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CONSTRUCTION AND MAINTENANCE

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30 Under 30

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Up-and-coming electrical professionals demonstrate innovation, outstanding work ethic, and technical savvy on the job.
Read more on ***pg. 18***

IN THIS ISSUE

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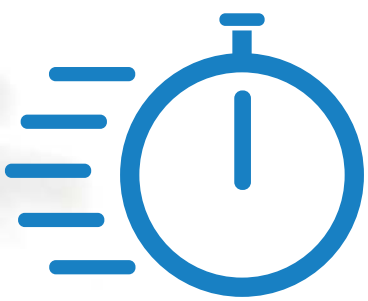
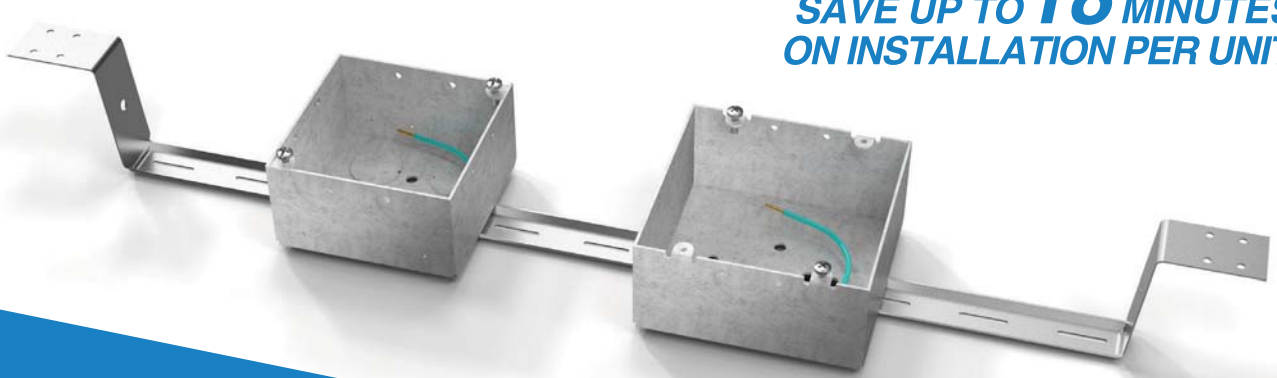


SAVE UP TO 18 MINUTES ON INSTALLATION PER UNIT



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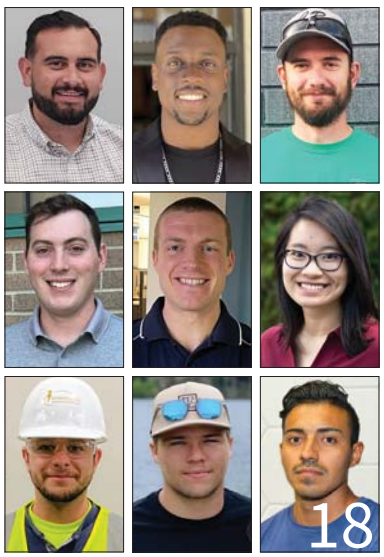
CONTENTS

COVER STORY



OTHER FEATURES

NATIONAL ELECTRICAL CODE

EC&M®
July 2022 • Volume 121 • Number 7

DEPARTMENTS

ISSN 1082-295X (print); ISSN 2771-6384 (digital)
EC&M, July 2022, Volume 121, Issue 7 is published monthly for no charge only to electrical contractors and their employees, consulting electrical engineers, and persons performing electrical construction, installation, and maintenance work in manufacturing, commercial, and institutional facilities in the U.S. by Endeavor Business Media, LLC. 1233 Janesville Ave, Fort Atkinson, WI, 53538. Printed in the U.S.A.

Periodicals postage paid at Fort Atkinson, WI, and additional mailing offices. Current and back issues and additional resources, including subscription request forms and an editorial calendar, are available on the Web at www.ecmweb.com. Canadian GST #R126431964. Postmaster: Send address changes to EC&M, P.O. Box 3257, Northbrook, IL 60065-3257.

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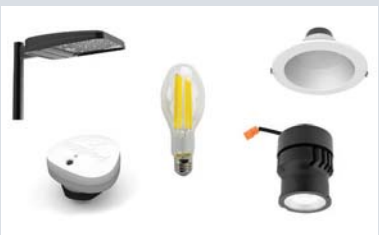

EDITOR'S CHOICE: TOP PRODUCT PICKS FROM LIGHTFAIR 2022

Photo Gallery ▶ Don't miss the latest product innovations from this year's LightFair.

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AVOIDING PROBLEMS WITH PORTABLE CORDS

Safety ▶ Electrical Consultant Mark Lamendola shares advice on safely using portable cords.

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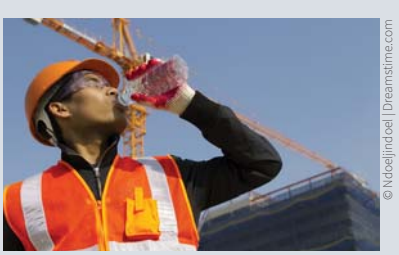

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OSHA TURNS UP THE HEAT

Construction ▶ Tom Zind looks at a new agency initiative aiming for increased awareness of worker heat exposure dangers.

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Editorial

Group Editorial Director - Buildings & Construction: Michael Eby, meby@endeavorb2b.com
Editor-in-Chief: Ellen Parson, eparson@endeavorb2b.com
Senior Associate Editor: Ellie Coggins, ecoggins@endeavorb2b.com
Associate Editor: Michael Morris, mmorris@endeavorb2b.com
Senior Art Director: David Eckhart, deckhart@endeavorb2b.com

Consultants and Contributors

NEC Consultant: Mike Holt, mike@mikeholt.com
NEC Consultant: Russ LeBlanc, russ@russleblanc.net

Sales and Marketing

Vice President: Mike Hellmann, mhellmann@endeavorb2b.com
Regional/Territory Account Manager: Jim Carahalios, jcarahalios@endeavorb2b.com
Regional/Territory Account Manager: David Sevin, dsevin@endeavorb2b.com
Regional/Territory Account Manager: Jay Thompson, jthompson@endeavorb2b.com
Media Account Executive – Classifieds/Inside Sales: Steve Suarez, ssuarez@endeavorb2b.com

Production and Circulation

Production Manager: Brenda Wiley, bwiley@endeavorb2b.com
Ad Services Manager: Deanna O'Byrne, dobyrne@endeavorb2b.com
User Marketing Manager: James Marinaccio, jmarinaccio@endeavorb2b.com
Classified Ad Coordinator: Terry Gann, tgann@endeavorb2b.com

Endeavor Business Media, LLC

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President: June Griffin **COO:** Patrick Rains
EVP, Special Projects: Kristine Russell
Chief Administrative and Legal Officer: Tracy Kane
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Editorial Office: Endeavor Business Media, LLC, 1233 Janesville Ave, Fort Atkinson, WI, 53538.

Subscription Rates: Free and controlled circulation to qualified subscribers. Non-qualified persons may subscribe at the following rates: USA (one year) $55.00; Canada (one year) $90.00; international (one year) $130.00. Single copy prices are $10.00 (USA) and $15 (Canada), and $20 (International). Prices subject to change.

Subscription Services Department: For subscriber services or to order single copies, call customer service at (847) 559-7598 or send an email to electricalconstmaint@omeda.com.

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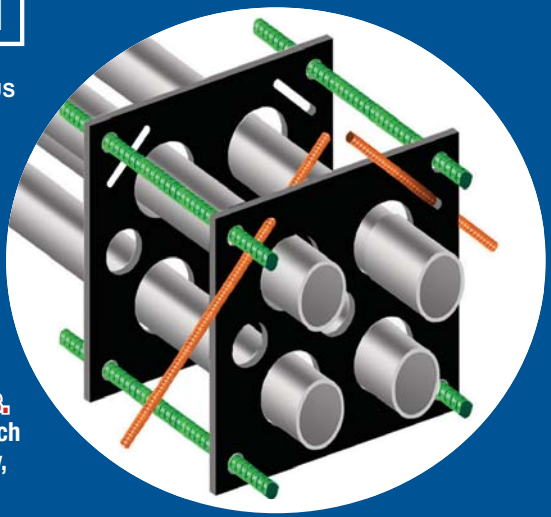

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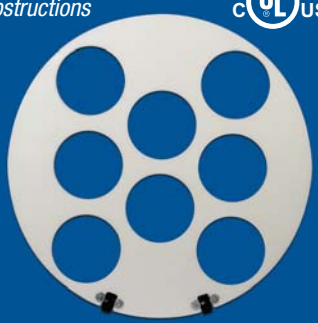

IP13A-F

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Celebrating Extraordinary Young Talent in the Electrical Industry

By Ellen Parson, Editor-in-Chief

I've been with *EC&M* for a very long time — more than 20 years on this magazine and then several more years prior on sister publications in our brand's electrical group. During this time, I've seen many trends come and go. But one has remained relatively constant. I honestly can't remember when recruiting and retaining skilled labor in the electrical industry wasn't a top priority for electrical engineering firms, electrical contracting companies, and electrical professionals working in the plant facility/manufacturing sector.

Not only do we not have enough young folks entering the profession and pursuing a career in electrical work, but the number of Baby Boomers retiring adds fuel to the labor shortage fire. According to research by Guillaume Vandenbroucke, an economist and assistant vice president at the Federal Reserve Bank of St. Louis, every single day for the next two decades approximately 10,000 Americans will turn 65 (read the full report at https://bit.ly/2MlUJEg). This reality definitely presents an ongoing challenge for our readers; however, they continue to come up with creative ways to bridge the labor gap. Based on data from our past Top 40 Electrical Design Firms and Top 50 Electrical Contractors surveys, some of these strategies include: mentorship programs that match new employees with experienced workers; on-the-job training and shadowing initiatives; bringing retired or retiring engineers/contractors on board to work with younger employees; documenting veteran work practices in training materials; matching new hires with mid-level electrical professionals during training sessions; inviting experienced workers to offer leadership training to younger employees; and creating intergenerational teams to work together on projects.

This year's group of 30 Under 30 Electrical All Stars, featured in this month's cover story (starting on page 18 and written by Amy Fischbach) is a testament to this commitment surrounding career development. In this special report, read the personal journeys of 30 young electrical professionals, representing many facets of the electrical engineering and contracting communities — all of whom have overachieved, excelled, and made their mark on the industry in their own ways by their 30th birthdays! Since 2018, *EC&M* has been honoring innovative young electrical professionals with its 30 Under 30 recognition program. Knowing we wanted to celebrate the next generation of electrical workers, we featured 10 Electrical All Stars the first year of launching the program. For the last four years, due to the significant increase in the number of nominations, we expanded that to 30. This year was no exception when it came to the caliber of candidates nominated by their supervisors and peers.

In keeping with the career development theme for this July issue, Senior Associate Editor Ellie Coggins highlights how a high school in Saugerties, N.Y. is participating in a unique program between the county's Habitat for Humanity chapter and its trades education program, which allows juniors and seniors in an electrical construction and maintenance program at the Ulster Board of Cooperative Educational Services (BOCES) to gain hands-on experience while also serving the community. Read more about this innovative program on page 50.

What does it take to get people to consider a career in the electrical field? Turn to page 56, and find out. In "Good Help Is Hard to Find," Freelance Writer Tim Kridel examines what some of the industry's largest firms are doing to recruit and retain top talent as well as what some of its youngest employees are saying attracted them. Their answers may surprise you.

Ellen Parson

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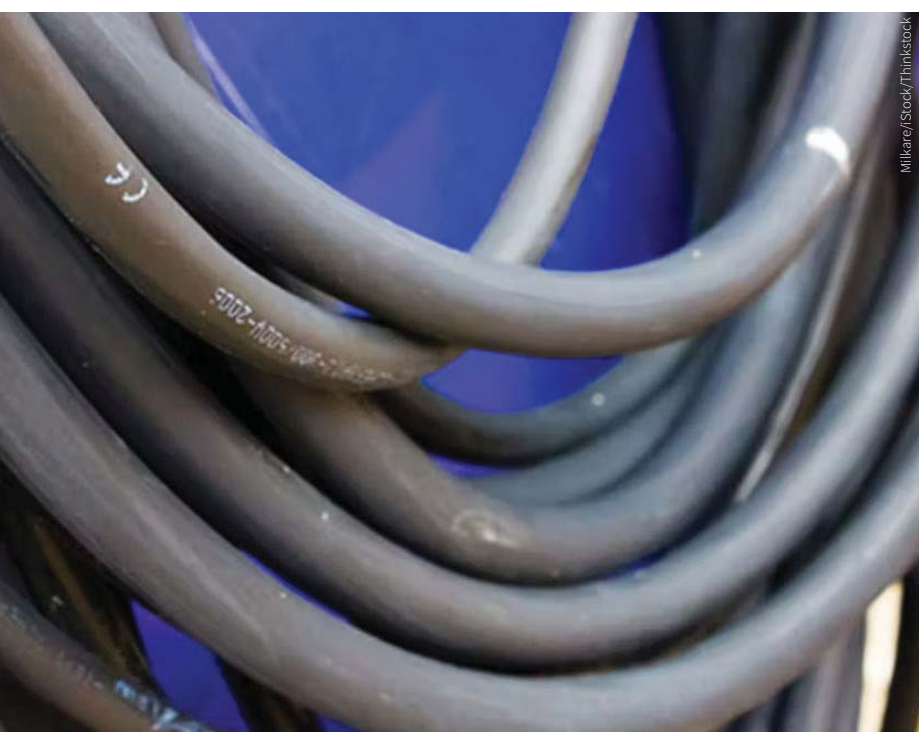
How to Use Flexible Cords and Flexible Cables Safely

To be safe with flexible cords and cables, choose the correct one for the application, and follow some usage rules.

By Mark Lamendola, Electrical Consultant



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Article 400 of the 2020 National Electrical Code (NEC) provides the requirements for flexible cords and flexible cables. OSHA also has requirements for them [29CFR1926.405(g)]. Think of cords as being designed for temporary wiring and cables as being designed for permanent wiring. This is how manufacturers of cords and cables refer to them. Article 400 makes a similar distinction (something apparent in Table 400.4).

OSHA REQUIREMENTS

Most NEC Chapter 3 Articles have a pattern of X.10 and X.12, where X is the Article number, 10 is the Section with "Permitted Uses," and 12 is the Section with "Uses Not Permitted". OSHA does something similar with flexible cords and cables.

OSHA states the permitted uses in 29CFR1926.450(g)(1)(i)(A) through (H):

A. Pendants. For example, the push-button controller for a hoist. These are usually manufacturer-attached.

B. Wiring of luminaires. For example, high-bay luminaires might be wired with flexible cords.

C. Connection of portable lamps or appliances. For example, portable fans or heaters. These are manufacturer-attached.

D. Elevator cables. These are approved by the manufacturer and attached by a manufacturer-certified installer.

E. Wiring of cranes and hoists. These are manufacturer-attached.

F. Connection of stationary equipment to facilitate their frequent interchange. This is regarding equipment that is moved about, but not in the same sense that portable equipment is moved about. For example, a small parts washer sits at the end of a production line for a particular order. After that run, it might be moved to another line or just disconnected because there is only an occasional need to wash the finished parts.

G. Prevention of the transmission of noise or vibration. This is often done with high-vibration operations, such as stamping or mixing.

H. Appliances where the fastening means and mechanical connections are designed to permit removal for maintenance and repair. Kitchen refrigerators typically connect with flexible cord because you are supposed to roll them out and clean their coils.

OSHA does "Sec. 12" with 29CFR1926.450(g)(1)(iii)(A) through (E), except they call these "Prohibited Uses":

A. As a substitute for the fixed wiring of a structure. For example, you can't run SO cord from the panel to the receptacle in the wall.

B. Where run through holes in walls, ceilings, or floors. It's easy to run an extension cord. To "be safe," some DIY types drill a hole in a wall to get power from a receptacle on the other side (and of course, there's no grommet!). This makes a cord act like

permanent wiring, although it's not designed for that purpose.

C. Where run through doorways, windows, or similar openings. Running a cord through a doorway is another "easy fix" that reduces safety. Flexible cords are soft-jacketed (that's why they are flexible) rather than being encased in rigid conduit (that would make them useless as cords). What happens to such a cord when a door is shut on it? Or, because it's in a doorway, it gets stepped on a dozen times with a door sill edge acting as a blade?

D. Where attached to building surfaces. It almost makes sense that saddle stapling a cord out of the way is a safety improvement. The problem is you are using the wrong wiring method. Remember, cords are meant to be temporary wiring. If you're going to attach a wiring method to a building surface, use a wiring method designed for that purpose. A surface raceway is a good choice; it works well and looks better than an SO cord saddle-stapled to a wall.

E. **Where concealed behind building walls, ceilings, or floors.** Among other things, this leaves them vulnerable to undetected damage by rodents.

USING PORTABLE CORDS SAFELY

It may be tempting for companies with a large investment in battery-powered hand tools to de-emphasize portable cords in their safety program — but that would be a mistake. Large stationary tools and many kinds of test equipment/hand tools are cord-connected. Plus, judicious use of cords can reduce battery management problems.

Cords are important enough that OSHA puts separate emphasis on them. For example, it refers to "flexible cords and cables" [1926.405(g)] and states a requirement for how "Type SJ, SJO, SJT, SJTO, S,SO, ST, STO cords" must be marked [1926.405(g)(2)(ii)]. Following that, it provides splicing [1926.405(g)(2)(iii)] and strain relief requirements [1926.405(g)(2)(iv)] for cords.

THERMO WHAT?

Most cord jackets are composed of one or more of these three compounds: thermoset, thermoplastic, and thermoplastic elastomer.

- **Thermoset jackets are heavy-duty grade or specification-grade rubber.** Cords made from thermoset are flexible, even in extreme cold. These cords also have much higher melting temperatures than their plastic counterparts. They are noticeably heavier than the other types of cords.
- **Thermoplastic is a light-duty plastic compound.** Cords made from thermoplastic are suitable for light-duty use.
- **Thermoplastic elastomer is a medium-duty plastic that is lighter than thermoset.** For most jobs, thermoplastic is a good choice because it gives high performance with a relatively

low weight. However, it can't withstand the extremes that thermoset can.

SELECT THE RIGHT CORD

- Select a cord suitable to the working conditions. Wet conditions, oily conditions, and extreme cold merit a condition-specific cord. Using a cord not suited to the conditions of use puts the cord at high risk of insulation damage, followed by electrocution or an arcing fault.
- Always use an industrial-grade or construction-grade portable cord. One thing you will notice is these (being 3-wire cords) always have a ground plug. Don't use an adapter with a 2-wire cord, use a 3-wire cord.
- Choose a cord long enough not just to reach the utilization equipment but to be safely routed to there.

JACKET DESIGNATIONS

You'll see these markings on a cord jacket.

- S: 600V service cord.
- J: junior service — 300V service cord.
- T: thermoplastic.
- E: thermoplastic elastomer.
- O: oil-resistant outer jacket.
- OO: oil-resistant outer jacket and oil-resistant insulation.
- W-A: approved (in the United States) for indoor/outdoor use (weather resistant).
- W: CSA approved (in Canada) for indoor/outdoor use (weather/water resistant)

CORD CAUTIONS

- Inspect the cord jacket for damage before use. Look for sharp bends or breaks.
- If a cord has tape on it, determine if it is there as a repair attempt. If so, destroy the cord and dispose of it.
- Inspect cord ends for damage, such as fraying or a broken ground plug.
- Route cords so they are not tripping hazards or exposed to damage. Where practical, use a cord protection device; there are many designs to choose from, and they are not expensive.
- If your firm relies on an assured grounding program, a GFCI is not a requirement. Otherwise, use a GFCI with any portable cord.
- If you must run a cord on a stairway, don't route it across steps (this creates a tripping hazard). Run the cord lengthwise on the stairway and tape it to one side. If you really must run it horizontally, push it all the way to the back and tape it down.
- If a cord must cross a pedestrian pathway, run it in a cord guard, and tape the cord guard in place. If the path is also a lift truck path, forget about the cord guard; run the cord overhead using a cord tree system or similar.
- If using an overhead system such as a cord tree, ensure you have sufficient vertical and horizontal clearances for people and vehicles.
- You may solve cord routing problems by finding a different power source or moving your tools and equipment. Even if this means connecting two long cords, it may be the best solution.
- Even if a cord is rated for oil or water, avoid running it into oil or water. While there is almost no chance that doing so will result in an electric shock, the operative word is "almost." And almost is not good enough. You don't know the history of that cord and what it's been through. It may have insulation damage that you cannot see. Always give the cord the best chance of protecting you instead of making "optimum condition" your default assumption.

CANCEL CORD AND CABLE CONFUSION

To avoid confusing cords with cables, think of temporary versus permanent. An elevator cable is permanently installed, and a lamp cord is not. Cables are terminated via splice, bolted connection, or similar while cords are plugged in.

To select the correct type of cord or cable for the intended use, start with NEC Table 400.4. Other Art. 400 tables, such as the various ampacity tables, can help you refine your selection.

If you're using a portable cord, think about how to route it from the receptacle (a GFCI unless you have an assured grounding system) to the utilization equipment. You want to protect it from damage and ensure it's not a tripping hazard. EC&M

Mark Lamendola is an electrical consultant based in Merriam, Kan. He can be reached at mark@mindconnection.com.

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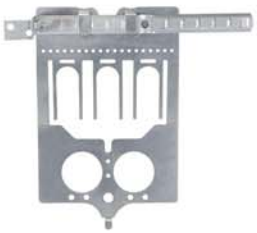

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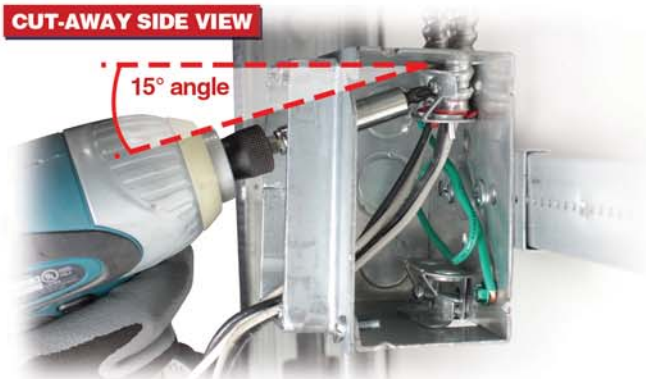

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Eight Timeless Estimating Principles

Don't miss these time-proven tips from the pages of yesteryear.

By Don Kiper, Electrical Estimating 101

The estimating process — like other industry processes — has improved over the years through better communications, computers, and software. But computers and software will not make you an estimator any more than owning a hammer and a saw will make you a carpenter. To be a skilled carpenter, you must understand the principles of house building. To be a skilled estimator, you must have a good understanding of these components: philosophy, methodology, and use of software. Over the years, estimating methodology and the implementation of software have revolutionized the process. While the methodology has changed with software, there are some estimating principles that remain timeless.

In the 1960s, *EC&M* published a book titled *How to Estimate Electrical Work*. This 98-page booklet contained 56 practical articles on electrical estimating methods. Some may find this book outdated and would never consider reading it. However, it contains many time-tested and proven estimating principles that are still true and should be considered in the estimating process.

In this article, we will look at some of these timeless principles I have extracted from random articles in that book.

PROVIDE A DETAILED SCOPE OF WORK

When there are no plans and specifications, the estimator should provide sketches or plans of the work to be installed. This scope of work letter or bid proposal should include details of quantities, wiring methods, and materials used in the estimate. The scope of work cannot be vague. When the scope of work is not well defined, scope seep is inevitable.

TRACKING YOUR OWN LABOR DATA IS BEST

The Manual of Labor Units published by NECA is data collected by the organization to provide contractors with an "approximate value" for labor units. However, the best contractors track labor installations on their projects to provide the best historical data for their company and market. When a project has labor overruns, a project's historical labor data will provide valuable information for future estimates.

EQUIPMENT WEIGHT AFFECTS LABOR UNITS

The weight of material and equipment is important when determining labor for installation. For example, an industrial 2-lamp LED luminaire weighs approximately 5 lb, while a 2-lamp LED luminaire for a Class I, Division 1 location weighs approximately 32 lb. Another example would be a 100A NEMA 1 disconnect switch, which weighs approximately 15 lb. The same size switch in a NEMA 7 explosion-proof

enclosure weighs approximately 50 lb. The estimator must always consider equipment weights when assigning labor units to an item. The types and sizes of hangers are also impacted by equipment weight.

LABOR ADJUSTMENTS DUE TO JOB FACTORS SHOULD BE CALCULATED

Job factors or project labor factors are project conditions that have a negative impact on labor productivity. There are as many as 40 project labor factors used today. This booklet lists six. They are standby, weather, size, coordination, complexity, and efficiency. The job factors are labor hours added to the direct labor hour total. These factors are cumulative. For example, if 20% of the work will be performed outside in inclement weather, only these labor hours are adjusted accordingly. A weather adjustment would vary based on geographic location.

PROJECT LABOR FACTORS APPLIED IN OCCUPIED FACILITIES

Determining labor for a new building compared to an occupied facility must be considered. When work is installed in an area occupied with desks and filing cabinets, it will require dust control, protection of the area, and white-glove inspection cleaning once the work is installed. Another example would be a warehouse filled with products that may have to be moved with forklifts to provide access to the work area.

INSTALLATION LABOR FACTORS APPLIED BASED ON MOUNTING HEIGHT

When luminaires or conduits are installed above a normal working height, adjustments must be made to the labor units. Different heights will require different adjustments. A luminaire mounted at 20 ft will require more labor than installed at 8 ft. Installation labor factors are adjustments made to labor units based on the ease or difficulty of the installation. These factors may increase or decrease the labor unit of the item being installed. One example of decreasing the labor units would be parallel run feeders either overhead or installed in a trench.

NON-PRODUCTIVE LABOR IS A MISNOMER

The term "non-productive labor" has been used very carelessly. Every contractor should want the "non-productive labor" to be nil or zero. Direct labor is the amount of time or labor hours that is required to install the material as per the plans and specifications. In addition to the direct labor hours, a project will have other labor items that should be considered, indirect labor and incidental labor, but never should it be referred to as "non-productive labor." Proper categorization of labor will provide the contractor with the best data to track the project's progress. Also, by referring to labor as "non-productive," it becomes difficult to sell to owners and architects on change orders. Please abandon this misnomer immediately.

HAVE A POST-PROJECT MEETING

This meeting has been sometimes referred to as a "postmortem analysis." The contractor will gather valuable information by comparing the actual labor hours required to install a project to the estimated labor hours. One important item is the average crew size for the duration of the project. Having fewer men is more productive than having too many. During this meeting, the project manager should provide data to the estimating department for future bidding. This data should include the following: journeyman to apprentice ratio, total labor hours, average hourly labor costs, and project labor conditions that had an impact on productivity. This information will increase bidding accuracy on future projects.

Every contractor should always be seeking to improve estimating efficiency. Using the best technology of our day is paramount, but let's not forget the timeless principles of our industry that are unchanged. Our current generation of estimators is indebted to the estimators of yesteryear for their labor and expertise in providing us with sound principles to do our job. EC&M

Don Kiper is an independent electrical estimating trainer and consultant based in Niagara Falls, N.Y. He can be reached at don@electricalestimating101.com.

Risk of Lightning Strikes Intensifies for Exposed Hospitals

Climate change may heighten the importance of lightning protection systems.

By Joseph Mizrahi , Burns Engineering

When a 2018 lightning strike knocked out power at New York's Good Samaritan Hospital Medical Center, operating room humidity controls failed. As a result, the hospital was forced to postpone dozens of surgeries.

That Level II trauma center is not alone. Flashes of bad luck have recently inflicted damage to hospital electrical cables, generators, and information communications technology. Extreme events include a 2017 lightning strike at a Florida hospital — where a fire led to widespread failure of the back-up power systems. Within six hours, the hospital transferred all 225 patients.

As climate change raises temperatures and produces more extreme storms, regions previously unaccustomed to lightning activity are now experiencing a greater number of strikes. The potential for damage is particularly concerning for critical facilities (like hospitals) in certain regions where most existing buildings do not have a lightning protection system (LPS). Left unprepared, a power surge could pose serious risks to patient care.

WARMER WEATHER, GREATER RISKS

When or where lightning will strike is unpredictable. Nevertheless, climate researchers have drawn connections between surface temperatures, precipitation rates, and lightning flashes — suggesting more lightning can be expected in the years ahead.

As temperatures warm, heavy precipitation events are likely to become more common, changing electrical balance in the air and causing lightning to strike. A study published in the journal *Science* concluded that every 1°C rise in global

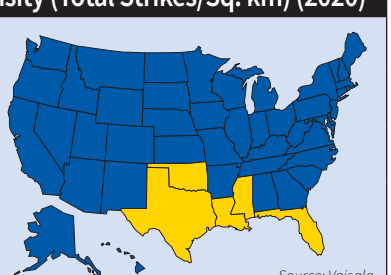
States with the Most Lightning Strikes (2020)

Texas	33.8 million
Florida	12.8 million
Oklahoma	12.6 million
Kansas	8.2 million
Missouri	6.9 million

Source: Vaisala

States with the Greatest Lightning Density (Total Strikes/Sq. km) (2020)

Florida	75.1
Oklahoma	69.7
Louisiana	50.8
Mississippi	50.3
Texas	48.6



Source: Vaisala

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temperatures will result in a projected 12% increase in lightning strikes.

The growing threat to buildings and other structures may already be real. Compared to the prior decade, from 2011 to 2020 the United States experienced a 40% increase in property damage events caused by lightning strikes, according to U.S. National Oceanic and Atmospheric Administration data. Lightning events often go unreported, especially from years back. Still, many building owners — hospitals included — are noticing an increase.

While protection systems are common in newly constructed hospitals, older facilities are more often left vulnerable. A growing number of insurers are insisting on their installation.

DANGERS FROM DIRECT AND INDIRECT LIGHTNING STRIKES

Health-care settings are particularly vulnerable to lightning damage. Sensitive electronic equipment includes imaging systems, patient monitoring devices, electronic record keeping, and more. Highly explosive materials (such as oxygen tanks) could pose fire risks if left unprotected.

When lightning surges enter a building, it travels through any conductive material — be it wiring communications systems, cable television (CATV) systems, or broadband communications systems. Without an LPS, surges are likely to blow through the electrical system and temporarily knock out power.

Problems can remain even after restoring the power supply, restarting servers, and rebooting other electrical systems. Lightning-struck hospitals have reported that surveillance cameras, badge readers, and fire alarm systems needed to be repaired. Following a strike, patient attendance systems and "code blue" resuscitation alarm buttons may also not function as designed.

Regardless of whether a hospital experiences a direct strike, lightning nearby poses dangers, too. Indirect strikes can result in an overvoltage between structure foundations and the building's power lines, or radiating voltage can travel from as far as several hundred yards away.

A Level I trauma center recently reported that a back-up generator repeatedly failed routine checkups due to improper integration with the hospital's LPS. Area thunderstorms caused enough transient voltage to likely cause the equipment failure.

Observed Change in Heavy Precipitation by U.S. Region

Northeast	71%
Midwest	37%
South	27%
Mountain	16%
Northwest	12%
Southwest	5%

Source: U.S. National Climate Assessment

LIGHTNING PROTECTION BEST PRACTICES

In recent years, advances in LPS design and surge protective devices (SPDs) have significantly prevented damage and helped to save lives. The challenge is to develop a whole-building approach. In an interconnected system, the LPS establishes a low-impedance path for lightning's electrical currents to reach the ground, while SPDs limit transient voltages and work to divert surge currents away from electrical equipment and toward the grounding system.

The design process begins with a site-specific study to determine the appropriate choice of air terminals (previously known as lightning rods), as well as to identify locations that best capture and redirect the lightning surge.

A system of grounded conductors is laid from the rooftop across the exterior of the building. Several aluminum or copper rods channel lightning to eventually reach the ground where its energy dissipates. Conductors are kept as short and direct as possible to minimize the risk of failure. Best practice is to avoid installation in gutters or downpipes to prevent corrosion of the down conductors. The wires that make up the "earth termination system" are usually placed a few feet away from the building.

Once installed, the LPS must be bonded to the building's electrical system, mechanical structures, and all external conductive components. Known as "equipotential bonding," this process offers internal lightning protection by preventing dangerous sparking events.

National Electrical Code Requirements and Lightning Protection System Applicability (NFPA 780-2020)

Airfield lighting circuits
Communication systems
CATV systems
Critical operations power systems
Emergency systems
Fire pumps
Heavy-duty stacks
Industrial machinery
Information technology equipment
Radio and television equipment
Solar photovoltaic (PV) arrays
Structures containing flammable or explosive materials
Watercraft
Wind turbines

Conductive parts that must be integrated with the equipotential bonding system include:

- earthing conductors,
- lightning protection earth electrodes,
- conductive parts of the building structures,
- earthing conductors for antennas, and
- metal shields of electrical and electronic conductors.

If voltage from a nearby lightning strike reaches the building, simple fuses and circuit breakers offer a poor defense. Instead, SPDs monitor external and internal system voltages and activate when a transient voltage occurs on the circuit. After diverting the transient back to its source or the ground, the SPD resets to a high-impedance state.

LIGHTNING PROTECTION CODE REQUIREMENTS

NFPA 70, *National Electrical Code* (NEC), and NFPA 780, *Standard for the Installation of Lightning Protection*, do not require lightning protection at all types of facilities or for all building structures. However, the number of systems that need to be protected has increased in recent iterations.

Protection designs must adhere to Underwriter Laboratories' UL 96A, the definitive standard for lightning protection system installation requirements. UL 96A addresses air terminals, cable conductors, fittings, connections, and fasteners.

In addition, hospitals are encouraged by NFPA 780, NFPA 70, and the Facilities Guidelines Institute (FGI) to develop risk assessments and mitigation plans for weather events such as lightning strikes. Considerations when undertaking a safety risk assessment include the potential of lightning damage on:

- communications, fire-alarm, and radio systems;
- electronic medical records (EMR) and other IT systems;
- evacuation procedures;
- heating, ventilation, and air conditioning (HVAC) systems;
- patient-monitoring systems and pharmaceutical-dispensing devices;
- power supplies and back-up generators;
- roof and structural systems; and
- security and safety systems.

HEIGHTENED VULNERABILITY, GROWING RISKS

Lightning contains up to one billion volts of electricity and produces heat estimated to be up to five times hotter than the surface of the sun, according to the National Weather Service. As the United States braces for heavier and more frequent rainstorms, some regions must also prepare for an increase in lightning strikes. Although thunderstorms are more common in southern states, health-care facilities in the rest of the country may be less likely to have fully operational and properly maintained protections.

To determine the protection needs for any facility, Annex L of NFPA 780 offers a lightning risk assessment. In general, this standard recommends LPS installations on structures where vulnerability exceeds the facility's tolerable risk. For many health-care facilities, risk assessments will likely conclude that the costs of a potential lightning strike are too risky to bear. The increasing use of sensitive electronic systems and Internet of Things (IoT) devices make robust LPS and SPD systems even more imperative.

If misfortune strikes, it will be the proactive hospitals that can withstand a storm event. Along with advanced emergency back-up power systems, hospitals should consider LPS and SPD upgrades to ensure full operations at times when patients and community members rely on these systems the most. EC&M

Joseph Mizrahi, P.E., is a vice president at Burns Engineering in New York. He leads the New York office and is a nationally respected provider of specialized engineering services, bringing highly technical, sought-after expertise for complex transportation and critical infrastructure projects. He can be reached at jmizrahi@burns-group.com.

2022's 30 Under 30 EC&M ELECTRICAL ALL STARS

Meet 30 young electrical professionals with a strong work ethic, a thirst for knowledge, and a passion to improve the future of the electrical industry.

By Amy Fischbach, Freelance Writer

Each year, *EC&M* crowns a select group of up-and-coming leaders in the electrical industry with its annual 30 Under 30 honor. This year, the group includes a diverse blend of young electrical professionals who are all working toward a brighter future for the electrical industry.

The 2022 Electrical All Stars work in the field as electricians or project managers or in the office as engineers or business owners. While some stumbled upon opportunities in the industry, others were literally born into the electrical trade. Levi McBride, an electrician for McBride-Owens, Inc. in North Carolina, is a prime example.

"The industry needs all the young people it can get, and it's a great career to be in," he says. "We need to learn as much as possible from the industry veterans while we still can."

Tom Berch, superintendent for CRB Group in Maryland, agrees, saying that when they first enter the industry, young electrical professionals need to leave their ego at the door.

"Remember that just because you went to college doesn't mean you know even remotely more than the tradesmen who have been doing the work since before you were born," Berch says.

Even after they graduate from college/technical school or earn their project management certification/journeyman card, the 30 Under 30 are still trying to learn everything they can about the industry.

"You need to recognize that it takes a crew to construct a building, and you're not going to have the answers right away," says Kevin Compton, Trimble operator for Eldeco, Inc. "Being determined to find solutions is vital to success in the electrical industry."

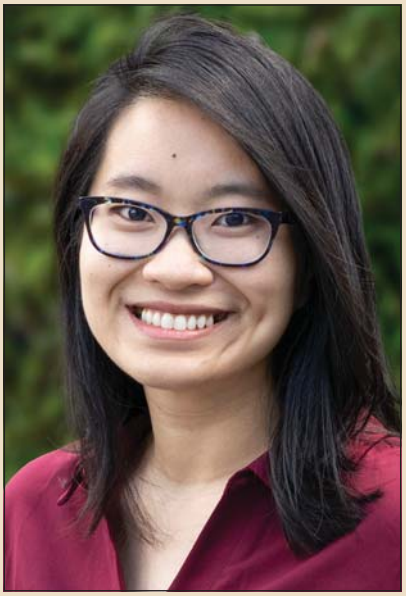
To gain a competitive edge, the up-and-coming leaders are staying in tune with new technologies and trends. For example, Cody Swayze, project manager at Smith Seckman Reid, says his company has invested in virtual reality on large projects to improve coordination on mechanical/electrical/plumbing systems both during design and construction.

"Much of today's technologies are allowing engineers, architects, and contractors to work more closely than ever before in coordinating designs across all trades," he says.

The following 30 electrical professionals are making their mark by transforming city skylines with new high-rise buildings, infusing their companies with knowledge about new technologies, and focusing on not only productivity, but also safety.





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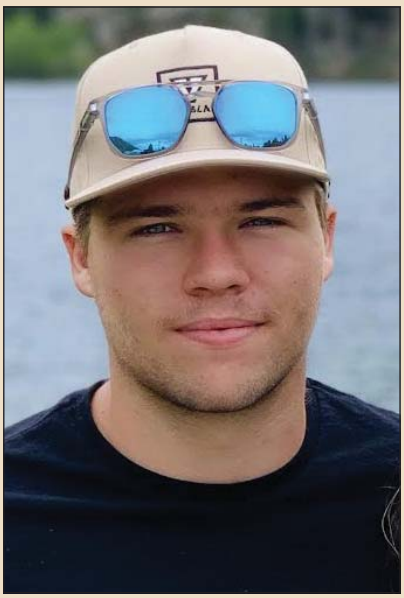


Tom Berch, who passed the electrical power professional engineer exam in February 2022, is responsible for overall trade management, design management, quality control, safety, and regular project schedule updates.

TOM BERCH

Job Title: Superintendent
Company: CRB Group
Location: Rockville, Md.
Age: 27; **Years on the Job:** 6
Interests: Lifting weights, playing music and writing songs, playing video games, and getting outside as much as possible

As a kid, Tom Berch enjoyed taking apart small electronics, much to his parents' dismay. He has a lifelong interest in technology, and his dad and uncles have been involved in the construction industry — from landscaping to carpentry to electrical contracting.

"Through them, I was introduced to the construction industry early, but I enjoyed the technical aspect of the electrical industry the most," Berch says.

Born and raised in and around Germantown, Md., Berch switched from computer engineering to electrical engineering his sophomore year and hasn't looked back. During the summers, he worked as a contractor's assistant doing hands-on work.

"Through that experience, I realized how much I enjoyed being in the field," he says. "I strategically positioned myself to not fall under the traditional design or field role found within the industry."

After graduating from college, he worked as a design electrical engineer before moving to a general contractor. These past experiences have helped prepare him for his current dual role as an MEP design manager and superintendent.

"There's nothing quite like solving a difficult engineering or construction problem that's been plaguing a team and watching it be implemented in real time," Berch says.

Currently, his company is working on a 90,000-sq-ft, $90-million Life Sciences Building fit-out, which, when completed, will provide proprietary life-saving medicine. In the future, he envisions himself running bigger projects from a joint project director type of role.

"In the more distant future, I hope to run a division or office that will continue to work on projects that benefit humankind," he says. "I plan to reach these future goals by continuing to learn and refine my project management skills from both a design and field perspective."

EC&M ALL STARS
2022 UNDER 30

JONATHAN BRANTLEY

Job Title: Project Manager
Company: 5 Points Electrical
Location: Norcross, Ga.
Age: 26; **Years on the Job:** 5
Interests: Spending time with his three-year-old son, Jonny, and his wife, Jessica, and listening to heavy metal

During his childhood, Jonathan Brantley didn't dream of becoming a doctor, firefighter, or banker. Every time he would pass by a construction site, however, he was intrigued by how workers could create buildings from the ground up.

Born in Orlando, Fla. and raised in Suwanee, Ga., Brantley worked in everything from construction, remodels, and renovations to project management and estimating. His experience in the service industry influenced his ability to become a successful project manager and estimator.

"The ability to walk into a building and know exactly how much time, material, and effort the electrical tasks will take has been nothing short of beneficial," Brantley says.

As he progresses in his career, he is continuing to challenge himself by taking courses to further his skills.

"Leading yourself into new and tough situations instead of walking away from them, will give you extra knowledge and experience to better yourself and your work," he says.

Now as a project manager for the Small Projects Department at 5 Points Electrical, he checks on the status of ongoing projects, estimates for project bids, and preps the night crews for work assignments. His favorite part of the job, however, is building a relationship with the clientele.

"The teamwork it takes to finish these projects on time and under budget is a rewarding experience," he says. "Organization and coordination are key in this field."

In the future, he hopes to one day own his own electrical company.

"5 Points Electrical has given me nothing but opportunities to further my knowledge in any field directly tied to the electrical industry," he says.

As a project manager for 5 Points Electrical, Jonathan Brantley and his team handle many of the Bank of America renovations throughout Georgia and also in Tennessee and South Carolina.

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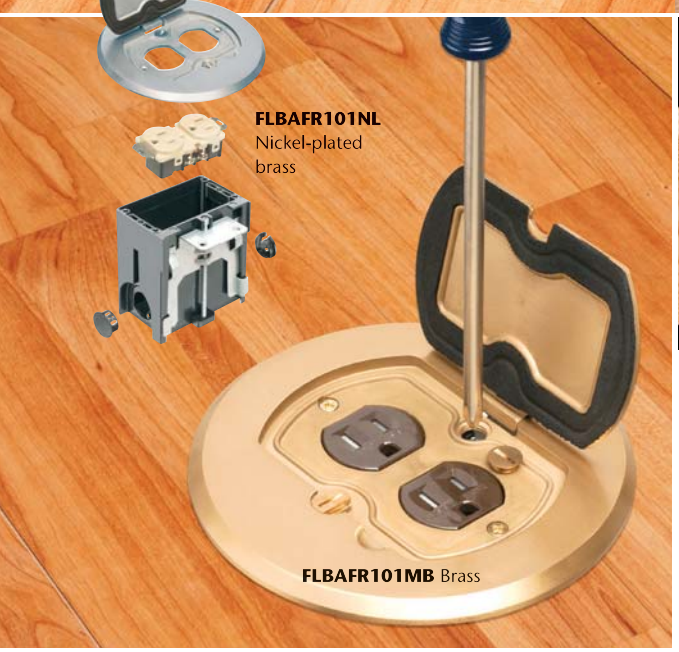

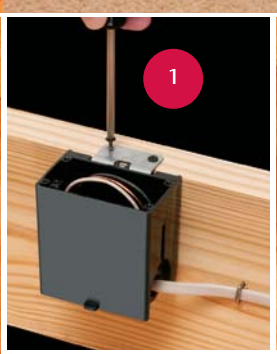

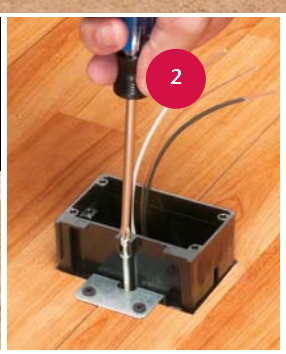

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As the project manager, AJ Butera is in charge of safety, construction, and manpower for two high-rise luxury-living buildings with challenging builds.

AJ BUTERA

Job Title: Project Manager
Company: Power Design, Inc.
Location: St. Petersburg, Fla.
Age: 27; **Years on the Job:** 6
Interests: Going to the beach, attending sporting events, hanging out with friends, and traveling

With a grandfather who worked as a residential electrical contractor, AJ Butera was always fascinated by how things worked and enjoyed working with his hands. His friend recommended he check out Power Design, where he currently is a project manager.

"I found the hands-on experience to be very interesting and rewarding," he says. "Now I am working on the same materials and tools my grandfather used when he was working in the electrical trade."

As the project manager, Butera is in charge of safety, construction, and manpower for two high-rise luxury-living buildings with challenging builds.

Butera, who earned a mechanical engineering degree from the University of Rhode Island, spends several weeks in the field to learn about the installation of electrical equipment. As a new project manager, he reviews drawings, attends weekly meetings, and manages the budget.

"I enjoy the fast-paced movement of the projects and building something that is tangible," he says. "At the end of the project, there is a new high rise that is now a part of the Austin or Dallas skyline."

While he is based in St. Pete, he flies to the job sites in Texas once a month to walk the site, meet with customers, work with the field team, and update upper management. He enjoys traveling and performing hands-on work when on site.

He says technology is vitally important for electrical subcontractors.

"I think the electrical field is going through a revolution at the moment," he says. "Today everyone is connected by technology, even at home."

In the future, he sees himself continuing to grow at Power Design and climbing the management ladder to become a project executive. He said he is honored to be part of the *EC&M* 30 Under 30.

"This recognition is something I am proud of, and it motivates me to work harder," he says.

CADE COLLINS

Job Title: Service Electrician
Company: The Happy Outlet, LLC
Location: Carson City, Nev.
Age: 22; **Years on the Job:** 5
Interests: Fly fishing and taking his dog to Lake Tahoe

Cade Collins says his mom manages a lighting store, and for his first job, he installed luminaires and ceiling fans. During his career, he has spent one year wiring homes, one year troubleshooting new installations, and six months specializing in commercial wiring and installations.

He plans to reach his future goals by continuing his education through the company.

"All of my electrical knowledge until coming to work for The Happy Outlet has been in the field training," says Collins, who was born and raised in Bakersfield, Calif. "My training has increased my communication skills and has made me more knowledgeable on the products that I install."

In his current role at The Happy Outlet, he is responsible for new installations and troubleshooting residential and manufactured homes.

"The Happy Outlet is constantly furthering my education — from people skills training to going over the NEC with the rest of my team," he says.

Collins says every electrician he has worked under has his or her own way of doing things.

"By the time you get to go out on your own, you can combine the best of what you've learned from them to make yourself faster and more efficient," he says.

As an installer for The Happy Outlet, he usually goes on two to three calls per day. His key responsibilities are installs and troubleshooting. On occasion, he gets the opportunity to meet with new clients, address their needs, and provide options to make their electrical system safer.

At The Happy Outlet, technology is a key component of the employees' daily lives. The software enables them to review notes and photos of previous work, create invoices, and order materials for a return trip. He says he is grateful to be nominated and selected for the *EC&M* 30 Under 30.

"It feels good to be recognized by people I look up to," he says.

Cade Collins plans to reach his future goals by continuing his education through the company.

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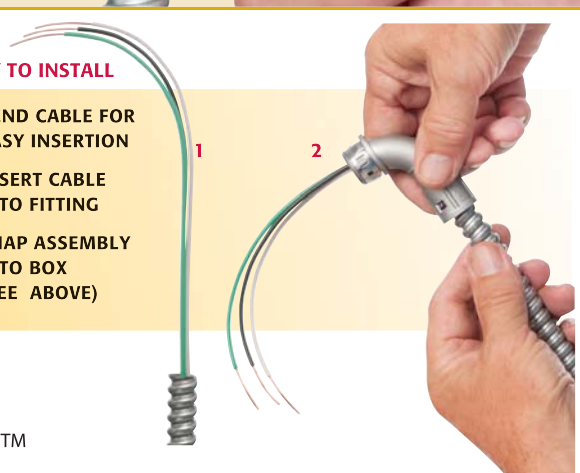

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Kevin Compton says he is fortunate to have worked with experienced workers in the electrical industry during his career.

KEVIN COMPTON

Job Title: Trimble Operator
Company: Eldeco, Inc.
Location: Greenville, S.C.
Age: 25; **Years on the Job:** 3
Interests: Spending time with his wife, working on their house/yard, hiking, and playing the guitar

Kevin Compton grew up around construction, but his brother-in-law, Marc, sparked his interest in becoming an electrician.

"Problem solving has always brought me satisfaction, and there's so much of it in this field," Compton says.

Born and raised in Easley, S.C., Compton majored in construction engineering at Greenville Technical College. After a year-and-a-half, he left college to start in the trade with no experience or prior training.

"The majority of people who have trained me have been very quick to offer help and to teach, which is something I'm extremely grateful for," he says.

As a Trimble operator, he lays out specific items from an engineering drawing onto the job site and collects locations and as-builts for a job. If any issues arise, he works on finding a solution.

"My favorite part about this job is seeing things line up the way they should," Compton says. "When the numbers come out right — and everything looks good both on paper and in the field — that's a great feeling."

Currently, his firm is working on industrial building projects, and he is focused on locating duct banks, light poles, and equipment. He says technology is vital to an electrical firm's success and allows crews to get a jumpstart on installations.

"The old methods work, but they are much slower and take up more man-hours," he says. "In my field, with the use of a Total Station, one person could do it in one day where it would take three people a week to do without it."

Over the next decade, he would like to work more closely with the engineering department.

"I enjoy the design side of it, and that's the best place to see it," he says. "I plan to keep asking questions and learning everything I can to help wherever I am needed."

EC&M ALL STARS 2022 UNDER 30

MARK DANIELS

Job Title: Estimator/Project Engineer
Company: Shaw Electric Co.
Location: Novi, Mich.
Age: 27; **Years on the Job:** 6
Interests: Weightlifting, running, autocross, and attending Michigan State University football tailgates

A life-long interest in construction and engineering attracted Mark Daniels to the construction management program at Michigan State University (MSU). While earning his bachelor's and master's degrees, he served as an intern and then as a full-time project engineer at Shaw Electric Co.

"I felt tremendously well prepared for the project management and estimating side of things from my time at MSU," he says. "Electrical was totally new to me, so starting small as an intern and then as a project engineer helped me to learn the trade little by little."

He says his training has been top-notch and put him in a position to succeed.

"I believe that work ethic is everything, and you get out what you put in," he says.

As a project manager, his day consists of interacting with foremen, overcoming challenges, managing material procurement and subcontractors, reviewing drawings, and estimating new work.

"My favorite part is working with our team to find a solution to a particular challenge and seeing that resolution," he says. "The most challenging parts are dealing with things out of our control like material supply chain issues and labor shortages."

Currently, he is working on the McLaren Greater Lansing Replacement Hospital Project, a 10-story, 500,000-sq-ft hospital project. On this job, he is overseeing power distribution, mechanical tie-in, operating and specialty treatment rooms, fire alarms, and commissioning.

In the future, he hopes to be in a senior leadership position where he can make an impact on some of his biggest and most important projects. To get to this point, he plans to continue working hard, using new technology, and leveraging his construction management background.

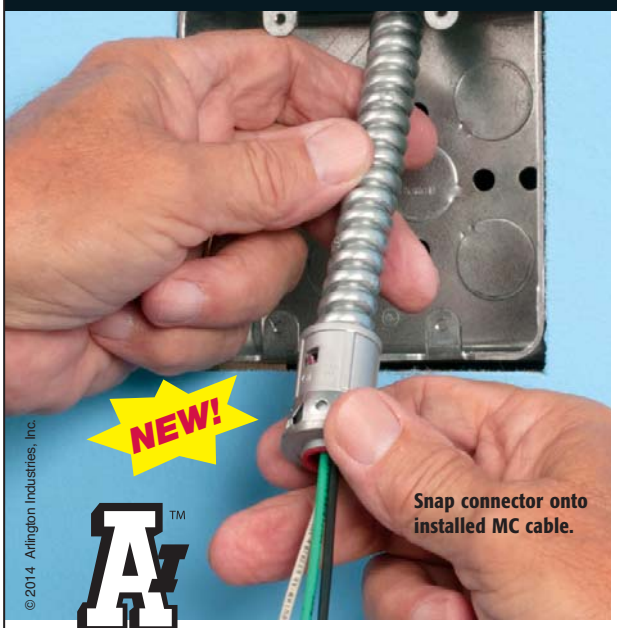
"I think technology is tremendously important, and proper adaptation will allow electrical contractors to thrive," he says.

Mark Daniels reads publications like *EC&M* to learn about new products and construction methods.

NO TOOLS • EASY SNAP-IN INSTALLATION • *SAVES TIME!*

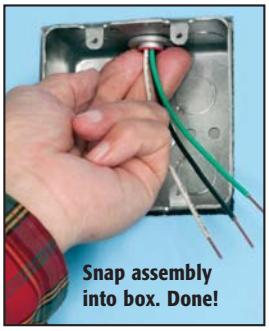
SNAP2IT® CONNECTORS

FOR RETROFIT INSTALLATIONS



Arlington's new one-piece **RETROFIT SNAP2IT®** fittings are *easy to use in an OLD WORK installation*, and handle the widest variety of cables! They're ideal for adding additional circuits to a load center. And you get the same labor-savings in a retrofit installation!

Easy snap-in installation - NO TOOLS. Install connector into the knockout in an ***existing* box**, pulling cable/conduit through the knockout. Slip the fitting onto the cable, then snap the assembly into the box. That's it... a secure installation with *no pullout*.



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Widest total cable ranges 14/2 to 10/3
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VERTICAL OR HORIZONTAL • RETROFIT & NEW WORK INSTALLATIONS

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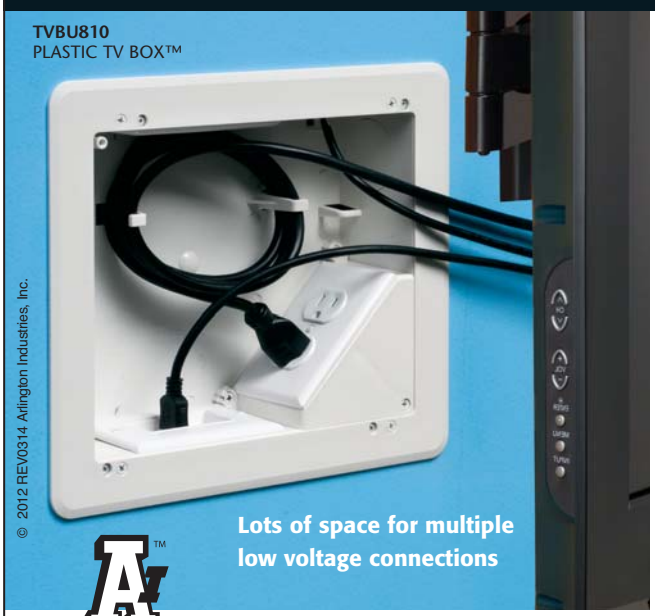
Non-Metallic 8x10 TV BOX™

PERFECT FOR HOME THEATER SYSTEMS



Arlington's PLASTIC 8X10 **TV Box**™ delivers the *ultimate in versatility* for installing flat screen TVs in new *and* retrofit projects. There's more room in the box for wires and it installs horizontally or vertically to properly position low voltage connections behind the TV.

- Ideal for home theater systems: multiple connections for sound systems, satellite TV, CATV, DVRs
- Brackets for neater cables, with a 1-1/2" knockout for ENT and other low voltage wiring
- Box mounts to stud in new work; for retrofit, mounting wing screws secure box in wall

includes box, trim plate, duplex receptacle, line voltage box, wall plates, cable entry device, knockout plugs

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Product info aifittings.com/landing/TVBU810

JACOB EGOROV

Job Title: Engineer and Project Manager
Company: The Engineering Enterprise
Location: Auburn, Calif.
Age: 29; **Years on the Job:** 6
Interests: Road trips, international travel, exploring outside, hiking, and caving.

In high school, Jacob Egorov was part of a FIRST Robotics team, which got him interested in engineering. He earned his bachelor's and master's degrees in electrical engineering from Cal Poly-San Luis Obispo, and during the summers, he interned with construction companies in the oil and gas and solar industries.

Now, as an engineer and project manager, he is continuing to learn the different codes and latest construction methods and studying for credentials such as the LEED AP. Most of his time is spent managing projects, attending meetings, and updating the plan sets for each project.

"My responsibilities involve managing entire projects," he says. "When I first started, I was only helping out with parts of a project — now I do everything."

His company is working on a multitude of projects at the UC Davis Medical Center, including two parking garages and renovations to the Cancer Center. He is also managing the design of several projects for Placer County.

"One of the challenges is when there are multiple project deadlines at the same time, but that makes it more rewarding to complete," he says.

Egorov says it is important to keep up with the latest technology used by design teams to be as helpful as possible to the architect and general project manager.

"Our goal is to be able to work seamlessly with the rest of the team," he says. "Internally we are creating tools in a software to automate any repetitive tasks. This reduces the possibility of errors in addition to saving us time on the drafting and design side."

Jacob Egorov says to be successful in the industry, it's important to have an eagerness to continue learning about different specializations and be able to self-learn and stay organized.

In five years, he would like to still be managing projects and working in electrical engineering but become more of an expert at each subfield. He would also like to continue to build relationships with electrical/general contractors and expand the design-build projects performed by his company.

"I am very happy I chose the construction industry as a career for an electrical engineer," he says. "I highly recommend that other electrical engineers currently in school consider this field, and I think it should be given more exposure at universities."

EC&M ALL STARS 2022 UNDER 30

CHRIS ELY

Job Title: Northern California Service Technician
Company: Photovoltaics California
Location: Pleasanton, Calif.
Age: 26; **Years on the Job:** 3
Interests: Enjoys painting/art, traveling with friends for snowboarding or camping trips, and working on cars with friends and family

Chris Ely has always had a love for working with his hands and tools. With a mechanical and construction background, the electrical industry was a natural fit.

Chris Ely's training under certified electricians and classes has prepared him for field troubleshooting and leadership in team settings.

"I attempted traditional education and college, but I was unhappy and decided to make a change," says Ely, who was born in Washington and raised in California.

Ely, who is currently enrolled in WECA, is completing a five-year apprenticeship program with his company, Photovoltaics California, and pursuing his journeyman's license.

Ely says he takes pride in safety, learning, and teaching others what he knows about electrical, communications, and commercial solar operations and maintenance. In the solar industry, he says equipment is quickly becoming obsolete.

"I am constantly working on unfamiliar or new equipment that I have to research and learn," he says. "I am helping this company by doing back-end research. It helps my career and our company grow and develop."

During a typical day as a field service technician, Ely performs electrical and communication troubleshooting, works directly with clients, management, and manufacturers, and services sites in Northern California.

"My favorite part of my role is the appreciation and respect I get from clients and management when service calls and projects go smoothly and under budget," he says.

He is currently closing out and working on a portfolio of commercial rooftop systems across California. In five to 10 years, he plans to work in management for a commercial solar O&M provider or pursue his C10 contractor license and starting a small contracting company with a few employees.

"I take pride in my work and skillset, and I look forward to all future projects I will be a part of," Ely says.

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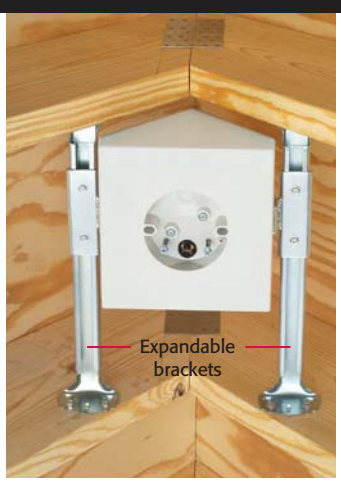
Position box between framing members by sliding it along the expandable brackets



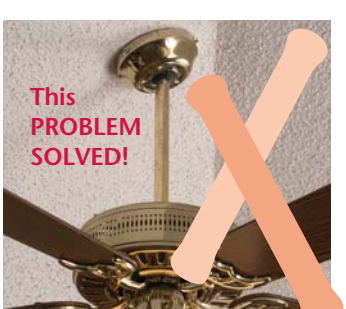
Get a centered, safe installation with Arlington's one-piece FBX900 Fan and Fixture Box. *Save time and money too.*

FBX900 has expandable brackets that mount securely between joists, eliminating the need to cut and nail 2X4s to center a fan or fixture in the room.

- Self-contained – No loose parts
- Supplied template levels, positions bracket between rafters
- Fits cathedral ceilings with angles greater than 80°
- Large, 8" square mounting surface handles fans with large canopies

UL Ratings
FBX900 Fan/Fixture: 70 lbs
FB900 Fan: 70 lbs, Fixture: 200 lbs

Use FB900 to install a fan/fixture box *next to a rafter*



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Product info aifittings.com/landing/fb900-series

Taylor Groves says as a younger employee, it's important to be confident in yourself, but never underappreciate advice.

TAYLOR GROVES

Job Title: Project Manager
Company: Stansell Electric Co.
Location: Knoxville, Tenn.
Age: 27; **Years on the Job:** 4
Interests: Mountain biking on local trails with his wife, traveling with their dog in a camper van in the mountains, and spending time with his friends and family, especially his nieces and nephew

Born in a rural town north of Nashville, Taylor Groves remembers seeing his father go to work for the local power utility company.

"As a child, I spent a lot of time with him around the shop getting to experience the camaraderie and hard work involved with working in the trades," he says.

Groves studied business at Pellissippi State Tech and Community College to learn management and job cost accounting. He then started his career after college by working for Hodges Group, a general contractor.

When working on a project in Nashville, he discovered Stansell Electric, and he and his wife decided to move back to Knoxville, Tenn., where he joined the company's east Tennessee division as a project manager.

"I very quickly fell in love with the role we play as the electrical contractor in the large roadway and bridge builds," he says.

As a project manager, the majority of his duties are completed in the office, but he also spends time with the field crews in the shop. He works on monthly project cost projections, purchasing, and billing, as well as strategizing future work. He also tries to be on site when major activities are taking place.

His company is currently working on a widening and revitalization project between Knoxville and the Great Smoky Mountains and a job to add or replace dynamic message sign boards along Tennessee's major interstates.

"The majority of our work is here in Knoxville, and I love building my community," he says. "Driving around town and seeing projects that we've worked on that make life safer and easier for people is super fulfilling."

In the future, he plans to help his company grow and expand into new areas.

"Hopefully, I will be able to mentor a future leader and help them to succeed," he says. "I plan to reach these goals by giving my best every day, being positive, and treating people the right way."

EC&M ALL STARS
2022 UNDER 30

RAYKEION HYLTON

Job Title: Principal Owner
Company: Hylton Electric LLC
Location: Lakeland, Fla.
Age: 24; **Years on the Job:** 6
Interests: Religion, researching/reading, meditation, watching sports, trying out new restaurants/lounges, and working on his local start-up non-profit foundation

From an early age, Raykeion Hylton has had an interest in the trades and a goal of starting his own business.

"I chose electrical because it is a very technical trade, and I wanted a career that would challenge me mentally," he says.

Born and raised in Polk County, Fla., Hylton started off in the electrical industry as an electrician helper. After earning his electrical training certificate from Penn Foster College, he took a prep class at the Contractor's Institute and passed his state electrical contractor's license test on the first attempt.

"All of my training helped me become a safety-oriented master electrician, but it did not prepare me for running my electrical business," Hylton says. "I attend conferences and seminars, conduct research, network with other business owners, and learn from mentors who own million-dollar businesses."

When he started his business, he worked as a one-man crew and did all the physical labor in the field himself. Today, as the principal owner, he focuses mainly on managing and growing his business. His first hire was in January 2022, and at the end of May, the company has grown from zero to six employees.

His company is currently working on replacing all of the main panels in the apartment complex at Swan Cove Apartments in Lakeland, Fla. He says all his company's daily operations are done using technology.

"Technology is very important for today's electrical firms, and companies should not shy away from it because it makes everybody's jobs easier, saves time, and makes the company more profitable," he says.

In five to 10 years, he sees himself out of the daily operations of managing the business but continuing to see it grow.

"I see the business able to run without me being involved, having between 50 to 100-plus employees, and the gross sales exceeding $100 million," he says.

As a business owner, Raykeion Hylton reviews estimates, follows up with clients, visits job sites, and looks over billing and payments.

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FLUSH TO FLOOR INSTALLATION

Nickel **FLBR101NL**
Brass **FLBR101MB**

Brown **FLBR101BR**

Non-Metallic covers in FOUR COLORS

Brass **FLBRF101MB**
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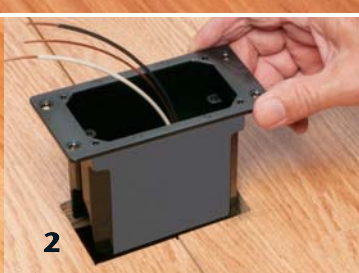
EASY TO INSTALL!

1



2

3

4

UL LISTED FLOOR BOXES... the low cost way to install a receptacle flush in an EXISTING FLOOR

WHITE
FLBRF101W
ASSEMBLED

BLACK
FLBRF101BL

LIGHT ALMOND
FLBRF101LA

BROWN **FLBRF101BR**
KIT COMPONENTS

- Oversized rectangular covers hide miscut flooring; gaskets prevent water intrusion; **threaded plugs or flip lids** protect box when it's not in use
- **Rectangular Covers**
  Non-Metallic
  White, light almond, brown, black
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Emmanuel Isidro enjoys his job so much that he sees it almost more like a hobby.

EMMANUEL ISIDRO

Job Title: Foreman
Company: Spectra Electrical Services
Location: Tempe, Ariz.
Age: 28; **Years on the Job:** 5
Interests: Restoring his classic vehicles and going out of the city to a quiet campground to enjoy life

Born in Testistan, Jalisco, Mexico, Emmanuel Isidro came to the United States at the age of four years old. During his childhood in Phoenix, he went on jobs with his dad.

"He was a handyman, and he worked in all the trades," Isidro says. "I got a chance to try out each trade, and out of all the trades, I enjoyed working on electrical. I was amazed about how everything depends on electricity, and I thought it will be a trade that will always be needed."

Isidro completed his four-year electrical apprenticeship program at Gateway Community College and graduated in 2018. He says the apprenticeship taught him everything he would not have learned in the trade.

"It's easy to learn all the physical work, but there is more to the trade," he says. "I learned how to do all the calculations for any situation."

Every day, he learns new ways to make his job easier and never stops learning. He says determination sets him apart from other young professionals.

"If you have determination, work hard, and show your hard work, it will grab the attention of important people who will help you to succeed," he says.

As a field supervisor, he reviews prints, supervises the crew, and ensures everything is installed in the correct location. He also instructs the employees on what work needs to be done. Currently, he is working on a large data center and helping the company finish all the jobs on time. He says technology plays a role in the project completion.

"I think technology has come a long way and has changed the way jobs are done," he says. "It's easier to have everything readily accessible in your hands to accomplish the job."

In the future, he sees himself traveling with his son to enjoy life outside of work.

"I will be working in the same trade," he says. "I enjoy doing electrical, so I would never want to switch trades."

MATT JASINSKI

Job Title: Project Supervisor
Company: Interstate Electrical Services Corp.
Location: Billerica, Mass.
Age: 29; **Years on the Job:** 11
Interests: Hiking and coaching soccer

Inspired by his stepfather, who worked as a carpenter, Matt Jasinski also wanted to pursue a career in the carpentry trade. His stepfather, however, told him that he could teach him carpentry on the side.

"He said to try electrical, and I was hooked," he says.

Born and raised in Methuen, Mass., he attended Greater Lawrence Tech in Andover, Mass., where he studied the electrical trade. At 19 years old, Jasinski started his electrical apprenticeship at Interstate Electrical Services. With his dedication and work ethic, he advanced to his current role of project supervisor.

"I'd say the most challenging part of my role is usually the project finish date," he says. "The owners always want the project done sooner than the end date."

After receiving his license, Jasinski worked with the Interstate Legacy Group of seasoned electricians who have been with the company 30 to 40 years. He leveraged their mentoring to enhance his skills and expand his goals.

"I wouldn't be where I am today without participating in Interstate's Legacy Group," he says.

On design-build life sciences projects, which is one of the fastest-growing sectors in the state, Jasinski is involved with managing the projects and working with the team to successfully deliver projects on-time and on-budget. For example, his most recent project was a $1.7-million contract for BE Biopharma, in which 14% of the total hours on the job were done in prefabrication assemblies.

Early on in his career, he learned how to use the company's prefabrication facility to support his projects and meet demanding schedules.

"Prefabrication in the electrical trade is a tremendous asset in helping me to increase my team's efficiency," he says. "I enjoy managing every part of the job, from lighting to power to fire alarm to distribution."

Matt Jasinski's dedication and work ethic has contributed to his rapid climb at Interstate.

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Fully assembled, **SNAP²IT®** fittings **handle the widest variety of MC cable *AND THE NEW MC-PCS cables.***

Compared to fittings with a locknut and screw, you can't beat these snap in connectors for time-savings!

- **Fits widest range and variety of MC cable** 14/2 to 3/3 AC, MC, HCF, MC continuous corrugated aluminum cable and MCI-A cables (steel and aluminum)...*including the new MC-PCS cable that combines power and low voltage in the same MC cable*

  ANY Snap2It Connectors LISTED for MC cable are also LISTED for MC-PCS cable! *These products offer the greatest time-savings.*
- **Fast, secure snap-on installation**
- **Easy to remove, reusable connector**
  From cable Loosen screw on top. Remove connector from cable.
  From box Slip screwdriver under notch in Snap-Tite® ring. Twist. Remove connector.

CATALOG NUMBER	DESCRIPTION Snap2It® connectors	CABLE OUTSIDE DIA (OD)
4010AST	Snap in, 1/2" KO w insulated throat	.405 to .610
5010AST	Snap in, 1/2" KO w insulated throat	.580 to .780
505010AST	Duplex Snap in, 3/4" KO w insulated throat	(2) .590 to .820
4110ST	Snap in, 1/2" KO	.525 to .705
414110ST	Duplex Snap in, 1/2" KO	(2) .525 to .640
NEW! **4141107ST**	Duplex Snap in, 3/4" KO	(2) .525 to .690

Easy to Snap into Box!

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Product info aifittings.com/landing/snap2it-mc-cable-connectors

GEORGE KAROLIDIS

Job Title: Senior Project Manager
Company: E-J Electric Installation Co.
Location: Whitestone, N.Y.
Age: 30; **Years on the Job:** 10
Interests: Spending time with his family and gardening

As an NYU electrical engineering student, George Karolidis stopped at the E-J Electric booth at a career fair, which changed the course of his career.

"I was interested in the high profile and complexity of the projects, and E-J gave me a tremendous opportunity at a very young age," says Karolidis, who was born and raised in Queens, N.Y.

Karolidis, a licensed professional engineer in the state of New York, earned his bachelor's degree in electrical engineering and his master's degree in construction management. While schooling taught him the basics, much of his training came from on-the-job experience.

"Working with some of the most seasoned managers, project managers, and foremen in New York truly gave me the conditioning needed to build in the city that never sleeps," he says.

Electrical construction is complicated and detailed, and it can only be truly understood with rolling up your sleeves and digging in, he says.

"To succeed in this industry today, you must be hungry, humble, eager to learn, coachable, and learn to roll with the punches," he says.

As a senior project manager, he makes sure the field workforce has the proper tools, material, and layout to be successful on the job. His favorite part is completing the work and overcoming obstacles in the field.

"No matter how good everything may look on paper and in the 3D model, turning that into reality has its challenges, whether it's coordinating with other trades, sequencing the work, planning from start to finish, or remaining on budget," he says.

In the future, he sees himself managing a group of project managers and multiple projects.

"I plan to continue to learn about the trade, work on my people skills, build people up who work with me, and continue to find ways to improve processes," he says.

George Karolidis is currently working on Perelman Performing Arts Center at the World Trade Center, the Frick Collection renovation and expansion, and the Vessel + Hudson Yards Plaza in Midtown New York City.

EC&M ALL STARS 2022 UNDER 30

HUNTER KERBOW

Job Title: Lead Journeyman
Company: Faith Technologies, Inc.
Location: Kansas City, Kan.
Age: 24; **Years on the Job:** 4
Interests: Working out at the YMCA, playing sports, and spending quality time with friends

Hunter Kerbow and his college roommate both worked on a farm before making a jump to the electrical trade. One summer, his friend started working for Faith Technologies, and he encouraged Kerbow to apply.

"He knew I liked to work with my hands and learn new skills," Kerbow says. "I liked the idea of being paid to take classes. It sounded like the perfect option to me as someone who didn't have a clear direction on what I wanted out of college."

Born in Liberal, Kan., and raised in Hugoton, Kerbow started his four-year apprenticeship in Kansas City through Faith Technologies. He graduated from his apprenticeship in October 2021 and passed his Kansas journeyman exam in March 2022. Kerbow took a Code prep class to prepare for his first journeyman license in Kansas, and he is now planning to take the Oklahoma journeyman test. He said his desire to learn as much as he can about the trade sets him apart from other young electricians.

"It's easy to get stuck in the day-to-day activities, so I'm always trying to take on a new challenge and seek out in-depth information from more experienced leads," he says. "I've always found my job more enjoyable when I'm allowed to be independent. To do that, I must continuously try to exceed what is expected of me."

For the last 10 months, Kerbow has been in charge of lighting installs and lighting controls on a seven-story hospital project in North Dakota. On this job, he is teaching the apprentices about quality expectations, standard workplace practices, and how to meet electrical codes. In the next five years, he strives to run a project successfully by staying driven and asking questions.

"As I take on more responsibility in leadership roles, I will have to continuously step up my game and take the initiative in the best possible way," he says.

Hunter Kerbow has worked on hospital, data center, warehouse, and food production projects since he started working with Faith Technologies.

PHOTOVOLTAIC

NEW CABLE CONNECTORS

CONNECTS, PROTECTS MULTIPLE PV1000 CABLES

Arlington's non-metallic NMPV series photovoltaic cable connectors are ideal for solar, and other jobs, requiring the connection of multiple cables into raceways, fittings, and combiner or junction boxes. This connector series is perfect for PV1000 cable.

NO Sealant Required. *No need to seal off raceway where wires exit fitting.* Grommet (included) seals and separates wires and prevents moisture, debris and insects from entering the raceway.

- **For PV1000 and other cables** from .245 to .280
- 3/4" **NMPV753** holds up to 3 cables...
  1" **NMPV1005** holds up to 5...
  1-1/4" **NMPV1257** holds up to 7

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Product info aifittings.com/landing/nmpv

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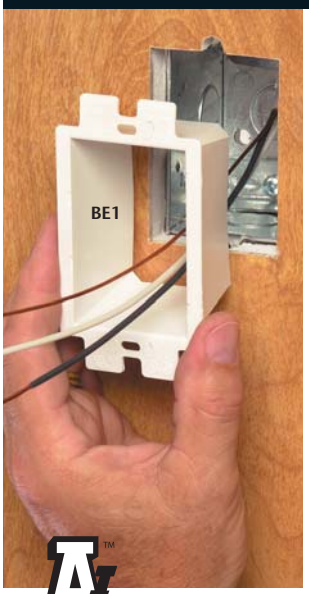
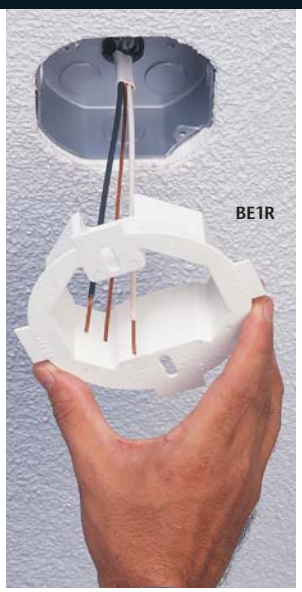
BOX EXTENDERS

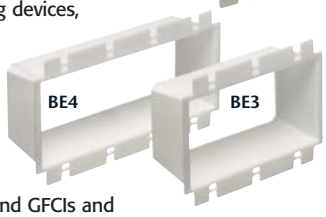
EXTENDS SET BACK BOXES UP TO 1-1/2 INCHES





Arlington's **UL/CSA Listed** Box Extenders extend set back electrical boxes up to 1-1/2".

Made of heavy-duty, non-conductive plastic, they level and support wiring devices, protecting wires against damage and stripping.



BE1R for round or octagonal boxes, the single-gang (BE1), two-gang (BE2) for all standard devices, switches and GFCIs and **three- and four-gang box extenders for multiple gang boxes!**

*Try them all, including our **'Larger Flange' one-, two-, three- and four-gang styles**, for the safe, easy way to obtain Listed installations in set back boxes!*

Larger Flanges

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Trent Kincaid says what sets him apart from other young electrical professionals is his dedication to the company and his willingness to learn new installation techniques and incorporate new industry technology.

TRENT KINCAID

Job Title: Journeyman Electrician
Company: Edgewood Electric, Inc.
Location: Edgewood, Ky.
Age: 23; **Years on the Job:** 4
Interests: Relaxing with friends and family, golfing, fishing, and watching the Cincinnati Bengals

Trent Kincaid enrolled in a traditional college to play NCAA baseball, but once he started his classes, he realized college was not the best route for him. He was then introduced by his friends to an electrical contracting company — Edgewood Electric — where he now works as a journeyman electrician.

Once he got hired on with the company, he enrolled in the four-year apprenticeship program: Edgewood University. He completed the four-year program in June 2022.

"When I first came into the electrical trade, I was fortunate to work with some experienced electricians who taught me various installation techniques that I still use every day," he says. "I'm appreciative of all the older electricians who I have worked with to get me to this point in my career."

Once he completes his apprenticeship program, he intends on taking some review courses to prepare to take the Kentucky journeyman electrician exam. As a building electrician, he organizes and stages materials and assists the foreman and superintendent with various tasks. Kincaid also enjoys working with the younger and newer electricians.

"I like to show them things I have learned and help them grow in the electrical trade as well," he says.

For the last year, he has been working on a high-profile project in Dayton, Ohio. On this job, he installed underground feeder conduits, oversaw the building lighting, and assisted with office rough-in and trim-out.

In the future, he would like to become a master electrician by continuing with his education in the trade and his on-the-job training to pursue a superintendent position.

"I would like to thank all the guys who have gotten me to this point in my career, and I look forward to working at Edgewood Electric for a long time," he says.

EC&M ALL STARS 2022 UNDER 30

CODY KRSTONICH

Job Title: Commissioning Safety Manager
Company: M.C. Dean
Location: Boydton, Va.
Age: 25
Years on the Job: 3
Interests: Playing ice hockey, hunting, fishing, and spending time outside

Working in the health and safety industry has always interested Cody Krstonich. When he had his first internship with M.C. Dean, he was immediately drawn to electrical work.

Born in Pittsburgh, Krstonich earned his bachelor's degree in safety management from Slippery Rock University. He will soon achieve the status of a Certified Electrical Safety Compliance Professional. Currently, he's pursuing an electrical engineering degree in electric power and energy systems from Arizona State University as well.

Krstonich, a participant of the IEEE Electrical Safety Workshop and member of the OHS committee, has taken courses in low-voltage and high-voltage work and electrical safety. He has also spent extensive time with electrical engineers and field technicians during testing and commissioning activities.

"Engaging field technicians and engineers to gain an understanding of electrical testing on the job allows us to integrate safety processes with testing procedures," he says.

As a commissioning safety manager, he attends meetings with commissioning teams to discuss hazards, mitigation techniques, and safety practices and spends time in the field to assess energy isolation activities and near energized work scenarios.

"I enjoy developing solutions for complex problems and working with complex electrical systems," he says.

In the future, he would like to lead a group of safety professionals, creating a market for electrical safety professionals and building programs for engineers and technicians.

"It's an honor being selected to this prestigious group of electrical industry professionals," he says. "I will use this platform to connect with safety professionals and to help improve the field of electrical safety."

To expand his knowledge, Krstonich has worked to develop a broad network with skilled individuals on the job.

LOW COST • ZINC

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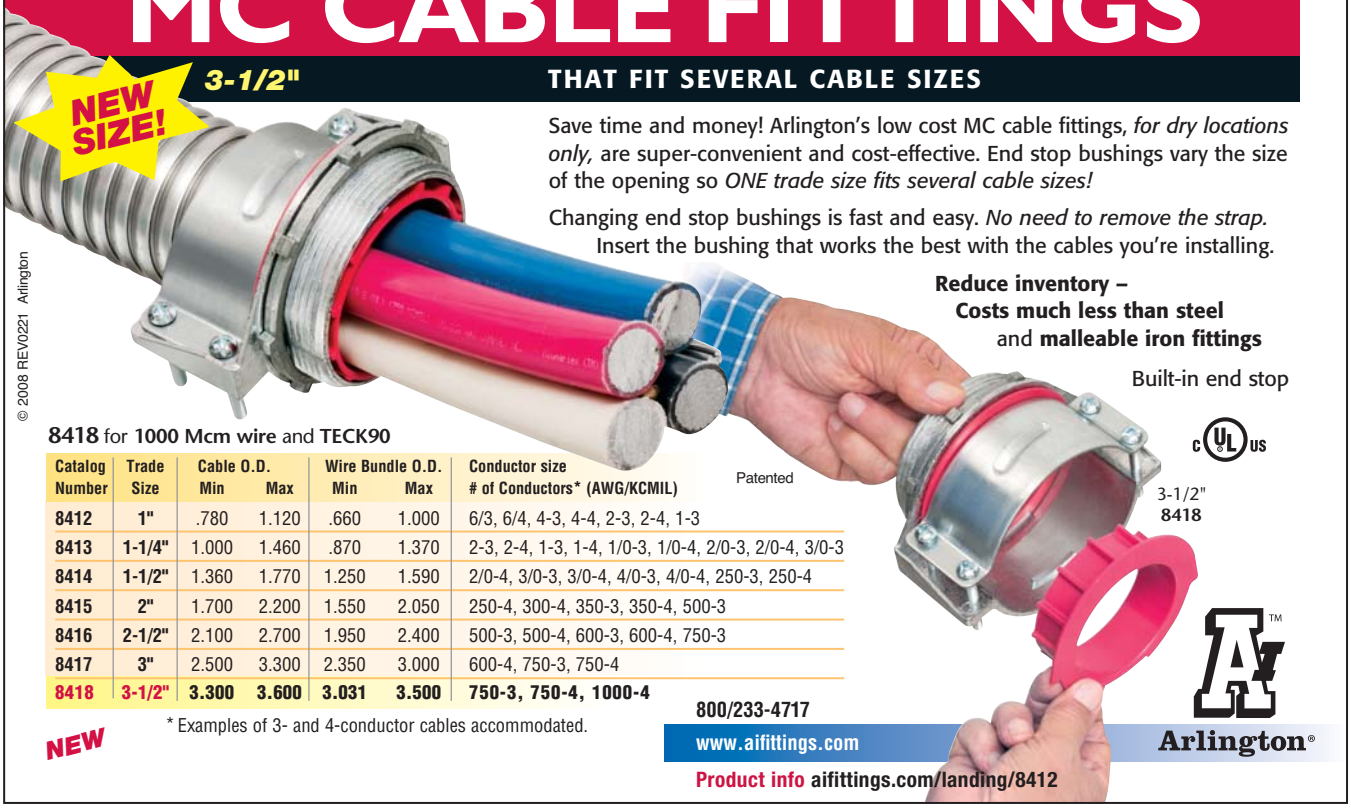
MC CABLE FITTINGS

NEW SIZE! 3-1/2"

THAT FIT SEVERAL CABLE SIZES



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Changing end stop bushings is fast and easy. *No need to remove the strap.* Insert the bushing that works the best with the cables you're installing.

Reduce inventory –
Costs much less than steel
and **malleable iron fittings**

Built-in end stop

Patented

3-1/2"
8418

8418 for **1000 Mcm wire** and **TECK90**

Catalog Number	Trade Size	Cable O.D. Min	Cable O.D. Max	Wire Bundle O.D. Min	Wire Bundle O.D. Max	Conductor size # of Conductors* (AWG/KCMIL)
8412	1"	.780	1.120	.660	1.000	6/3, 6/4, 4-3, 4-4, 2-3, 2-4, 1-3
8413	1-1/4"	1.000	1.460	.870	1.370	2-3, 2-4, 1-3, 1-4, 1/0-3, 1/0-4, 2/0-3, 2/0-4, 3/0-3
8414	1-1/2"	1.360	1.770	1.250	1.590	2/0-4, 3/0-3, 3/0-4, 4/0-3, 4/0-4, 250-3, 250-4
8415	2"	1.700	2.200	1.550	2.050	250-4, 300-4, 350-3, 350-4, 500-3
8416	2-1/2"	2.100	2.700	1.950	2.400	500-3, 500-4, 600-3, 600-4, 750-3
8417	3"	2.500	3.300	2.350	3.000	600-4, 750-3, 750-4
8418	**3-1/2"**	**3.300**	**3.600**	**3.031**	**3.500**	**750-3, 750-4, 1000-4**

NEW

* Examples of 3- and 4-conductor cables accommodated.

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Product info aifittings.com/landing/8412

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THE LOW COST BOX...WITH ADJUSTABLE STEEL BRACKET AND *PLASTIC* BOX

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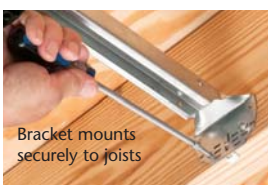
FBR423
Patented

- Easy mounting in new construction... fan bracket installation screws ship captive
- Bracket ends adjust for flush installation on ceilings up to 1-1/4" thick. They're pre-set for a 1/2" ceiling. Bend along score line for other ceiling depths.

- 23.0 cu. in. plastic box is positionable anywhere along bracket
- UL/CSA Listed

* **2-HOUR FIRE RATING**



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Product info aifittings.com/landing/fbr423

In his role as a journeyman and foreman, Jonathan Lotycz is currently finishing up jobs at Kraft Heinz and JM Milan, a roof manufacturing company.

JONATHAN LOTYCZ

Job Title: Journeyman and Foreman
Company: Industrial Power Systems
Location: Rossford, Ohio
Age: 26; **Years on the Job:** 7
Interests: Traveling to the Upper Pennisula in Michigan to ride his snowmobile, having fun with his family, riding a jet ski, and spending time outdoors

While working on his dad's new house and wiring luminaires in the basement, John Lotcyz's uncle introduced him to the trade. He then attended the Tiffin Trade School for electrical trades and participated in Sentinal Team Works, which competed and won top awards in the state and national competitions.

After his high school graduation, he continued his education in the electrical field at a non-union shop. He was then accepted into the union and recently wrapped up a five-year apprenticeship.

As a general foreman, he starts out every work day by ensuring he has the proper safety paperwork and his workers have the correct PPE. He then outlines the tasks for the day, but he says he is open-minded to other ways to get the job done.

"There are multiple ways to do every single task, and we are always looking for the easiest and cheapest ways to complete a quality install, especially with the price of everything nowadays," he says.

In his role, he said communication is the most challenging part of the job, followed by computer skills. While he said he has never been a tech-savvy person, he is learning a lot about computers in his role and is always looking for new tools.

"I am a firm believer in the right tool for the right job, so if there is a new tool that I see in the industry that will make the job go faster, I see if we can get it," he says.

Ten years down the road, he would like to have five rental properties, a dream house, and be married with two kids. To reach these goals, he plans to work even outside of working hours.

"You're not going to hit your goals if you're working 40 hours a week," he says. "When you get tired, you keep pushing through. If you get that little more done, then you can then be that much closer to your goals in life."

EC&M ALL STARS 2022 UNDER 30

LEVI MCBRIDE

Job Title: Electrician
Company: McBride-Owens, Inc.
Location: Clemmons, N.C.
Age: 18; **Years on the Job:** 1
Interests: Riding UTV side-by-sides on the trails in West Virginia, camping, fishing, and spending time with his girlfriend and his family

When he was very young, Levi McBride remembers his dad, Scott, starting an electrical company with his friend, Jody Owens.

"I grew up around people who worked in the electrical trade my whole life," he says. "Watching my dad build a successful business in this field makes me have more drive and determination to succeed and see how this company grows in the future."

Born in Lexington, N.C., McBride said he is fortunate to learn on the job with his dad as his instructor along with his team members, who have years of experience in the industry.

"I learn new things about the industry every day, and I am excited to continue doing that," he says. "Having on-the-job training is the best way to prepare for all the things that can go wrong on the job site."

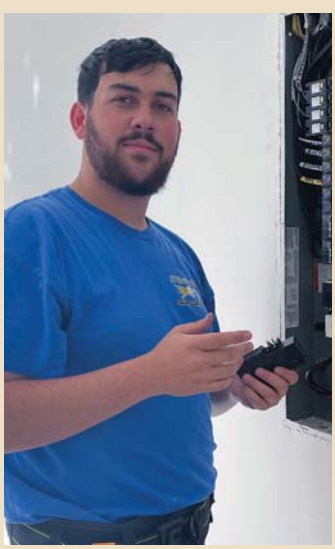
His company typically wires 125 to 150 new construction homes a year along with everyday service calls. Currently, as a residential crew leader, he performs jobs such as doing a rough-in on a new construction home, performing trim-out work, or setting temporary power poles.

Over the course of his career, he moved from a "green helper" to running a van of his own with a helper. In this role, he ensures his team members on site are working safely, have the materials they need, and are completing assignments in a timely manner. One of the favorite parts of his job, however, is to operate the heavy machinery equipment.

"I'm always glad to take a large piece of equipment down the road and dig ditches, move dirt, and install the primary electrical conduit from the power company to the building underground," he says. "Success in this industry comes with getting dirty and working hard."

Down the road, he plans to become a licensed electrical contractor and continue to provide electrical service to homeowners and general contractors.

"I definitely see myself continuing on this career path in the electrical field," he says.



To reach his goals, Levi McBride always does his best on job sites and seeks advice/direction from experienced professionals in the trade.

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Arlington's **8141F** and **8081F** boxes deliver the fastest, easiest way to install light fixtures and receptacles on siding. *Good looks. Smooth vertical mounting!*

- Easy to install one or two-piece styles for any siding type
- NM cable connector included
- UV rated for long outdoor use
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from ***OUTSIDE*** *a* ***New Work Box...***

Save money with Arlington's non-metallic NM cable connectors – the *lowest cost* NM cable connectors on the market – and the fastest to install! Easy push-in installation...

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NM94X... BETTER than our popular NM94 AT THE SAME PRICE!

- 1/2" trade size NM94X holds:
  (1) 14/2 to 6/2, (1) 14/2/2, (1) 12/4,
  (1) 12/2/2, (1) 14/3 to 10/3,
  (2) 14/2 to 10/2, (2) 14/3,
  (2) 12/3,
  (1) 14/2 and (1) 12/2,
  (1) 14/2 and (1) 10/2,
  (1) 12/2 and (1) 10/2

NM94X

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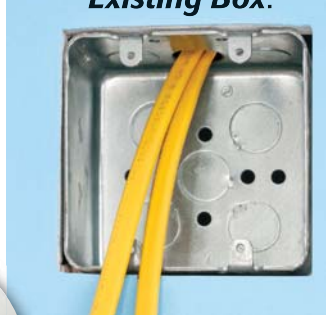
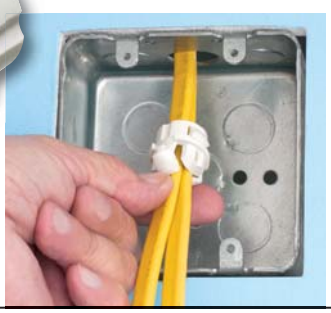
- **Easy** removal with pliers or screwdriver
- **Listed.** Exceeds UL/CSA pullout requirements

or ***INSIDE*** *an* ***Existing Box.***





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Product info aifittings.com/landing/NM94X

Richard McCrae helps to design, build, and commission all the panels that come out of his company's shop.

RICHARD MCCRAE

Job Title: Panel Shop Coordinator/ Electrical Systems Technician
Company: R.H. McRae Electrical Contractors, Inc.
Location: Rockingham, N.C.
Age: 25; **Years on the Job:** 5
Interests: Hunting, fishing, and spending time at the beach

Richard McCrae's dad has been in business for 33 years. To get his start in the industry, he began working for him when he was 20 years old.

After studying mechatronics engineering at Richmond Community College, he obtained six years of experience in the field. He is now the UL 508A manufacturer's technical representative for R.H. McRae Electrical Contractors, Inc.

"With my dad already in the industry, I decided to study mechantronics. After learning about PLCs and process controls, I quickly found that I had a love for industrial automation and industrial control panels," he says.

McCrae is currently taking a three-month course to study for his unlimited electrical contractor's license in North Carolina. He says he takes pride in his work and does not believe in cutting corners.

"I believe it's the little things that matter most. In my panel shop, it's about quality, not quantity," he says. "If you want to succeed, you have to care about your work, and always look for opportunities to get better."

At his company, he manages the panel shop and designs the control panels built using AutoCAD. In addition, he designs the PLC and HMI applications.

His company is currently designing a box delivery system for National Beef in Liberal, Kan., with its partner, D&F Equipment. The company is also building all control panels for a new turkey plant in South Carolina. While working on these new projects, technology plays an important role, he says.

"We always take the time to study new technology and stay on top of the constantly changing technology," he says. "We make sure to keep our software up to date and look at new products."

His company started the UL shop three years ago, and in the first year, built about two panels. This year, his company has sold more than 25 control panels for the largest food producers in the world.

EC&M ALL STARS 2022 UNDER 30

TYLER MIZE

Job Title: Group Leader and Senior Electrical Engineer
Company: Mason & Hanger
Location: Lexington, Ky.
Age: 30; **Years on the Job:** 8
Interests: Spending time with his four-year-old son and baby daughter, making BBQ, and playing drums in his church's worship band

As a student at the University of Kentucky, Tyler Mize built electrical control systems for a small manufacturing company, which fueled an interest in electrical engineering. During his senior year, he served as an intern with Mason & Hanger, where he currently serves as an electrical engineer.

"In the electrical design industry, every project is different, and the only constant is change," says Mize, a licensed professional engineer in Kentucky and Tennessee. "This makes for a very exciting and challenging career, which I find very rewarding."

Mize leads a team of five members, ranging from engineers to design professionals to interns. He serves as the discipline lead for projects in his company's military and international markets. As the engineer of record for the electrical and telecommunications systems for secure, mission-driven facilities, he is responsible for the plans, specifications, and engineering calculations.

Currently, he is serving as the engineer of record on several projects around the globe in the International Programs market. Stateside, he serves as the engineer of record for multiple projects for the Army and Air Force. In his role, he says technology is critical for designing electrical and telecommunications systems. He helps to vet and implement new modeling and calculation technology for the electrical department.

"Mason & Hanger was an early adopter of BIM and CIM modeling for our clients, and we seek to continually improve our expertise in these areas," he says.

In five to 10 years, he plans to continue to train and mentor other electrical engineers and designers at Mason & Hanger.

"I plan to still be contributing to the success of others at Mason & Hanger, fostering the next generation of innovation through individual growth and an increased deliverable quality to our clients," he says.

From the adoption and implementation of changing electrical technologies to working with clients in varied markets, Tyler Mize says he is always learning something new at Mason & Hanger.

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PUSH-ON CONNECTORS

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PUSH ON installation

17 seconds per connector

VS

Conventional installation

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Arlington's push-on connectors offer the fastest, easiest way to install non-metallic liquid-tight conduit, type B.

Our one-piece connectors reduce labor steps and eliminate lost pieces. They ship fully assembled with no disassembly needed – and are removable and reusable.

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*at $30.00/hour labor rate

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Catalog Number	Trade Size	Straight	90°
NMLT5	1/2"	✔	
NMLT905	1/2"		✔
NMLT7	3/4"	✔	
NMLT907	3/4"		✔
NMLT10	1"	✔	
NMLT9010	1"		✔
NMLT12	1-1/4"	✔	
NMLT9012	1-1/4"		✔
NMLT15	1-1/2"	✔	
NMLT9015	1-1/2"		✔
NMLT20	2"	✔	
NMLT9020	2"		✔

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According to his nominator for the 30 Under 30, David Mulder works beyond the standard to deliver service that exceeds expectations.

DAVID MULDER

Job Title: Project Manager
Company: Sprig Electric
Location: San Jose, Calif.
Age: 27; **Years on the Job:** 5
Interests: Embracing new opportunities, working on fast-paced projects, and having the opportunity to learn

While studying construction management at Cal Poly, David Mulder stumbled across opportunities in the electrical industry. By talking to his brother, Kent Beecham, who is also in the electrical industry, Mulder decided to pursue a career in the trade.

Born in Atascadero, Calif., he has gained experience in the electrical industry through experience and learning by doing. He is continuing his training by growing his experiences and opportunities.

"As a lifelong student, I try to find learning opportunities in every situation I am involved in," Mulder says. "I really want to thank all the people who have supported me in this journey — from loved ones to friends and mentors. I appreciate all the time and effort they have invested in me."

As a project manager, he spends his work days managing projects and visiting job sites. Since he first started at Sprig Electric, his responsibilities have changed from managing small portions of a project to managing multiple projects.

In today's electrical industry, he says bringing new opportunities to the table in a fast-changing environment can be a challenge. As he manages tech, data center, and research/development projects, however, he enjoys the chance to keep learning.

"I just come in and enjoy my job," he says. "To succeed, have fun, and enjoy the people you work with."

He says in his job, technology can be a double-sided sword.

"New technology is great and can be a very useful tool," he says. "Being too involved in the technology side can also be harmful. This is an industry built on labor — not tech."

In five years, he hopes to gain experience in skillset, but not lose his passion or current mindset.

"I will do whatever it takes to reach my future goals," he says.

JAKE POWERS

Job Title: Finance and Operations Director
Company: Streib Company
Location: St. Louis
Age: 26; **Years on the Job:** 4
Interests: Hanging out with friends and family, dirt bike riding, water sports, boating, and golfing

St. Louis-born-and-raised Jake Powers learned about the job opportunities at Streib Company through a family friend. After earning his bachelor's degree in business and administration from the University of Missouri-Columbia, he joined the company, where he has learned about the industry on the job.

As the finance and operations director, he meets with individual departments to review metrics, issues, and procedures. He also investigates and resolves issues and works on specific projects to discover better, more efficient, and easier processes for the company. His key responsibilities include financial management, developing and monitoring critical KPIs, logistical and warehouse management, and reviewing and identifying technology and software needs.

"There never seems to be a dull day here at Streib Company," he says. "We are currently in the juggle between being a small business and excelling to the next level. It continues to push me in ways I would have never imagined and allows me to grow both professionally and personally."

The company is currently in the process of reviewing and evolving key metrics company-wide to ensure the customers, employees, and company are successful. By using technology, the employees can ensure they are communicating effectively.

"Using the right tools at the right time allows us to gain insight on our projects and operations to identify potential issues before they arise," he says.

Over the past four years working with Streib Company, his company has seen significant growth and continued opportunities for employees and customers with no sign of slowing down. He said he is excited to see what the future holds.

"The vision of the company has been apparent from the first day I started with Streib Company, and it was extremely easy to get on board," he says. "Due to the vision and endless opportunities, I see myself continuing to be an integral part of the operation and assisting to develop careers for young individuals like myself."

Jake Powers believes creating and following a set of core values to base decisions on is critical to drive success.

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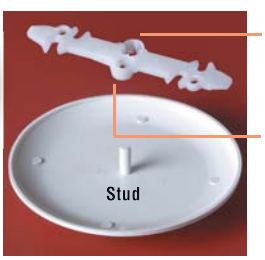
Versatile bracket design with 'A' and 'B' openings for use on flat or uneven ceilings.

Versatile Bracket Design

Easy installation. Attach the bracket to the box with #8 or #10 screws. Back the screws out enough to slip the bracket on.



'A' for flat ceilings
Push stud into opening to seat cover

'B' for uneven or textured ceilings
Thread stud into opening until tight

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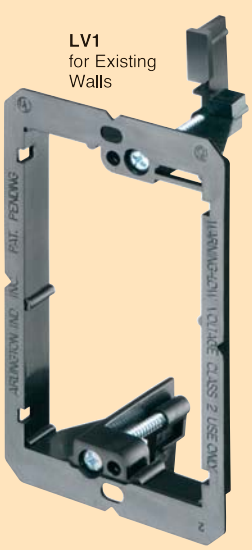
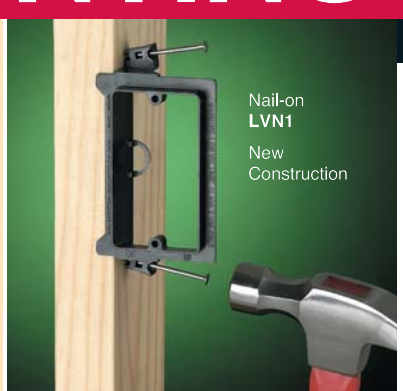
FOR CLASS 2 LOW VOLTAGE WIRING





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In *existing* construction, centered mounting wing screws pull the bracket securely against the wall. The LV series – LV1, LV2 and multiple gang brackets – adjust to fit 1/4" to 1" wall thicknesses.

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We also offer a variety of low voltage brackets for specialty applications.

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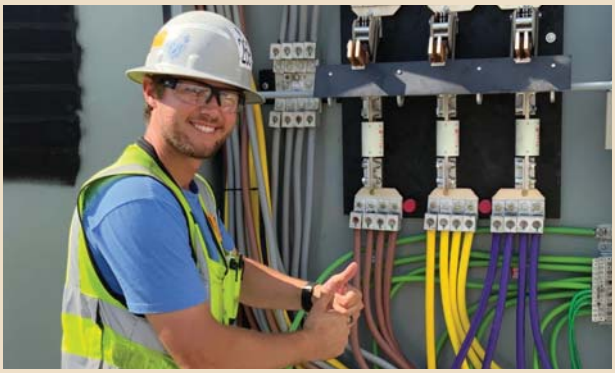

In his role, Richard Reeves has been able to work on a wide variety of project types, which challenges his Code and electrical knowledge and helps him to be a more well-rounded electrician.

RICHARD REEVES

Job Title: Foreman
Company: Masters Electrical Service
Location: Seguin, Texas
Age: 29; **Years on the Job:** 8
Interests: Spending time with his wife and son, going outdoors, hunting, archery, woodworking, and trying new tools

With his dad working as a former welder and contractor, Richard (Ricky) Reeves grew up in a construction environment. In fact, one of his best friends' families owned the company he currently works for.

"I worked here in high school one summer and was very interested in the work," he says. "I hadn't seen anything like it before."

Born and raised in Texas, Reeves attended college for two years before attending IEC San Antonio for four years. In 2019, he completed the program and tested out for his license in his fourth year. As an apprentice, he said he was able to work under some great journeymen.

"Taking the experience of the older guys — and listening to what they have done and applying it — has allowed me to be able to install fast, clean, and quality work," he says.

As a job-site foreman, he lines out his crews with daily tasks, attends coordination meetings, walks the site, and plans projects for his crew. He also completes material orders and assists with installation issues on site.

"Since gaining more experience and completing jobs, I have been given more responsibility and freedom to do the job as I see fit," he says. "I design my own installation methods and work plan, and I like having control over the installation process."

Over time, he has been able to work on larger jobs. For example, he is currently in charge of renovation and new construction work at the 90-acre Carvana warehouse facility in San Antonio as well as many school facilities in San Antonio and Austin.

Currently, he is studying the NEC, focusing on learning better field installation methods, and sharpening his organization and planning skills to become a master electrician.

"This trade is also a passion of mine, I love the work I get to do, and I want to be the best," he says. "I think for a young employee to succeed, you have to be passionate about your profession and always take your education to the next level."

IRVIN RETIZ

Job Title: Founder and President
Company: Retiz Electric
Location: Austin, Texas
Age: 27; **Years on the Job:** 17
Interests: Hiking, hosting the Construction Royalty podcast, reading, hosting construction professionals meetups in Austin, lifting weights, and spending quality time with people he loves

Irvin Retiz, the son of an electrical contractor, was inspired by the electrical contracting industry from an early age and started working for his dad at age 10. While still in high school, he studied the National Electrical Code and took night classes at the home of a master electrician.

He passed the journeyman exam, and then a few years later, when he was in college, he passed the master electrician exam. Within a few months, he decided to start his own business, Retiz Electric, in June 2018 in Houston. He relocated his business to Austin in January 2021.

"Training hard since I was young has helped me to develop a different mindset than most people in the industry," he says.

As the owner of Retiz Electric, he spends most of his time managing his team members, meeting clientele, and working with his tools (when needed).

"I started the business as a one-man show, wearing all the hats of different roles," he says. "Now I've handed the technician role to two of my techs while teaching another team member how to do sales. I love seeing my team learn and grow over time. I don't get more internal joy from anything else."

Currently, his company has been working on a lot of partial and full home remodels.

"The Austin real estate market is on fire at this moment," he says. "It feels good to be part of a booming market and help homeowners make their dream home a reality."

A decade down the road, he plans to have a branch in all the major cities in Texas: Austin, Houston, Dallas, Fort Worth, San Antonio, and Corpus Christi.

"We will get there by breaking down our goals into small pieces and executing it on a daily basis — just winning the day one day at a time," he says.

As a business owner, Irvin Retiz oversees projects to ensure everything is completed the right way and his team has what it needs to complete the job.

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Product info aifittings.com/catalog/siding-mounting-blocks/weatherproof-fs-outlet-box/FS8091F

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BRIAN REYES

Job Title: Project Manager/Electrical Designer
Company: Reyes & Sons Electric, Inc.
Location: Sylmar, Calif.
Age: 29;
Years on the Job: 5
Interests: Trying new restaurants and watching movies with his wife, going to the shooting range, cooking, camping, and playing chess

Since he was young, Brian Reyes has been surrounded by the electrical trade. His dad and two of his uncles own electrical companies, and his dad has been taking him to projects since he was in middle school.

"I had a first-hand look at what the day-to-day looked like through my dad's eyes," he says. "The ride-alongs with my dad eventually led me to digging trenches and working alongside our journeymen electricians."

While he appreciated the work and everything involved, he wanted to know how everything functioned.

"I quickly became interested in electrical theory, and I strived how to find out how electricity is generated, transmitted, and distributed to our communities," he says.

Raised in the San Fernando Valley of California, Reyes earned his electrical engineering degree with an emphasis in power systems from California State University-Northridge. After college, he joined his dad's company, Reyes and Sons, full-time as a project manager. He has also served as an instructor for Associated Builders & Contractors (ABC), where he taught electrical theory to second- and fourth-year apprentices.

As an engineer and project manager, Brian Reyes has learned how to problem solve and approach everything analytically.

"I've always appreciated academics, so this role was important to me," he says. "My goal was to spark some joy in them about electricity."

As a project manager, he prepares change-orders, reviews schedules, maintains the project management software, and orders material. He also conducts on-site visits for EBS and creates site reports for the engineers at the office. He is currently working on two design-build projects in the Los Angeles Unified School District and the Metro Purple Line Expansion project for EBS.

In 10 years, he envisions himself as the COO of Reyes & Sons Electric and one day serving as the president of a new engineering division.

"Being a first-generation Latino, I've worked really hard to follow my dad's footsteps and honor his name," Reyes says.

REBECCA RICHARDSON

Job Title: Commissioning EIT
Company: Smith Seckman Reid
Location: Crestview, Fla.
Age: 27; **Years on the Job:** 5
Interests: Spending time with friends and family, working in her garden, completing home improvement projects with her husband, and taking their Corvette to the beach

Growing up in Jackson, S.C., Rebecca Richardson loved science and math in middle school. She competed in FIRST Robotics and participated in a pre-engineering partnership program in high school before earning a bachelor's degree in electrical engineering from Clemson University.

In the field, Rebecca Richardson visits construction sites to test their electrical power distribution, emergency power supply systems, and low-voltage systems.

Richardson says her undergraduate experience solidified her decision to become an electrical engineer and gave her the critical thinking skills and desire to keep learning outside the classroom.

Fresh out of college, she was selected for a position in the commissioning group at SSR. Within her first year of working at SSR, she worked in many different fields. Now, as an electrical commissioning EIT, she alternates from week to week between field work and desk work.

"As I've developed my skills and knowledge, I am probably working 75% in the field and 25% in the office," she says. "I am now responsible for my projects from start to finish, and I am responsible for more projects at one time."

Currently, her commissioning group is working on a new multipurpose sports arena in middle Tennessee, a prison facility in California, a new patient tower in Boston, and a military health-care campus in Germany.

In five years, she plans to earn a Professional Engineering license and CxA certification and take on more projects and responsibilities at SSR. She is currently studying for these exams and participating in a year of cross-training with the design side of her company.

"I encourage other young professionals starting out to prioritize pursuing a job that you love and a company that aligns with your values that you can see yourself staying with for the rest of your career," she says.

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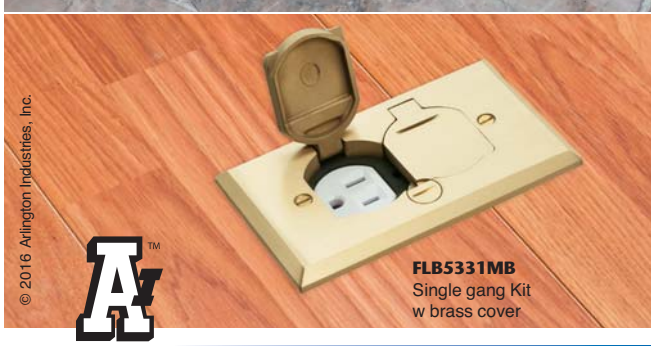

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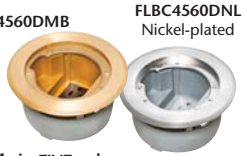
FLBC4560DMB
Brass

FLBC4560DNL
Nickel-plated



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FLBC4560DCA
Caramel

FLBC4560DBL
Black

FLBC4560DLA
Light almond

Product info aifittings.com/landing/inbox-cover-kits/

RYKER STICKNEY

Job Title: Prefab Manager
Company: CR Lighting & Electric, Inc.
Location: Layton, Utah
Age: 29; **Years on the Job:** 5
Interests: Hunting, fishing, camping, bowling, and serving as his son's coach

Ryker Stickney always enjoyed talking to his cousins in the trade about their projects. Now that he is a prefab manager, he says it's fun to drive down the road and show his family which projects he was a part of.

In the electrical industry, he said you must be innovative and adapt to constant changes.

"I like to think I have a go-get-it-done attitude, and I rarely tell someone no," he says. "When I tell them it will get done, I will get it done — and they don't have to worry about it."

Born and raised in West Point, Utah, Stickney graduated from high school before completing four years of trade school in the electrical program. Now, as a prefab foreman, he works on job sites, performing tasks from running pipe to roughing in walls and installing fire alarm systems.

"I look for new ways that we can be more efficient and faster out on the job site with new tools that come out or with prefab," he says.

He also coordinates with the other foremen on what they need for him to assemble at his shop and talks to his crew about what needs to be done for the day or week.

Since technology changes so fast in the electrical trade, Ryker Stickney says it's important to stay in touch with tool reps to find out what's coming out on the market.

"I am always doing something different every day, and I make sure my crew has work to stay busy," says Stickney, who typically works from 7 a.m. to 4:30 p.m.

Recently, Stickney and his crew assembled prefabbing house panels, room kits, and concrete tilt walls for 500 apartments for the University of Utah student housing.

"In the future, I plan to stay at the same company and find ways to innovate," he says.

EC&M ALL STARS 2022 UNDER 30

CODY SWAYZE

Job Title: Project Manager
Company: Smith Seckman Reid
Location: Nashville, Tenn.
Age: 27; **Years on the Job:** 5
Interests: Traveling with his wife and trying to visit every U.S. national park, snow skiing, hiking, fishing, and enjoying adventures in the outdoors

When Cody Swayze was finishing middle school, he job shadowed one of his current SSR mentors, who was working on the Amway Center for the Orlando Magic. He was intrigued with how the project integrated his interests of math, science, athletics, and design.

"It seemed like a great culmination of my natural interests and strengths, and I was immediately drawn in," Swayze says.

Born and raised in Nashville, Tenn., he earned his electrical engineering degree from Tennessee Tech University, his LEED AP certification, and his professional engineering license. Currently, he is enrolled in the MBA program at the University of Nebraska-Lincoln and is set to graduate in July 2022.

As a project manager at SSR, he works in the sports and entertainment group, where his time is balanced between managing projects and leading the electrical engineering design. Initially, his role was internally facing, and today, he leads electrical design on projects, manages project teams, and is involved with business development.

"I frequently wear many hats on projects, which opens me up to a wide range of responsibility, but also opportunity," he says. "I enjoy all aspects of engineering design, project management, and client activities, which always keeps me on my toes."

He also enjoys the challenge of working on large, high-profile sports projects, which he says can be very complex and have unique obstacles. Currently, he is serving as the lead electrical engineer on San Diego State University's Snapdragon Stadium. He is also serving as the project manager and electrical engineer of record at Vanderbilt University, the Nashville Soccer Club's new training facility, an NBA training facility, and several casinos nationwide.

In five to 10 years, he sees himself continuing to learn and grow into a principal at his firm.

"After I complete my MBA, my goal is to continue to push myself to take on more challenging roles on both projects and within the firm to better learn and manage the business," he says.

During his career, Cody Swayze has worked on the electrical design for the Las Vegas Raiders' Allegiant Stadium, the Golden State Warriors' Chase Center, the Detroit Red Wings' Little Caesars Arena, and Texas Christian University's Amon G. Carter Stadium.

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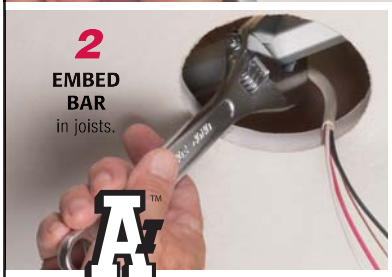

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FBRS4200R
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CSA Rated: at 16" or 24" oc 50 lb fan or fixture

Product info aifittings.com/landing/fbrs4200r

Lilly Vang performs electrical calculations, conducts site visits, and reaches out to vendors to review and write specifications.

LILLY VANG

Job Title: Electrical Engineer
Company: CDM Smith
Location: Maitland, Fla.
Age: 26; **Years on the Job:** 4
Interests: Reading science fiction and biographies and trying out new recipes from around the world

By taking electrical courses at North Carolina State University, Lilly Vang got hooked on electrical engineering. Inspired by her brother to explore engineering and encouraged by her professors to take electrical courses, she pursued an internship with a protection and control team, researching how battery storage could improve reliability in the grid.

"I loved what I learned there so much that I went for a master's in electrical engineering and was able to get my professional engineer license a year earlier than my fellow electrical engineers," she says.

Raised in the Piedmont foothills of North Carolina, Vang says she spent the last two years of high school at the North Carolina School of Science and Math.

"Math and science have always been a big part of my life," Vang says. "That's why when I had the opportunity to pursue an education focused mainly on math and science, I took it."

Vang, who recently got married and moved to Florida with her husband, is now working as an electrical engineer for CDM Smith. When she first started with the company, she said the team was very knowledgeable, provided training opportunities, and invited her to join them on on-site visits to see different electrical equipment.

As an electrical engineer at CDM Smith, she is currently working on the contract drawings for a $40-million facility expansion for a Florida wastewater treatment plant. She is also evaluating medium-voltage variable frequency drives to help a client to resolve current voltage spike issues.

"I love coming up with solutions that meet code requirements and satisfy the client's needs for these complex problems," she says.

As a young electrical engineer with design, construction and specification writing experience, Vang is continuously learning about new standards/codes and reaching out to other electrical engineers.

"Every engineer has a different perspective on a project," she says. "I think it's important to learn these perspectives while cultivating my own."

AUSTIN VIRAMONTES

Job Title: Senior Staff and Electrical Engineer
Company: Brown and Caldwell
Location: Ramsey, N.J.
Age: 27; **Years on the Job:** 6
Interests: Hanging out with friends and family, watching movies, or going to comedy shows

With an interest in math, science, and technology, Austin Viramontes headed to Portland State University with an eye on computer and electrical engineering. After his first semester, he zoned in on power systems.

After graduating in 2016 with an electrical engineering degree, he joined Brown and Caldwell and received on-the-job training from several mentors at his company. Three years later, he moved from Oregon to New York to continue working with the company.

"I am always looking to grow and take on new tasks, ensuring I have the information available to succeed," says Viramontes, who recently earned his professional engineering license.

As an electrical engineer, he participates with three to five project design teams at any given time. He creates electrical drawing markups, verifies codes and standards, interfaces with equipment manufacturers, and conducts job-site visits. He also assists with equipment startups and electrical design budgeting.

"My favorite part of my role at Brown and Caldwell is being able to see a project from start to finish," he says. "Being able to help design a project and then see it fully implemented provides a feeling of accomplishment."

Because every client and project are different, his position is constantly changing and never becomes stale, he says. Currently, his company is working on power distribution upgrades for wastewater treatment plants and pump stations.

In the next five to 10 years, he plans to work as a design lead for electrical projects, then move back to the West Coast to continue his engineering career. He said he is honored to be selected as part of the 30 Under 30.

"Being selected is rewarding as it feels my hard work has not gone unnoticed," he says.

Since moving to New York, Austin Viramontes has helped with projects for New York City's Department of Environmental Protection as well as other projects scattered throughout the eastern United States.

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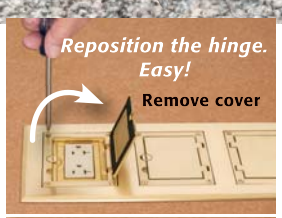

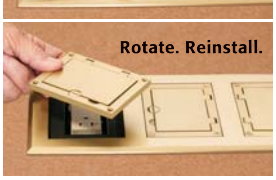

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FLBC8520GY Gray
FLBC8520CA Caramel
FLBC8520LA Lt Almond

Three-gang
FLBC8530BR Brown
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Inspiring the Next Generation *of* Electrical Workers

How a unique partnership is allowing high schoolers to not only learn hands-on electrical skills, but also help their community

Kaitlyn Lennon, Jonathan Toth, and Dylan Senor (from left to right) worked together on the circuit labeling of the load center — and had fun while doing it. They graduated in June 2021.

By Ellie Coggins, Senior Associate Editor

In the town of Saugerties, N.Y., a small rural town in Ulster County located a little less than an hour south of the state's capital of Albany, a unique program between the county's Habitat for Humanity chapter and its trades education program is allowing junior- and senior-aged students studying in the electrical construction and maintenance program at the Ulster Board of Cooperative Educational Services (BOCES) to gain hands-on experience while also serving the community.

Michael Catalano, a master electrician with field experience since 1989 and long-time guidance counselor at Saugerties High School, helped advocate for and oversee this unique partnership after getting involved with the local Habitat chapter as its lead electrician. When the opportunity presented itself to have the kids come on site and use their electrical theory in hands-on, real-life practice, he was thrilled.

Three years and three builds later, Catalano said having a fully supportive school administration has made a world of difference in moving this program forward and steering kids toward the electrical trades. When the program began nearly four years

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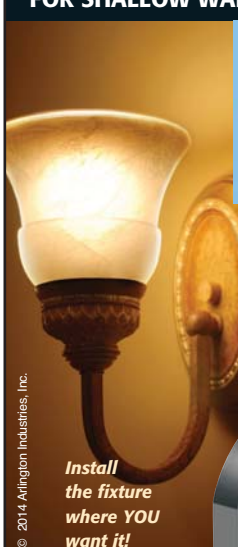

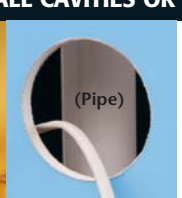

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ago, the students could only work on the weekends. But in their third year, they were given the chance to take kids to the job site during the week, which ultimately allowed the work to be counted toward school credit — something that helped encourage more students to participate.

"Whatever the motivation, at least I get them in the building working. Maybe I can steer them in a real good, positive direction," Catalano said. "I feel like if kids don't have some hands-on in a real job, many of them may not pursue electrical work at a higher level."

REAL-WORLD EXPERIENCE… AND REAL-WORLD CHALLENGES

On the latest Habitat home, which was completed in the fall of 2021, Catalano and his crew of six students (five of whom are from the electrical construction and maintenance program) worked on the house every Wednesday. The students were given the opportunity to do almost everything required electrically on the project — from installing a concrete-encased grounding electrode (Ufer ground) to pulling in service cable from the utility pole to a pad mount step-down transformer. They also installed a secondary underground residential distribution (URD) cable to a 200A meter can, which fed a 200A load center. They even installed the low-voltage Cat. 5 communications cable (computer) and RG 6 cable (television) and connected the low-voltage control equipment.

But that opportunity didn't come without challenges. For example, when Catalano started on the third house with his crew of students, they didn't have an electrical schematic. "Guess what? For a lot of jobs, you're going to walk into a space, and there's going to be no schematic," Catalano explained to the kids on day one. "You're going to have to go back to your National Electrical Code — and your training."

With each new Habitat build, each student got the chance to try different things, including running circuits, figuring out which gauge cable to choose, learning how to perform installations up to Code, and more. However, the third house (a four-bedroom structure for a family with a young girl in a wheelchair) required the students to work with ADA requirements/recommendations and exercise some new skills. For example, with Catalano's guidance, the students raised the receptacle locations and lowered switch heights while incorporating other ergonomic features to make life easy for the family moving in.

Even factors such as the weather played a big role in the build — living in Eastern New York means harsh winters are a very real challenge. During the coldest days, breaks were spent around heaters in order to keep their hands nimble enough to do work.

"There were a lot of obstacles we had to deal with," Catalano said in a June 2021 *EC&M* podcast episode. "But we rolled up our sleeves, and we worked together."

POSITIVE IMPACT FOR STUDENTS

Catalano, other professional workers on the job sites, and school administrators/teachers are not the only ones who understand the positive impact this partnership is having on the next generation of electrical workers — the students also see how much they've learned from it.

In a June 2021 *EC&M* On Air podcast recording, three of Catalano's electrical students who worked on the third

Dale Wolgamuth, who graduated in June 2022, is hammering in new work PVC boxes for receptacle and switch locations.

Habitat home had the chance to speak on why they became interested in electrical work in the first place, their experiences working on the job site, and what the future holds for them in the electrical industry. The full podcast can be listened to online at https://ecmweb.com/21166009.

The students included Jonathan Toth, Kaitlyn Lennon, and Dylan Senor, who graduated in June 2021. All three were students at Saugerties High School and enrolled in the two-year electrical construction and maintenance program at Ulster BOCES. Additionally, all are strongly considering continuing their education in the electrical industry after graduation.

One of Toth's favorite skills he learned throughout his time working with Catalano on the job site was working with the panel. "The panel is really fascinating because the panel runs all electric to the whole house," he said.

Catalano also expressed his pride in Toth's work, sharing that he wired almost the entire panel himself. "I showed him minimal instruction," he said. "And then I backed away, and Jonathan just did his own thing. It was inspiring to see a young man taking off right in front of me."

For Lennon, working on the job site helped give her more confidence in her workmanship, especially when it came to wiring devices. "With BOCES, it helped me learn how to wire the devices," she added. "But when it comes to the Habitat house, it taught me how to take that knowledge of devices and put it into the real world."

Meanwhile, Senor got to participate in one way he'll never forget — being in the ceiling and running wires all over the house. "It was a really tight space in some spots. And just having to stand in it, going from beam to beam is interesting," he shared in the podcast. "It's a once-in-a-lifetime experience."

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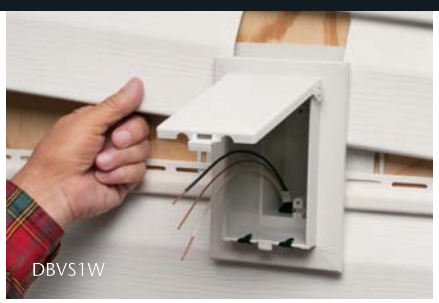

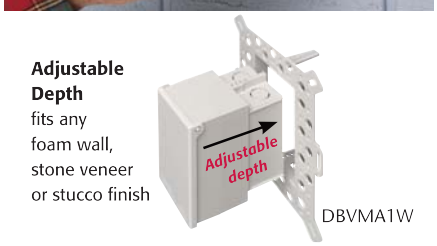

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Jonathan Toth and Kaitlyn Lennon work together to hang an electrical panel.

it also presents a potential solution to one of the industry's biggest hurdles: worker shortages.

It's certainly not news that the electrical industry has faced a shortage of skilled workers for many years. According to the 2021 *EC&M* Top 50 Electrical Contractors special report, 75% of Top 50 firms are experiencing worker shortages, and a whopping 83% plan to add employees. Coupled with more than 40 of the 50 firms responding that difficulty finding and retaining quality employees is the No. 1 factor having the most negative impact on their business growth, it's clear that the electrical industry may need to shift recruitment, training, and retainment strategies.

Programs like the partnership between Ulster BOCES and Habitat show how positive experiences such as this can help encourage the next generation to pursue a career in the electrical field. However, cooperation from everyone — from school leadership all the way down to students — is key for programs such as Catalano's to find success.

At first, students worked on the first two houses (which took about a year each to complete) almost solely during the weekends. However, Catalano continued to push to have students be able to work during school days to make the hands-on opportunities more accessible and allow them to gain school credit in the process. Fortunately, he was met with a supportive administration. "Your leadership must be supportive to think out of the box and take some calculated risks," Catalano said. "That's how you get movement."

Leadership has continued to be nothing but supportive, allowing Catalano to really take the reins and lead this program toward the future. "They got us the movement and traction we needed," he added.

And school administration is nothing but proud of the students' work. "The partnership between the Saugerties CSD and the Habitat for Humanity was an amazing opportunity for our students," said Kirk Reinhardt, superintendent of Saugerties Central School. "The experiences, hands-on lessons, and soft skills learned by our students will benefit them throughout their future careers and training. To have this once-in-a-lifetime experience during this challenging time of a pandemic is wonderful. We cannot be more proud of our students and staff."

"I am so proud and humbled by the commitment of our students," added Saugerties High School Principal Tim Reid. "In spite of a pandemic, these students continue to serve their community. They exemplify the best of qualities in all of us."

WHAT'S NEXT?

The whole community is thrilled that this partnership isn't ending with house No. 3 — in fact, the fourth, fifth, and sixth Habitat builds are currently underway. And now, all Ulster BOCES electrical construction and maintenance students – around 50 in total — and their teachers will get the chance to work on these homes, two of which are currently underway in the same development as the first three.

Additionally, Esopus, N.Y.-based The Mount Academy (a four-year private high school founded by the Bruderhof, a Christian community movement) and the Mennonite Disaster Service (MDS) are also partnering on the modular build that is being completed on its 500-acre campus. MDS donated $50,000 so far to support the modular build, which is expected to be delivered to the Habitat development in May or June. Recently, students from both The Mount and BOCES worked together to perform its rough wiring.

"We're all together in this," Catalano said, adding that he and the Mount's technology teacher and their main electrician coached the students. The initial electric work was ultimately completed over the course of a few days.

Students from the Mount are also welcomed to work on the homes located in the Habitat for Humanity development. Students from both the Mount and BOCES recently helped Catalano install a stanchion, 200A meter, and more to run temporary power to the job sites. Today, all three of the new homes are roughed-in, and one is energized. The others will be powered up by August 2022.

If everything goes as planned, all three homes will be completed by the end of the summer or early fall, helping give three more deserving families a place to call their own.

MORE THAN JUST ELECTRICAL WORK

While teaching the students the necessary skills to be successful in the electrical trade is part of what brings Catalano pride and joy, he truly believes it goes beyond mere electrical skills. "It's even bigger than just wiring a building," Catalano emphasized. "It's really sending the message of the importance of giving back and helping people. I'm hoping that the kids will grab on to that."

It certainly seems this is the case. Several of Catalano's students had the chance to witness the family finally receive the keys to their home in July 2021. It was a packed house of nearly 100 people there to celebrate, Catalano estimated.

"It was great to hand the keys over to them, knowing that they're all going to be safe now," Toth said.

Characterizing the experience as "a big accomplishment," Senor definitely realized the impact of this experience extended far beyond the classroom. "There's a bunch of people out in the world that literally just don't have homes, and we're giving people hopes and dreams," he said. "It's how life is these days — you've got to be willing to help people to get a little back." EC&M

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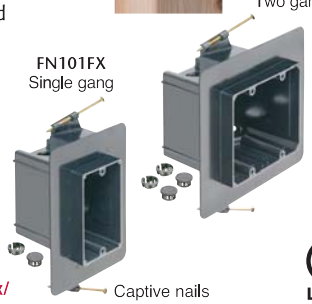

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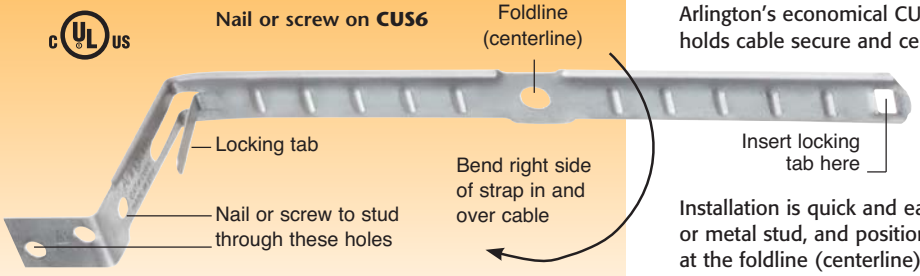

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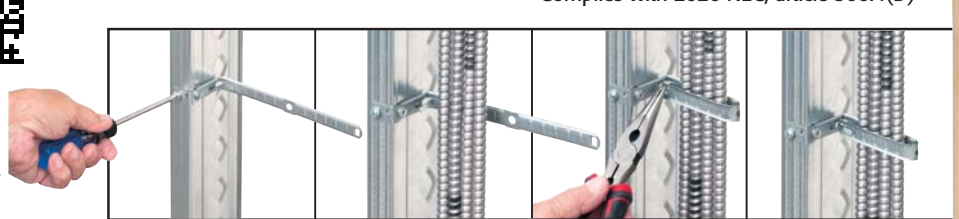

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GOOD HELP IS HARD TO FIND

What does it take to get people to consider a career in the electrical field? Here's what some of the industry's largest firms are trying — and what some of its youngest employees are saying attracted them.

By Tim Kridel, Freelance Writer

George Karolidis didn't go to college to become a project manager for the No. 15 Top 50 Electrical Contractor in *EC&M*'s 2021 rankings. In fact, he didn't plan to go into the electrical contracting field at all. Nor did Russ Lancey plan to become an estimator — let alone go on to become president and CEO of the No. 18 contractor (Five Star Electric) on *EC&M*'s list. But here they are. How they wound up in the electrical field, why they've stayed, and what they've learned along the way are worth pondering as the profession struggles to find enough skilled workers.

Karolidis was a junior studying electrical engineering at New York University, where E-J Electric Installation Co. had a booth at the school's job fair. "It attracted my interest," he says. "They worked on JFK Airport and some of the high rises in Manhattan, such as Bank of America Tower — these big-name projects. I was like, 'Oh, wow! I want to be a part of that.' I didn't even know what electrical construction was."

E-J's reps asked Karolidis whether he had any construction experience — he didn't – and about his level of comfort with AutoCAD. "They gave me an internship from my grades and my attitude, and the rest is history," he says.

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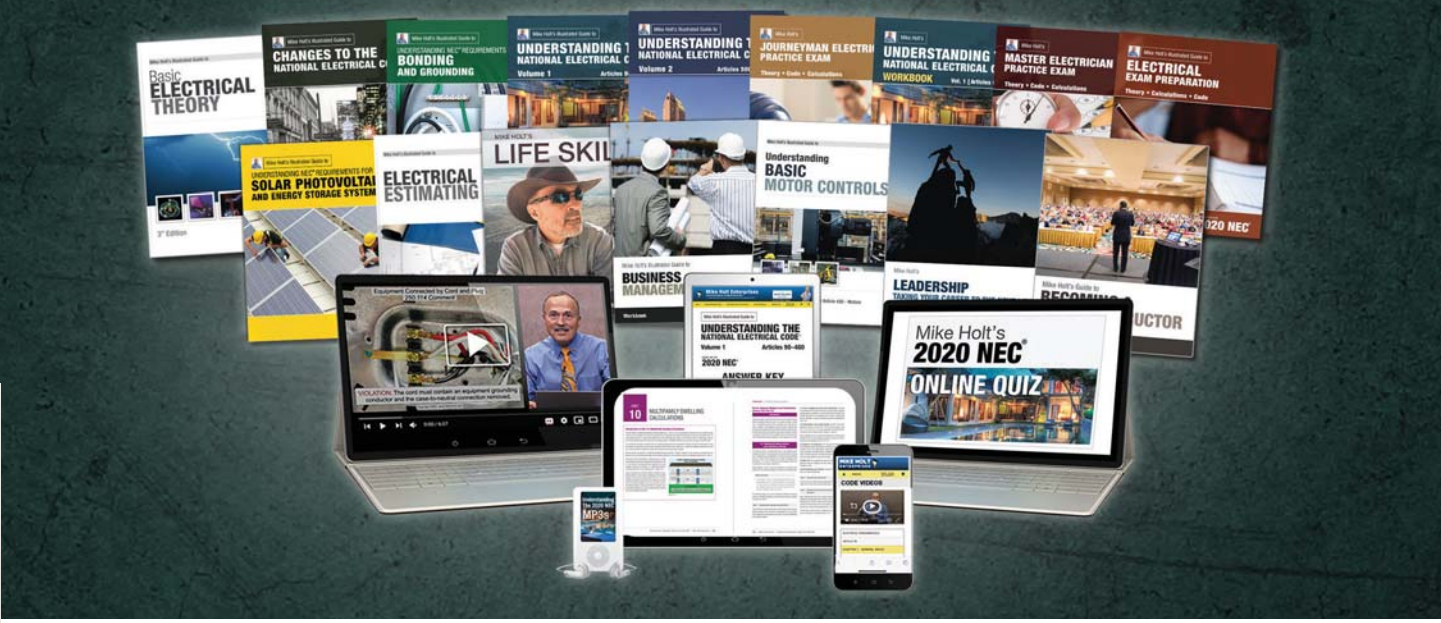

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"…as for me and my house, we will serve the Lord." [Joshua 24:15]

Karolidis started as a junior estimator/assistant project manager (PM). Today, he's a senior PM at Long Island City-based E-J, is running two projects, and was selected as one of *EC&M*'s "30 Under 30 All-Stars" for 2022.

Lancey took an even more serendipitous route. After graduating from the University of Rhode Island with a bachelor's degree in electrical engineering, he went to work for the parent company of ABC Radio, ESPN, and Radio Disney. While serving as a broadcast engineer, he was asked to oversee a major remodel of the company's studios in New York City.

"One of the electrical contractors that I ended up hiring offered me a job at the end of the renovation," says Lancey, who was named president and CEO of Five Star Electric at age 34 in 2019. "I never thought I would end up in the construction world, but sometimes you can't plan your path. A lot of it is timing and opportunities that become available."

CASTING A WIDER NET

These days, there are more opportunities than ever, thanks to some recent trends that also have increased the challenge of finding enough people to fill them.

"The emerging decarbonization/electrification trends have placed more emphasis/burden on the electrical engineering community as compared to other consultants," says Robert Ioanna, Syska Hennessy Group CTO. "Also, as a result of the increased amount of remote working and cloud computing usage from the pandemic, the data center industry is at historic levels of design and construction. The complexity of these electrical designs has placed more burden on the electrical engineering community. This need is amplified on all sides of the table: owners, engineers, developers, owner's reps, facilities, CMs."

EC&M surveyed hundreds of electrical engineering and contracting firms in its annual Top 40 and Top 50 surveys to find out which positions have the highest demand and how firms are finding candidates.

"Supervising engineer and senior engineer are two positions we have the most difficulty filling," says Ann Bonney, HR director at Long Beach, Calif.-based P2S. "We are not receiving applications from this level of employee and have to source passive candidates on LinkedIn, Indeed, or through employee referrals. Traditionally, the more experienced engineer positions have been challenging to fill, but the market has become more competitive with more job openings than qualified candidates."

Like many of its peers, P2S has changed its recruitment strategy.

"We have significantly increased our social media advertising on LinkedIn and Indeed in 2022," Bonney says. "We actively used LinkedIn Recruiter to source candidates passively but now have unlimited job posting slots, automated job wrapping from our ATS, and a premium career page for increased candidate impressions. We currently sponsor P2S jobs on Indeed to stay on the first pages of search results, a P2S Logo on postings, and a career page. Since adding these features, we have experienced increased applications, with most candidates entry to mid-level engineers."

Other firms are stepping up their use of traditional media such as radio. For example, in the past year, Jacksonville, Fla.-based Miller Electric began advertising on three stations whose widely different formats — country, easy listening, and sports — help reach a variety of demographics.

"Sometimes it's just general, like 'We're hiring, and here are our pay rates,'" says Maggie Lorenz, marketing communications specialist. "Every few months or so, we have job fairs at our Jacksonville offices. So then we'll [switch] the radio ads to 'Are you looking for a new career?' or 'Do you have a lot of experience?' Right now, we're trying to focus on experienced workers. We're trying to really tailor those radio ads and social media ads to people who have years of experience: the journeymen. We have a pretty robust radio campaign, but we're looking to bump it up even more."

Those commercials also caught the attention of national outlets such as Cox Media Group and iHeartMedia.

"They want to offer us a comprehensive radio, digital, all-inclusive campaign," Lorenz says. "We're kind of deciding where we want to go with that. We're potentially looking to invest a big chunk of money with a big name that would handle all of our recruitment needs."

SPARKING INTEREST

Many contractors and design firms also are increasing their efforts to make young people — and their parents — aware of the lucrative career opportunities.

"There is definitely a stigma around the idea of attending a four-year university and getting a bachelor's degree being the standard of future success," says Taylor Groves, project manager at Knoxville-based Stansell Electric and one of *EC&M*'s "30 Under 30 All-Stars" for 2022. "That is simply not true. Not only are jobs in the trades at an extremely high demand, but they are very fulfilling. I always wanted to have a set of skills that no one could take away from me or easily recreate."

The profession also benefits when younger employees share that sense of fulfillment with people their age, as Karolidis has done with his former electrical engineering classmates.

"It's something that surprises them," Karolidis says. "It's something that intrigues them. They think, 'Maybe I should consider that as a career option, too.'

"When I told them I went into construction, they said, 'You went to school for four years to wear boots?' And I'm like, 'It's not that cut and dry.' It's much more than that. We actually take a lot of the basic foundation that you learn in engineering to solve real-life problems. I still keep in touch with some of my classmates, and I have to say I think I'm happier than they are today."

Apprenticeships are more important than ever when it comes to attracting young people.

"I went through the apprenticeship, and most of the people on my team also went through an apprenticeship, so we see the value in that," says Jeff Daigle, workforce development training manager at San Jose, Calif.-based Rosendin Electric. "Anybody that we're in contact with that, [we say] the best avenue is to go through the apprenticeship."

Miller Electric participated in more than 140 school events so far this year, showcasing opportunities such as its Electrical Training Alliance apprenticeship program. Seven high school students can take pre-apprenticeship classes to get a head start on their careers.

"It turns a five-year program into a four-year program and gives them a

Factors Affecting Construction Labor and Materials the Most

New market research recently released from cove.tool examined what type of impact the skilled labor shortage and supply chain constraints are having on the construction industry. The "2022 U.S. Construction Market Study, Q1-Q2" report revealed key insights into the current and projected future national construction market conditions.

LABOR

Architecture and construction companies continue to struggle with hiring and retention. "Increased demand for workers coupled with stagnant numbers of new architecture graduates or limited workers choosing construction jobs (NCARB) results in a labor shortage when there is a significant increase in the volume of work," said Patricia Kusumadjaja, author of the report and Virtual Design and Construction Director at cove.tool. "Additionally, many in the current architectural and construction workforce leave their jobs to seek higher compensation, better working conditions, and more flexibility. Some have reported that they are leaving to join an adjacent industry."

She attributes the increase in demand for workers to a nationwide housing shortage, low-interest rates, and projects resuming after being on hold from the pandemic. The current backlog of projects has continued to increase to nine months of work. Other highlights in this arena include:

- 46% of AEC professionals said their firm will employ a hybrid workforce in 2022. Almost 25% expect their company to operate with a fully remote workforce, while 19% see a full return to the office for all staff.
- Compensation for architectural positions is expected to increase an average of 5% this year, while the inflation rate is at 8.5% for March (AIA).
- 650,000 workers are needed to fill the construction industry's labor shortage in 2022 (ABC's 2022). Design services continue to accelerate. AIA's Architecture Billings Index (ABI) score for March was 58.0, and a backlog of about 7.4 months (AIA ABI).
- 89% of construction firms struggle to find enough qualified workers (AGC).
- 96.9% of architects experienced burnout in 2021 (Monograph Survey).

MATERIALS

The market is seeing variable material price indices around the country, and AEC professionals have reported that the variable lead times, costs, and raw material availability has impacted project delivery. When materials are delayed or unavailable, that affects labor. According to the BLS, producer price indexes, PPIs for construction bid prices, and inputs rose in the year ending in March of 2022. While materials inputs began to level out in the first quarter of 2022, diesel fuel has continued to increase, driving up shipping and delivery costs.

Lumber costs are rising faster than other materials, bringing the annual increase to 33.1%. Delays and shortages on construction materials also affects labor hours and workforce efficiency.

"Suppliers also reported an increase in purchases of sustainable and high-performing materials over the last two years due to the increasing demand for traditional materials," said Kusumadjaja. "The COVID-19 pandemic continues to pose significant challenges to the supply chain and manufacturing, which have impacted material prices."

Since the early days of the pandemic, the author explains that overseas factory shutdowns have led to production shortages. Subsequent outbreaks and restrictions further placed disruptions on production, shipping, and delivery. "As plants and manufacturers ramp back up to meet demand, suppliers believe that this shortage will begin to ease. However, other global events, such as the war in Ukraine, will have unpredictable effects on material availability," she says. "Additionally, as gas prices increase, the market is likely to see the effects of increased shipping and delivery costs."

Other report highlights include:

- ENR's 20-City Construction Cost Index was up 0.7% in the quarter and 8.0% since January of 2021. The 20-City Building Cost Index was up 1.6% in the quarter and 13.9% since January of 2021.
- The ENR Material Cost Index above indicates that construction costs nationwide continue to increase overall, particularly material costs. Steel experienced a slight increase of 2.1% in one month, bringing the annual increase to 42.0%. Lumber costs are rising yet again, with a 5.3% increase in one month, bringing the annual increase to 33.1%.

For more information, read the full report from cove.tool at cove.tools/2022-q1-to-q2-u-s-construction-market-study.

One of the greatest obstacles for *EC&M's* Top 40 Electrical Design Firms and Top 50 Electrical Contractors is finding and retaining top talent in the electrical industry. In fact, a never-seen-before 100% of Top 40 survey respondents indicated that they would be adding headcount in 2022.

vested interest in us, so they don't get out of school and go to work in some other trade or some other industry," says Tim Hinson, Miller Electric director of workforce development. "They can finish that much quicker and then be making top-dollar in just three years out of high school."

Miller also is an example of how the profession is increasingly looking beyond high schoolers.

"It used to be that it was enough to just go to high schools and target juniors and seniors," Lorenz says. "We're going all the way down to the elementary level. Construction career days are not just for juniors and seniors anymore."

In elementary schools, Miller now provides electrical circuit kits that students snap together to get LEDs to light and buzzers to go off.

"That just is so intriguing to those young folks," Hinson says. "They just love that. They sit there and play with that all day. So we know that's really making some memories and planting some seeds."

Instead of college, some teenagers join the military. But that doesn't mean they're no longer candidates for the profession. For example, Rosendin works with Overwatch, a program for military veterans.

"These are guys that have completed their service and are looking to enter the trades," Daigle says. "Overwatch was able to set the expectation and make sure they know what they're getting into. We don't want to put in the work and now it doesn't work for either person."

MENTORING AND FLEXIBLE WORK STYLES CAN BE KEY

Many firms say they're changing work styles and compensation in a quest to attract and retain younger employees.

"We see a shift in what employees under 30 value versus older colleagues," says P2S's Bonney. "Those under 30 are focused on salary and place less value on benefits [such as] health, vision, dental, and 401(K). We have lost employees who have taken a higher wage, even though the total reward package P2S offered was more competitive.

"Employees under 30 are also seeking more flexibility in work schedule, work location, the ability to take the PTO they accrue, and more purposeful work. We have successfully retained employees with our flex schedule and purposeful work. We also accommodated most employees who moved away from our office locations due to living costs and requested to work remotely."

As the pandemic wanes, remote work remains popular partly because it eliminates the time and expense of commuting.

"At Cupertino Electric, we have a workforce comprised of office and union employees who perform different kinds of work in locations across the U.S.," says Estrella Parker, chief people officer. "Post-pandemic, we've embraced a 'hybrid' model with our office employees that allows for more flexibility and has enabled us to attract a more diverse and progressive workforce in more locations than ever. We've allowed divisional and team leaders to set group norms based on role types, the type of collaboration needed, and the results they need to deliver."

Mentoring also is key.

"I had very little electrical construction experience, but I had great mentors who helped me learn heads from tails," says Groves, who's now seven years into his career. "My position demands a basic knowledge of the overall electrical technicalities of the project, and fortunately we have highly trained electricians who handle those things while I get to use other skills to assist them in building a successful project."

Syska Hennessy's Engineer Development Training (EDT) program uses mentoring across multiple disciplines.

"This program is an example of our commitment to the development and education of young engineers through cross-training in mechanical, electrical, plumbing, energy modeling, LEED, sustainability, commissioning, technology, and business practices — all items that make well-rounded engineers," Ioanna says. "EDT team members regularly visit job sites to experience projects underway, while being mentored by more senior engineers and working with peers. The value of mentoring and technical training shortens the learning curve, increases performance and job satisfaction, and maximizes the effectiveness of our organization — all while achieving the firm's strategic goals and objectives."

Finally, when it comes to recruiting, smaller contractors and design firms aren't necessarily at a disadvantage if candidates believe they'll have more opportunities for hands-on experience in a wider variety of roles.

"I think I was maybe 22 and had the opportunity to be part of a startup that literally went from nothing to about $30 million in sales in the first year," Lancey says about the second electrical contractor that he worked for, which eventually was acquired by Five Star. "With small firms, you get a chance to do it all: supervising, project management, estimating, engineering." EC&M

Remote Control and Signaling Circuits, Class 1

Boost your understanding of NEC requirements for Class 1 circuits.

By Mike Holt, NEC Consultant

Based on the 2020 NEC.

Article 725 of the National Electrical Code (NEC) covers remote-control, signaling, and power-limited circuits that are not integral to a device or appliance. This includes circuits for burglar alarms, access control, sound, nurse call, intercoms, some computer networks, some lighting dimmer controls, and some low-voltage industrial controls.

Here are some examples of the three types of circuits:

- A remote-control circuit controls other circuits through a relay or solid-state device. A motion-activated security lighting circuit is an example of this.
- A signaling circuit provides an output that is a signal or indicator such as a buzzer, flashing light, or annunciator.
- A power-limited circuit is a circuit supplied by a transformer or other electric power source that limits the amount of power to provide safety from electrical shock and/or fire ignition.

Article 725 circuits "are characterized by usage and power limitations that differentiate them from electrical power circuits" [Sec. 725.1 Note]. It provides alternative requirements for minimum conductor sizes, overcurrent protection, insulation requirements, wiring methods, and materials.

Article 725 consists of four parts. Part I provides general requirements (which we address here), Part II pertains to Class 1 circuits (which we also address here), Part III pertains to Class 2 circuits, and Part IV provides listing requirements.

Class 1 vs. Class 2:

- **Class 1 circuit.** The wiring system between the load side of a Class 1 circuit overcurrent protective device (OCPD)and the connected equipment. See Sec. 725.41 for the voltage and power limitations of Class 1 circuits.
- **Class 2 circuit.** The portion of the wiring system between the load side of a Class 2 power supply and the connected Class 2 equipment. Due to the limitations of its power supply, a Class 2 circuit is considered safe from a fire initiation standpoint and provides acceptable electric shock protection.

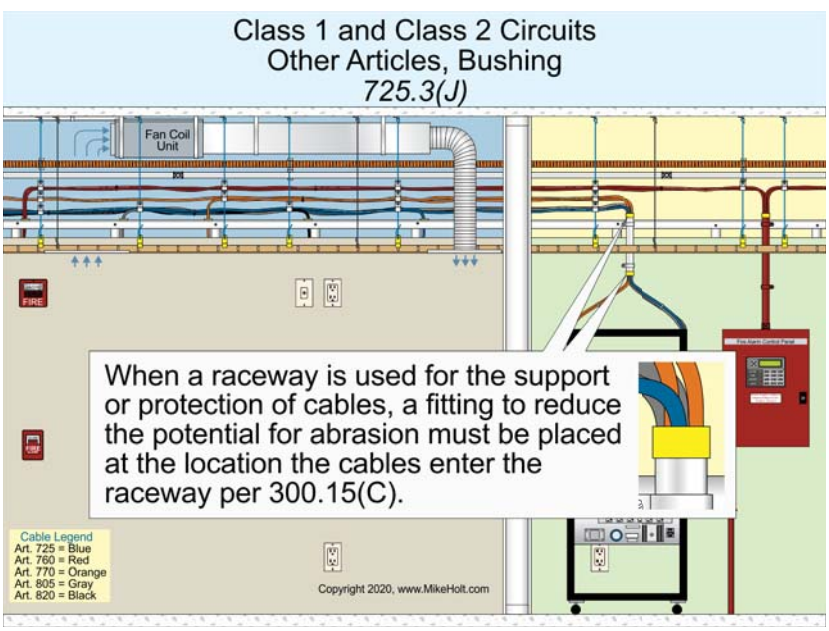


Fig. 1. Protecting a cable's outer insulation layer is vitally important to its integrity and longevity.

GENERAL REQUIREMENTS

An understanding of the general requirements is necessary to correctly install Class 1 or Class 2 circuits.

Article 725 consists of "Other Article" requirements found in Sec. 725.3(A) through (P). These aren't referencing exceptions to Art. 725 that are covered elsewhere. These are requirements in addition to the requirements of Art. 725.

The number and size of conductors or cables within a raceway are limited per Sec. 300.17 [Sec. 725.3(A)]. Raceways must be large enough to permit the installation and removal of conductors without damaging conductor insulation [Sec. 300.17].

When all conductors within a raceway are the same size and insulation, the number of conductors permitted can be found in Annex C for the raceway type [Chapter 9, Notes to Tables, Note 1].

For conductors not included in Chapter 9 (such as a multiconductor cable)

you must use the actual dimensions. If you use one multiconductor cable inside a raceway, you must use the single conductor percentage fill area [Chapter 9, Notes to Table, Notes 5 and 9].

To limit the spread of fire or products of combustion, the installation of Class 1 and Class 2 circuits must comply with Sec. 300.21 [Sec. 725.3(B)]. Electrical circuits and equipment must be installed in such a way that the spread of fire or products of combustion will not be substantially increased. Openings into or through fire-resistive walls, floors, and ceilings for electrical equipment must be fire-stopped using methods approved by the authority having jurisdiction (AHJ) to maintain the fire-resistance rating of the fire-resistive assembly [Sec. 300.21].

Outlet boxes must have a horizontal separation of at least 24 in. when installed on opposite sides in a fire-resistive assembly unless an outlet box is listed for closer spacing or protected by fire-resistant "putty pads" per manufacturer's instructions. "Putty pads" are typically installed on the exterior of the box, but many manufacturers have listed inserts for box interiors.

Boxes installed in fire-resistive assemblies must be listed for the purpose. If steel boxes are used, they must be secured to the framing member. Cut-in-type boxes are not permitted.

Class 1 and Class 2 circuits installed in ducts or plenums must comply with Sec. 300.22. [Sec. 725.3(C)]

Exception No. 1: Class 2 cables selected per Table 725.154 and installed per Sec. 725.135(B) and Sec. 300.22(B), Exception, can be installed in ducts specifically fabricated for environmental air.

Exception No. 2: Class 2 cables selected per Table 725.154 and installed per Sec. 725.135(C) can be installed in plenum spaces.

Class 1 and Class 2 circuits installed in hazardous (classified) locations must comply with the following Sections: 501.10(B)(1), 501.150, 502.10(B)(1), 502.150, 503.10(A)(1), 503.150, 506.15(A), 506.15(C), 511.7(B)(1), 515.7(A). They must also comply with Art. 517, Part IV [Sec. 725.3(D)].

Class 1, 2, and 3 circuits in cable trays must be installed per Parts I and II of Art. 392 [Sec. 725.3(E)].

If a raceway is subjected to different temperatures, and where condensation is a known problem, per Sec. 300.7(A) you must fill the raceway with a material approved by the AHJ to prevent the circulation of warm air to a colder section of the raceway [Sec. 725.3(H)]. This raceway seal is not the same thing as an explosion-proof seal.

When a raceway is used for the support or protection of cables, a fitting is required to reduce the potential for abrasion and must be placed where the cables enter the raceway per Sec. 300.15(C) [Sec. 725.3(J)], as shown in **Fig. 1** on page 61.

Equipment grounding conductors must be identified per Sec. 250.119 [Sec. 725.3(P)].

Exception: Conductors with green insulation are permitted to be used as ungrounded signal conductors for Types CL3P, CL2P, CL3R, CL2R, CL3, CL2, CL3X, CL2X, and substitute cables installed per Sec. 725.154(A).

Above suspended-ceiling panels, ensure there's not an accumulation of cables that prevents the removal of those panels for access to equipment [Sec. 725.21].

Exposed cables must be supported by the structural components of the building, so they will not be damaged by normal building use. Support must be by straps, staples, hangers, cable ties, or similar fittings designed and installed in a manner that will not damage the cable [Sec. 725.24].

Cables installed through or parallel to framing members or furring strips must be protected where they are likely to be penetrated by nails or screws. Do this by installing the wiring method so it is at least 1¼ in. from the nearest edge of the framing member or furring strips, or by protecting it with a 1/16-in.-thick steel plate or equivalent [Sec. 300.4(D)].

Circuits used for safety-control equipment must be classified as Class 1 if the failure of the remote-control circuit or equipment introduces a direct fire or life hazard [Sec. 725.31(A)].

CLASS 1 CIRCUIT REQUIREMENTS

Class 1 power-limited circuits must be supplied from a power supply that limits the output to 30V and no more than 1,000VA [Sec. 725.41(A)]. Class 1

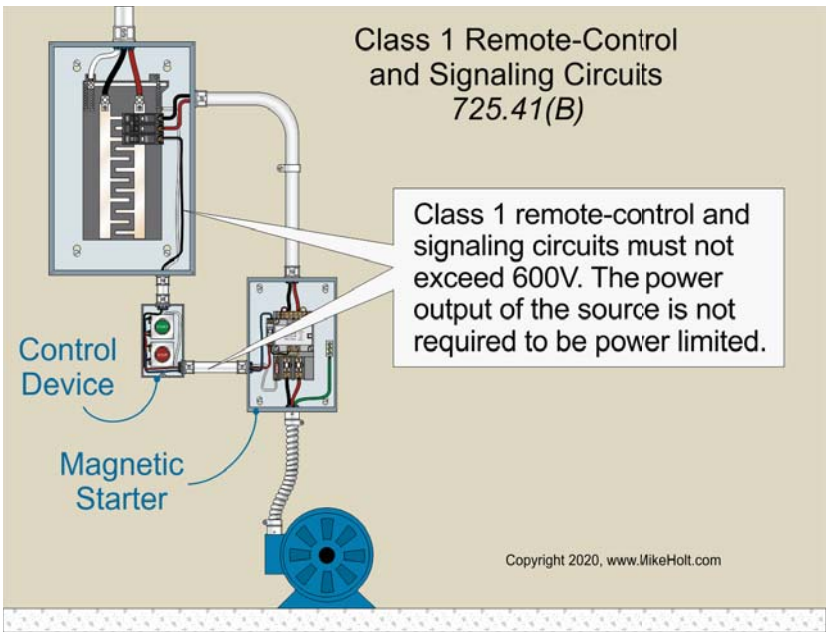


Fig. 2. There are voltage limits for Class 1 remote-control and signaling circuits.

remote-control and signaling circuits must not exceed 600V; the power output of the source need not be power limited Sec. 725.41(B)], as shown in **Fig. 2**.

Overcurrent protection for conductors 14 AWG and larger must be based on the conductor ampacity per Sec. 110.14(C)(1) and Table 310.16. Overcurrent protection for 18 AWG conductors cannot exceed 7A; and for 16 AWG conductors, overcurrent protection cannot exceed 10A [Sec. 725.43].

Locate OCPDs at the point where the conductor to be protected receives its supply [Sec. 725.45(A)].

Class 1 circuit conductors supplied by a transformer having only a 2-wire secondary can be protected by the primary OCPD per Sec. 450.3(B), but only if the primary OCPD does not exceed the value determined by multiplying the secondary conductor ampacity by the secondary-to-primary transformer voltage ratio [Sec. 725.45(D)].

Class 1 circuits must be installed per Part I of Art. 300, and Class 1 wiring must be installed in a suitable Chapter 3 wiring method [Sec. 725.46].

Two or more Class 1 circuits can be installed in the same cable, enclosure, or raceway if all conductors are insulated for the maximum voltage of any conductor [Sec. 725.48(A)]. Class 1 circuits can be installed with electrical power conductors under any of the circumstances described in Sec. 725.48(B)(1) through (4).

Conductors of sizes 18 AWG and 16 AWG installed within a raceway, enclosure, or listed cable are permitted if they do not supply a load that exceeds the ampacities of Table 402.5. Conductors 14 AWG and larger must meet the ampacities of Table 310.16 [Sec. 725.49(A)]. Class 1 circuit conductors must have at least a 600V insulation rating [Sec. 725.49(B)].

AVOIDING CODE VIOLATIONS WITH CLASS 1 INSTALLATIONS

The key to understanding and correctly applying Art. 725 is in knowing the voltage and energy levels of the circuits, the wiring method involved, and the purpose(s) of the circuit. Many of the installation errors with these systems arise from failing to properly characterize the installation. Take the time to ensure each circuit is properly identified whether it is Class 1, 2, or 3. If it is Class 1, determine whether it is power-limited or not. In addition to the general requirements, apply the relevant requirements for that Class and type of circuit. EC&M

These materials are provided to us by Mike Holt Enterprises in Leesburg, Fla. To view Code training materials offered by this company, visit www.mikeholt.com/code.

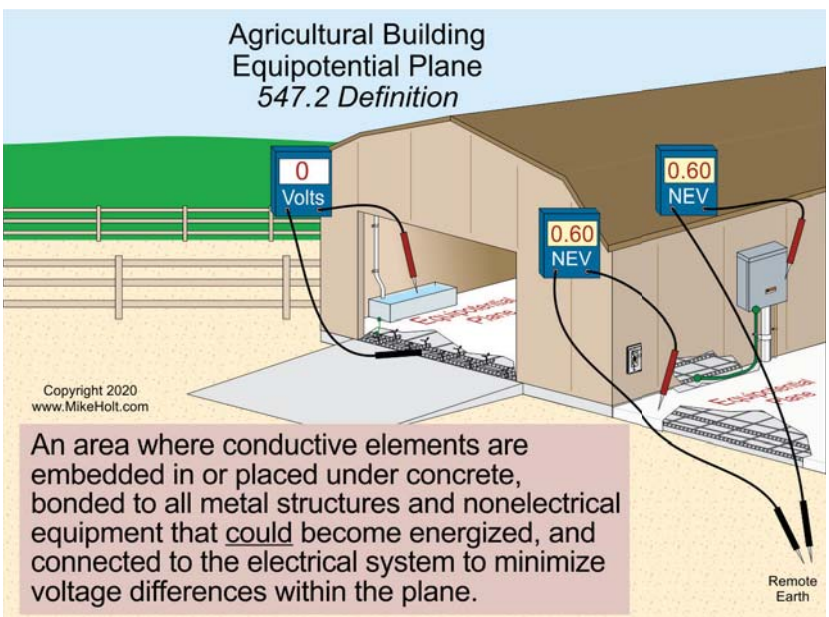
Stumped by the Code?

By Mike Holt, NEC Consultant

All questions and answers are based on the 2020 NEC.

Q. What is the Code definition of equipotential plane as applied to agricultural buildings?

A. Equipotential Plane (as applied to agricultural buildings) is defined as an area where conductive elements are embedded in or placed under concrete and bonded to all metal structures and nonelectrical equipment that could become energized and connected to the electrical system to minimize voltage differences within the plane [Sec. 547.2 (See **Figure**).



Q. What does the NEC require for protection of flexible cords or cables used for wiring methods at carnivals, circuses, or fairs?

A. Flexible cords or flexible cables accessible to the public must be arranged to minimize the tripping hazard, and they can be covered with nonconductive matting secured to the walkway surface or protected with another approved cable protection method, provided that the matting or other protection method does not constitute a greater tripping hazard than the uncovered cables. Burying cables is permitted, and the burial depth requirements of Sec. 300.5 do not apply [Sec. 525.20(G)].

Q. What are the specific NEC requirements for GFCI protection at agricultural buildings?

A. Ground-fault circuit-interrupter (GFCI) protection must be provided as required in Sec. 210.8(B), but GFCI protection is not required for receptacles rated 30A or more installed within the following areas:

(1) In areas having an equipotential plane in accordance with Sec. 547.10(A).

(2) Outdoors.

(3) In damp or wet locations.

(4) In dirt confinement areas for livestock.

Q. What is the NEC requirement when installing a separate equipment grounding conductor underground at an agricultural building?

A. Where the equipment grounding conductor is not part of a listed cable assembly, it must be insulated when installed underground [Sec. 547.5(F)].

Q. What does the NEC require as electrical datum plane distances for floating piers and areas subject to tidal fluctuations?

A. The electrical datum plane for floating piers and boat landing stages must be a horizontal plane 30 in. above the water level at the floating pier and a minimum of 12 in. above the level of the deck [Sec. 555.3(A)].

Areas subject to tidal fluctuations — In land areas subject to tidal fluctuation, the electrical datum plane must be a horizontal plane that is 2 ft above the highest tide level for the area occurring under normal circumstances, based on the highest high tide [Sec. 555.3(B)].

Areas not subject to tidal fluctuations — In land areas not subject to tidal fluctuation, the electrical datum plane must be a horizontal plane that is 2 ft above the highest water level for the area occurring under normal circumstances [Sec. 555.3(C)].

Q. What is the NEC rule regarding protection of lamps that are part of temporary installations?

A. Lamps (bulbs) must be protected from accidental contact by a suitable luminaire or lampholder with a guard [Sec. 590.4(F)]. EC&M

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Illustrated Catastrophes

By Russ LeBlanc, NEC Consultant

All references are based on the 2020 edition of the NEC.

SUNSHINE STATE SURPRISES

I spotted these violations on the backside of some Key West, Fla., shops. The wrong type of MC cable was used here. Installing MC cable in wet locations such as this is permitted by Sec. 330.10(A)(11), but only when a corrosion-resistant jacket is covering the metal covering and any one of the following three conditions are met: the metal covering is impervious to moisture, a moisture-resistant jacket is provided under the metal covering, or the insulated conductors under the metal covering are listed for use in wet locations. These MC cables look like typical MC cables that would be used for wiring offices or other commercial spaces. They're not suitable for this outdoor wet location. Securing cables to the exterior of rigid PVC conduit as a means of support for cables violates the requirements in Sec. 300.11(C). The black cable ties are most likely UV resistant or sunlight resistant, but the white cable ties are typically not identified for use in sunlight and would not comply with Sec. 300.6(C)(1). In my experience, cable ties that are not sunlight resistant generally will become brittle and fail rather quickly when installed in areas exposed to sunlight.

FUDGE SHOP FOLLIES

This photo was taken while I was walking along the sidewalk next to this fudge shop. I noticed the end of an extension cord hanging out of the soffit where the roof overhangs the sidewalk. After noticing the eye hooks screwed into the window frames, I figured this cord is probably used to provide power for holiday lighting displays. Section 400.10 provides only 11 permitted uses for flexible cords and flexible cables. These 11 permitted uses are further limited by the restrictions imposed by Sec. 400.12. Flexible cords, flexible cables, cord sets (otherwise known as extension cords), and power supply cords have seven prohibited uses as follows: (1) as a substitute for fixed wiring; (2) where run through holes in walls, ceilings, or floors; (3) where run through doorways or windows; (4) attached to building surfaces; (5) located above suspended ceilings or concealed by walls, floors, or ceilings; (6) in raceways unless permitted by other Code Sections; and (7) where subject to physical damage. I would say this extension cord use violates items (1), (2), and (5). Permanent wiring methods as specified in Chapter 3 should be used if the shop owner really wants to have a receptacle outlet located on the outside of the shop.

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Boxes and Enclosures

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The Evolution series floor box is available in three new durable finishes: brushed aluminum, satin brass, and satin nickel. Designed to be installed with ease, the series offers multiple benefits, including easy interior access and high-capacity furniture feed. In addition, it features finishes that are aesthetically pleasing and strong, offering superior resistance to scuffs and scratches, according to the company.

Legrand

Enclosure

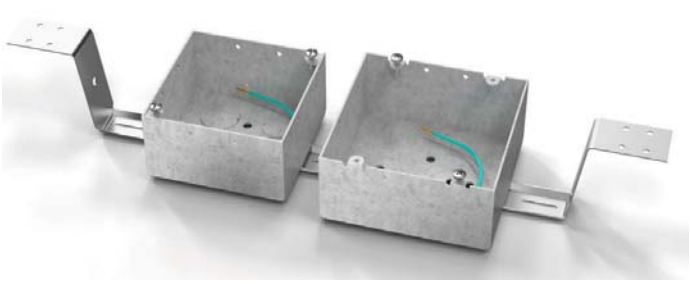
The 12124-50 NEMA Type 1 enclosure features up to 20 ½-in. knockouts on all sides (five on each side), plus a 1-in. to 1¼-in. concentric K.O. on the back. Measuring 12 in. × 12 in. × 4 in., this 16-gauge steel enclosure is designed as a pull-box for load centers and lighting control panels, as well as commercial "home run" boxes. Customers can mount the enclosure overhead with the BCHS-12. The enclosure, which includes a screw attached cover, is powder coated with ANSI 61 gray finish. The product is UL listed.

Orbit Industries

Preassemblies

These preassemblies are designed for electrical contractors engaged in large commercial and residential construction or renovation projects. The boxes are preassembled on a bracket and can save a contractor up to 18 min. on installation per unit, according to the company. The preassemblies work with 16 in. or 24 in. stud spacing and feature a wall box depth from 1½ in. to 3½ in. There are also multiple models available for floor to box center ranging from 12 in. to 24 in.

Presembler



Enclosures

Universal Case System (UCS) gives engineers a flexible housing option for nearly any printed circuit board (PCB) project. This modular family of IP40-rated enclosures can accommodate multiple PCBs in embedded systems and other PCB form factors. The removable side panels can be customized so that the housing can accommodate different current connection technologies in multiple sizes. DIN rail and wall-mounting options allow easier system integration. Finally, optional digital displays and light guides add more usability.

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What's Wrong Here?

By Russ LeBlanc, NEC Consultant

How well do you know the Code? Think you can spot violations the original installer either ignored or couldn't identify? Here's your chance to moonlight as an electrical inspector and second-guess someone else's work from the safety of your living room or office. Can you identify the specific Code violation(s) in this photo? Note: Submitted comments must include specific references from the 2020 NEC.

Hint: Outdoor receptacle debacle

'TELL THEM WHAT THEY'VE WON...'

Using the 2020 NEC, correctly identify the Code violation(s) in this month's photo — in 200 words or less — and you could win an Arlington Industries 18" Slider Bar and plastic box for mounting between studs with non-standard spacing. E-mail your response, including your name and mailing address, to russ@russleblanc.net, and Russ will select three winners (excluding manufacturers and prior winners) at random from the correct submissions. Note that submissions without an address will not be eligible to win.

MAY WINNER

Our lone winner this month is Kevin Redman, an *EC&M* reader from Escondido, Calif. Kevin knew that a service disconnect cannot be mounted this high. Having a meter socket mounted up high adjacent to a second-floor window is not a violation. But mounting a meter socket enclosure having an integral main breaker at this height is a violation. Section 230.70 requires the service disconnecting means to be installed at a readily accessible location. The definition in Art. 100 for "readily accessible" does not specify a maximum height, but needing a portable ladder to reach the disconnect proves it is not readily accessible. Section 240.24(A) requires circuit breakers and fused switches to be readily accessible and installed so the operating handle (in its highest position) is no more than 6 ft 7 in. above the floor or working platform. The breaker in this enclosure is probably 12 ft to 15 ft high. Another problem is the conductor drip loops appear to be too close to the window. Section 230.9 requires open conductors to have a clearance of 3 ft from windows designed to open.

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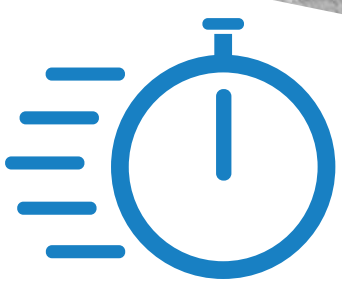

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