC%20System%20Assessment%20Calculation.pdf>

<sup>7</sup> ASHRAE, SPC 221P - Proposed Standard Authorized June 29, 2016 (St. Louis) Test Method to Measure and Score the Operating Performance of an Installed Constant Volume Unitary HVAC System <https://www.ashrae.org/standards-research-technology/standards-guidelines/titles-purposes-and-scopes#spc221p>

<sup>9</sup> NCI Lipscomb, 2017, Performance-Based HVAC Energy Savings



**Ben Lipscomb** is a registered Professional Engineer with over 14 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 engineering manager, and may be contacted at [benl@ncihvac.com](mailto:benl@ncihvac.com).

the unit and charge has been verified in the past, proceeding to the next step may not be necessary.

Sometimes it's necessary to install gauges and check refrigerant pressures, temperatures, superheat, and subcooling using manufacturer procedures. Charging procedures often only require superheat (for non-TXV) or subcooling (for TXV), but it's wise to check both to reveal issues other than low or high charge.

For example, high superheat and subcooling on a non-TXV system can indicate a liquid line restriction, which may be mistaken for low charge based upon the high superheat alone.

If you discover a leak, the right response is to fix it before properly recharging the system. Adding re-

energy efficiency measure must be called into question.

RCA as a standalone measure, or as a foundational measure in tune-up or maintenance programs, is unlikely to lead to measurable energy savings or efficiency improvements. It may lead to negative environmental impacts, and is not cost effective as an energy savings measure when properly performed.

The best path forward may be to take a step back, stop prescribing individual measures, and begin incentivizing Performance-Based Contractors to produce measurable improvements in efficiency and capacity.

While RCA has struggled to show even a 5% average improvement, a comprehensive renovation and tune-up program that rewards contractors

# How Performance-Based Contractors Can Make Customers Happy

**T**he year was 1990 in my family contractor business. The union was picketing our offices and commercial jobsites. We were 'cash-on-delivery' with all our suppliers and manufacturers. Two builders went bankrupt and stiffed us for over \$500K in receivables.

The general manager made a bone-headed accounting error on work-in-progress billing that inflated sales by almost half a million dollars (fictitiously). Plus, the Yellow Pages did not print our ads in five of the nine books in which we advertised. My mom hit my dad with divorce papers. And, the family dog of 17 years, a little Yorkshire Terrier named Cuddles, died.

My father signed personal financial guarantees with everyone to keep the doors open. By all measures we were on the brink of bankruptcy ... something our competition shared with every homeowner we mutually encountered.

By December of 1996, we turned a \$6.5 million-dollar company (mostly residential new construction or RNC) earning 4% net profit, into a replacement, service, and indoor air quality business. We were now generating \$8.0 million at 22% net profit and my father sold the company to a local utility company and retired shortly thereafter -- a wealthy and happy man.

### HOW DID WE DO IT?

We shifted our mix of business from low-profit, slow pay, RNC work to mostly replacement, ductwork, and indoor air quality sales. This carried high margins and immediate cash flow. Let me share with you one of the ways that had the biggest impact by far.

During my last 28 years in the home services business working with contractors of all trades across North America, I witnessed them struggle with the same challenges we did. Key among them -- low-priced competitors who undercut good companies that quote the right scope of work for the right price. Of course, there are also always those homeowners who object to price and who don't understand perceived value and affordability.

In my never-ending commitment to help contractors change paradigms, destroy self-limiting beliefs, challenge industry precepts, shatter expectations, create extraordinary experiences, and raise the level of performance, I found one of the most effective tools to deal with contractors' struggles is LEVERAGE!

Think about this:

- What do QVC, Best Buy, appliance retailers, and the most successful realtors, furniture and car salespeople, and ultra-successful in-home salespeople have in common?
- How can you effectively and ethically eliminate competition on every job?
- How do you offer customers the highest level of service and earning what you are worth, while the customer gets what they pay for?
- What can you offer today's consumer that almost guarantees they buy from you?
- In 1990, what did an almost-bankrupt-contractor use to reverse their misfortunes? The answer is leverage.





## WHAT IS LEVERAGE?

[BusinessDictionary.com](http://BusinessDictionary.com) defines leverage as: “The ability to influence a system, or an environment, in a way that multiplies the outcome of one’s efforts without a corresponding increase in the consumption of resources.”

In other words, leverage is having a relatively small amount of cost yield a relatively high level of returns.

Most contractors refer to this as consumer financing.

To that I say: “Quit dropping the ‘F-bomb’ in the home!” Don’t talk about what it is, talk what it does.

I call financing: “A convenient and flexible investment plan that makes buying what you want TODAY easy and affordable, which allows energy and repair cost savings to pay for, or offset, the investment.”

Providing resources for your customers to borrow money to do business with you creates money flexibility or options, much like a mortgage does for homebuyers.

The problem is that 95% of contractors use this resource ineffective-

ly or incorrectly by: (1) Not offering payment options to every customer, every time; (2) Not offering multiple options; (3) Offering it in a Reactionary fashion to the following:

- Customer’s price/perceived value objection (total price or versus another option)
- Customer’s perceived affordability objection
- Competitor’s lower price
- Customer’s inquiry about other solutions.

Being reactionary in this manner may come across as insulting to a potential customer.

When used correctly, leverage is the most effective way to share your investment options with customers. It shows customers how easy and affordable doing business with you is, especially if/when you are higher-priced (different/ly priced) than your competition.

In fact, leverage can render customer price, perceived value, and affordability objections neutral. And, using leverage requires no additional investment in marketing and lead generation.

This is great news for Performance-Based Contractors. Your pricing is not thousands of

more than a traditional contractor. You are thousands of dollars different than low-priced competitors who want to sell products not solve problems.

When you quote your solutions with low monthly payments paid for or offset by energy, repair, and premature replacement costs, you show customers how they benefit from a home that is safer, healthier, and more comfortable. All that for just a few dollars more a month than cheaper purchases.

This is even better news for performance-based contractors who believe homeowners are sensitive to price. According to CNN Money: “75% of U.S. households live paycheck to paycheck”. The problem is these people suffer from “cash separation anxiety” and prefer to pay monthly for items that pay for themselves. However, most contractors quote solutions based on the total investment rather than a small monthly expense comparable to other monthly expenses customers regularly pay.

## TYPES OF BUYERS

Most of today’s homeowner consumers are payment customers, not cash buyers. Let’s take a brief look at the various types of buyers:

**Cash Buyers** – They have the cash and can and will pay upon completion.

**Cautious Buyers** – They have the cash but are hesitant to write a big check.

**O.P.M. Buyers** (Other People’s Money) – They may or may not have the cash, but like options with no money down and 0% or deferred interest and/or payments. They may use credit cards to get points, miles, or cash back.

**Payment Buyers** – They want or need the lowest monthly payment to pull the trigger.



**Credit-Challenged** – Don’t forget the 30-40% of applications that can’t be approved by “A” paper lenders. These people want to buy and understand their monthly payment may be a little higher than they hoped but will act if their desire or need is met.

To meet market demands, performance-based contractors need to offer a variety of payment options:

- Secured and unsecured loans with long terms
- Low-rate long-term options
- 0% APR or deferred interest and/or payments
- Plans for the credit-challenged.

By the way – you should offer all these plans to all your customers.

## WHAT DOES LEVERAGE DO?

Remember: The only ways to increase sales are: (1) Run more leads (more time and marketing dollars); (2) Close more leads; (3) Increase average sale; (4) Increase frequency of sale (repeat business); (5) Generate more referrals who purchase.

Execute one of these measures and you can increase sales, profits, and personal income marginally. Execute two measures to yield geometric growth. Execute 3 or more initiatives and you’ll experience an exponential explosion in sales, profits, and personal income much like my company did in the 1990s.

This is the leverage I am talking about. It allows you to compound time and money for the mutual benefit of the customer, your company, co-workers, salesperson, and owners without

increasing expenses (any dealer cost is absorbed in the overhead and paid for by the customer). You can achieve exponential results.

Leverage will help you improve low closing ratios, increase average sales and profits, stop you from losing jobs to lower-priced/lower-value companies; increase customer perceived value, perceived affordability; give customers access to money; and increase a salesperson’s and the business owner’s personal income. Leverage also offers greater customer happiness and co-worker satisfaction with the company’s ability to deliver a better all-around experience for everyone it serves and employs.

Leverage is the secret to putting a tourniquet on losing sales to lower-priced low-value competitors that don’t solve the customer’s problems or address their concerns. You can stop leads from being burned and put an end to wasting marketing dollars to create leads you don’t close. Leverage is the magic that leads to opportunity maximization.

**LEVERAGE** is the key to helping companies generate **MORE!**

I am talking about a lot of **‘MORE!’**

- ✓ **MORE** opportunities created and converted

- ✓ **MORE** money MORE often, for MORE profit, MORE effectively, MORE efficiently than anyone else.

- ✓ The result is **MORE** customer happiness and co-worker satisfaction making you the most reviewed, highly respected, regularly recommended, and graciously referred

company in your market. This will also make your company one of the most sought-after employers of choice.


**BOTTOM LINE: MORE** juice for the squeeze and **MORE** bang for the buck.

## UPDATED THINKING

In 1937 Frank Bettger famously wrote in his book ‘How I Raised Myself from Failure to Success In Selling’: “When you show a man what he wants he will move heaven and earth to get it.”

I have updated his thinking to using payment options to help consumers buy what they want: “Show people what they want most, why they shouldn’t be without it, how they can afford it, how they can pay for it, and they will buy it...FROM YOU!”

In a subsequent article I will share the specific strategies, techniques, and language we teach our client’s to effectively use leverage payment options to yield record performance. We’ll provide sales performance expectations, KPIs, and specific lending resources.

Live life by the drop! Experience greatness. 



**Drew Cameron** is an advisor to Home Services Contractors and is president of both HVAC Sellutions and Energy Design Systems, Inc. The latter is an industry alliance that provides leading edge technology with complementary marketing and sales consultative support. Drew is an industry recognized author, speaker, educator, coach, consultant, software developer, and an International Consultant Award Winner. He is a Contractor University Founder & Faculty member for Electric & Gas industries Association (EGIA); and an Air Conditioning Contractors of America (ACCA) member. Contact Drew @ 610-745-7020 drew@hvacsellutions.com.



# The Relationship Between Baseball & Performance Testing

**A**s I write this, my oldest son is finishing up his senior year of high school baseball. The memories my family has and the life lessons he learned from the game will always have a special place in my heart. There are also valuable lessons Performance-Based Contractors™ can learn from the game of baseball.

Ted Williams, one of the greatest sluggers in the sport, once said that the hardest thing to do is squarely hit a round baseball with a round bat. Hitting a baseball appears to be physically impossible; yet each season players consistently hit that ball. Is this luck or is there a repeatable method to achieve this feat?

The discipline and art of hitting a baseball is achieved through practice, patience, and self-belief. Successful HVAC system performance measurements incorporate these same abilities.

Those who are willing to understand the principles, learn the skills, and invest the time to practice, can excel at producing measurable results. Let's look at what baseball can teach us about HVAC system performance testing.

## OWN THE BEST GEAR

This might sound silly, but you must own the gear to play. If you don't have a ball, bat, and glove, you can't play baseball. System performance testing is the same way. Without proper test instruments, you can't play.

Just as a top-quality baseball bat is an investment to a player, so are test instruments to the HVAC professional who measures per-

formance. Believe in yourself enough to invest in the test instruments critical to your success. Some of them aren't cheap – remember you get what you pay for.

You can buy better instruments as your skill level grows. Use the basic gear to get started and invest in better, more expensive equipment as you gain the needed skills. Most parents won't buy their youngster a \$400 bat to learn with. As their abilities increase and they mature into high school, college, and the big leagues, a larger investment makes more sense.

Follow a similar philosophy with test instruments and begin with a static pressure kit and dry bulb thermometer. The amount of information available to you from these basic tools is enough to get started. Once you master using them, make a larger investment and consider buying an air balancing hood and anemometer for more advanced testing.

Before you go live, you'll need to practice. Babe Ruth didn't start hitting home runs the first time he picked up a bat. You probably won't nail a duct traverse the first time you try either.

## PRACTICE MAKES PERMANENT

Learning to hit a baseball takes a lot of practice. Players invest countless hours practicing this single skill before playing in a game. Minor changes in a swing can mean the difference between a homerun and a strike out. The same holds true for measuring HVAC system performance.

Be sure you're practicing your skills correctly or you'll fail to achieve your goals. You must know the fundamentals. If you incorrectly practice swinging a bat repeatedly, you'll believe hitting the ball is impossible. Practice system performance testing fundamentals incorrectly and



Whether its hitting a ball or taking static pressure measurements, skill development requires practice. Remember, minor changes in a swing can mean the difference between a homerun and a strikeout.

you'll also believe measuring system performance is impossible.

Proper training is an essential foundation that prevents errors. Begin with the basics and work your way up. It takes dedication and repetition to be successful. There's no magic wand to make you an overnight success. It takes commitment and time invested on your end to be the best.

Practice testing skills before going live in front of customers helps prevent many common headaches and difficulties. The more you practice, the greater your confidence in your abilities will be.

## HANDLING SLUMPS AND SLIDERS

When a hitter has trouble seeing the ball and starts doubting their ability, it's known as a slump. When testing performance, unforeseen issues often arise, causing you to question your abilities. Doubts surface and you suspect the reliability of your readings.

Don't be afraid to ask for help when

in a slump. Keep the event in context. A refresher of the fundamentals, confidence in your abilities, and returning to the basics cures most slumps. Don't be afraid to call NCI for technical support.

What if you're on top of your game? Even the best hitters eventually face a slider when they're on top. The pitcher throws a ball appearing to come in straight and suddenly it breaks and makes an unexpected turn. The hitter swings and completely misses it.

When testing, circumstances will arise and challenge your skills. A slider presents the hitter an opportunity to improve their ability to recognize a pitch. Unexpected challenges present an opportunity for you to improve your diagnostic skills.

In fact, some of the most valuable lessons learned in performance testing come from unexpected challenges. Handle them with the right attitude and your skills will increase substantially.

**“PRACTICE MAKES PERMANENT. PERFECT PRACTICE MAKES PERFECT” – DENIS WAITLEY**

To be successful, ballplayers need the right gear, must know the fundamentals, and must practice.



### TRACK YOUR STATISTICS

All great ball players know and track their statistics. They know their batting average, on-base percentage, runs batted in, and fielding percentage. Stats tell a player how well they're doing. If batting average and runs batted in are high, the hitter knows their performance is great. If that stat is low, they need to work to improve the numbers.

The performance measurements you take are the HVAC system stats. Static pressure, airflow, and temperature are all stats telling you how well a system performs. When total external static pressure is high, or fan airflow is low, this is a stat indicating the system needs help.

Measuring and compiling the stats lets you know how well the system performs over time. Be sure you record and store this data in a location that can always be referred to easily. Something may drastically change from one visit to the next.

### KNOW YOUR POSITION

Tommy Lasorda, the former manager of the Los Angeles Dodgers, once said there are three types of baseball players: those who make it happen, those who watch it happen, and those who wonder what happens.

Every great ball player knows the role of their defensive position and that of their teammates. There are boundaries and limitations set for each position played. Each player knows what to do and how to make it happen.

It would be a confusing ball game if a first baseman tried to take the position of the catcher in the middle of a pitch, or the shortstop pitched to the batter at the same time the pitcher



The fundamentals always help ball players end a slump. If you're struggling with Performance Testing, training is a great way to get back to basics. Ultimately you will score! Just like Joe Richardson does here after knocking the ball out of the park.

winds up for his delivery.

These might seem like crazy misapplications of players, but it is exactly what happens in HVAC companies when roles and boundaries aren't defined. You end up with a confusing situation that appears out of control to a spectator (your customer).

Many roles are close and even cross over on certain occasions. Consider a fly ball hit between a center fielder and second baseman. Communication is a must in these situations. Every good ball team talks to one another, so each player knows who has the ball.

When measuring system performance, each role must be defined. Technicians need to know what position they play, just as installers, salespeople, and dispatchers do. When every player knows the role of their teammates, you set the stage for an organized team that wins games.

### IGNORE THE DOUBTERS

If you've ever been to a baseball game, you've heard fans and players from the other team attempting to

place doubt in the mind of a hitter at the plate. Various taunts and tricks are used trying to get into the batter's head to convince them they can't hit the ball.

There will be those who doubt you can accurately measure HVAC system performance in the field. Some will attempt to convince you these measurements can't be performed or don't mean anything.

Doubters often base their assumptions on claims the measurements can't be performed in a repeatable manner. Yet they offer no solutions on how to perform the measurements. They resort to keeping everything sheltered in a laboratory environment. They often complicate things due to their own misunderstanding of the principles and foundations performance testing is built upon.

The foundation for modern baseball is tied to greats like Ruth, Williams, and Mantle. In a similar manner, system performance testing is built on the foundational principles of air balancing, airflow, temperature, and Btus. **NCI**



**David Richardson** serves the HVAC industry as a curriculum developer and trainer at National Comfort Institute, Inc. (NCI). NCI specializes in training focused on improving, measuring, and verifying HVAC and Building Performance.

If you're an HVAC contractor or technician interested in learning more about HVAC system statistics, contact David at [davidr@ncihvac.com](mailto:davidr@ncihvac.com), or call him at 800-633-7058. NCI's website [www.nationalcomfortinstitute.com](http://www.nationalcomfortinstitute.com) is full of free technical articles and downloads to help you improve your professionalism and strengthen your company.



### "Tune-up Time in Texas"

— Dane McGinnis, Classic Heating and Air, McKinney, TX

Sometimes tune-up jobs are things of beauty. Maybe even artistic.

Congratulations to Dane McGinnis from Classic Heating. He is the June 2018 winner of our Photo-of-the-Month contest (in the GOOD category), as voted on by the subscribers to [High Performance HVAC Today magazine](http://HighPerformanceHVACToday.com) and visitors to the website. He will receive a \$50 gift card.

### YOU CAN BE A WINNER TOO

Submissions are always welcome. If you'd like to submit a photo for consideration in our Photo-of-the-Month contest, go to [ncilink.com/potm](http://ncilink.com/potm) and fill out the information as requested.

### THE JULY CONTEST OPENS ON JUNE 1, 2018.

That gives you plenty of time to submit something in any of our three categories: **The Good**, **The Bad**, **WTH (What the heck)**.

### Introducing NCI's First High Performance Mobile App:



NCI's new AirMaxx Lite™ app features easy-to-use data entry and easy-to-display reports.

**Get started on the path to High-Performance HVAC™ today!**

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# Exclusive 2018 Virtual Summit Offer to Members

If you didn't attend the High-Performance HVAC Summit in Austin, TX, we have some great news. National Comfort Institute, Inc. has set up a special **Virtual Summit experience** for members and their employees. You can access it 24/7/365 through March 2019, once you've enrolled.

This online version is available to you and your entire company for just \$695!

NCI's Virtual Summit includes PDFs of all Summit materials including the workbook, trailblazer implementation map, and session downloads. In addition, there are three comprehensive videos, including: Opening Session, Panel Discussion, and Closing Session.

All six of the breakout sessions are available with audio recordings and PowerPoint presentations. The sessions are:

- Leap from Tradesman to Craftsman
- Productive and Profitable Duct Renovations
- You Too Can Sell High Performance HVAC – If You Just Do It!
- Where Indoor Air Quality Meets System Performance
- ComfortMaxx Air™: Put It to Work!
- Become Your Local Carbon Monoxide Evangelist.

By purchasing the Virtual Summit 2018 package, you can also participate in our **Post-Summit Trailblazer coaching sessions** (\$1000 value)!

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[Click Here](#) to order your Virtual Sum-

mit Package today! NCI Members can apply their NCI Bucks towards the purchase of the Virtual Summit.

## SIZZLING SUMMER ONSITE TRAINING SPECIALS

With the onset of the busy Summer season, there usually isn't time to send technicians to training and certification classes. But NCI can help. We can bring training and certification classes directly to you. We call this Onsite Training, and you can now save up to \$3,000 in value and discounts on having certification training at your company!

The **Summer Onsite Special runs from June 1st to July 31st**. Here are five key reasons to schedule one for your technicians today:

- 1. GET UP TO \$3,000** in extra value and discounts when you schedule Onsite Training between June 1st and July 31, 2018
- 2. ONE AFFORDABLE PRICE** to train, certify/recertify your entire team
- 3. BONUS EVENING SESSIONS** with NCI Instructors available at no additional cost
- 4. NO TRAVEL TIME OR EXPENSES** - We come to you and train in your facilities. Less downtime for your team.



**5. EARN NATE, BPI** and State CEU's (where applicable).

Contact Mike Fowle at 800-633-7058 (or email him at MikeF@ncihvac.com) to schedule your onsite. Be sure to lock in your discounted training dates today!

## HELP YOUR CUSTOMERS BUY – OFFER FINANCING

Today, everyone is wary about the economy. Consumers spend a lot of time and energy shopping for deals. That often means they want to finance expensive items.

Will they appreciate financing when it comes to buying new HVAC systems, Air Upgrades, or duct renovations? Absolutely! Can you do this without hurting your cash flow? Of course.

NCI's High-Performance HVAC Alliance partner, Electric and Gas Indus-



tries Association (EGIA), can help you in this endeavor. Their [GeoSmart® Financing Clearinghouse](#) can simplify the process, save you money, and provide great financing to your customers.

In fact, according to GeoSmart General Manager Rob Noll, EGIA offers plans for virtually any situation your customer may need -- from Same-As-Cash deals, to low monthly payments, to low interest rates. Plus, you can get financing for any customer, whether they have an excellent credit score, or not-so-excellent.

[Click here to read the rest of this story.](#)

For more information, you can contact Rob Noll directly at 855-207-6834 or by email at RNoll@EGIA.org.

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## The Equipment is NOT the “System”



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**P**erformance testing should be something all stakeholders within the HVAC and energy efficiency industries should embrace. It cuts to the chase as to whether a system is delivering the comfort and energy efficiency it promises.

One of the biggest challenges with getting everyone to understand “System Performance,” is getting them to agree on the very definition of an **HVAC system**.

For decades, our industry has referred to unitary equipment as the “system.” Think about our industry’s marketing over the past 30-40 years. In most cases the manufacturer’s literature refers to furnaces and condensing units as “systems.”

Contractors perpetuated this misnomer with marketing showcasing replacement “systems.” In truth, our industry has been marketing and selling replacement equipment, not systems.

While technically an air handler/furnace, coil, and condensing unit are a closed loop system when it comes to the refrigerant side, they

heart and lungs of the system — it still is not “the” system.

This sounds logical and even simplistic, but it’s an important concept that needs to resonate not just with manufacturers and distributors, but with utilities and government who design energy programs and efficiency standards.

Still today, most programs and standards are focused on equipment efficiencies and duct sealing measures that miss the mark. They should focus on field measured system efficiencies.


Manufacturers are rightfully concerned that if standards are written to govern how to measure field performance of an entire “system,” government agencies will hold them accountable for something completely beyond their control.

The fear is these agencies might expect manufacturers to design equipment that overcomes the deficiencies of poor air distribution, and magically deliver 100% of it’s capacity to the space.

So let’s put that into perspective. Imagine if EPA held auto manufacturers accountable for the MPG of a vehicle in which the engine was being replaced, regardless of the condition of the car.

In a comparable situation to the replacement sector of the HVAC industry, an auto manufacturer would be held accountable for the MPG of a vehicle with a leaky gas tank, shot transmission, and bald tires, because a brand-new engine

was installed in that jalopy. That would be ludicrous, right? How could DOE hold manufacturers accountable for the installed efficiency of an HVAC system? The furnaces, coils, air handlers, and condensing units are just components, not the system itself.

It’s important for manufacturers and distributors to educate government and utilities about this indisputable reality. Expecting anything different defies the very laws of physics. 

are far from being the **SYSTEM** when it comes to the “Air” side of comfort delivery.

An HVAC “**SYSTEM**” starts at the return grilles, which are connected by ductwork to the return side of the furnace or air handler, which in turn is connected to the supply ductwork, and ultimately the supply registers.

Once all stakeholders begin to understand that while the equipment is a component of an HVAC system — in fact you could say it’s the

AN HVAC **SYSTEM** STARTS AT THE RETURN GRILLES, WHICH ARE CONNECTED BY DUCTWORK TO THE RETURN SIDE OF THE FURNACE OR AIR HANDLER, WHICH IN TURN IS CONNECTED TO THE SUPPLY DUCTWORK, AND ULTIMATELY THE SUPPLY REGISTERS.



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