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THE StressPoint™

FOR EXPERTS | BY EXPERTS

A publication of Engineering Design & Testing Corp.

GFCIs VS AFCIs

The difference between Ground Fault Circuit Interrupters and Arc Fault Circuit Interrupters

EDT CASE STUDIES

A Selection of Recent Assignments

2019 CONFERENCE ATTENDANCE

Find out where you can connect with our Engineers

THE MEETING POINT:

Human-Machine Interfaces

Can a poorly designed user interface lead to a large loss? You'd better believe it!

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Engineering Design & Testing Corp. is an association of forensic engineers dedicated to the study, and interpretation of loss.

A Message from the President

Dear Friends,

This edition of our magazine finds us looking at ways that we can deal with failures associated with electrical technologies. The article on human-machine interface focuses on how to improve interface designs to reduce or eliminate failure. In the article about GFCI's and AFCI's our attention is directed toward mitigating the consequences of an electrical fault. Together the two articles highlight ways that reasonable steps can be taken to control the risk associated with a hazard.

In similar fashion, we look at other environmental concerns shown elsewhere in this edition: plastics pollution and climate change. Prevention, mitigation, or a combination are contemplated.

With continued striving to mitigate failures that have already taken place can come insights that enable the pursuit of prevention. As humans we are imperfect, but we can learn and make a better future. Let's keep up the effort.

Respectfully,

Mark D. Russell

Mark D. Russell, Ph.D., P.E.
President and Chief Engineer

THE STRESS POINT™ is published twice a year by Engineering Design & Testing Corp. for our clients and friends.

THE StressPoint™

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Corporate Contacts

President and Chief Engineer
Mark D. Russell, Ph.D., P.E.
(303) 799-3967
mrussell@edtengineers.com

Director of Business Development
Charles "Chuck" Jackson
(803) 796-6975
cjackson@edtengineers.com

Editor / Design and Layout / Creative Director
Danielle Newbanks
(803) 796-6975
dnewbanks@edtengineers.com

Post Office Box 8027
Columbia, South Carolina 29202
(800) 338-5227

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On the Cover: Image of operator programming buttons on control board panel

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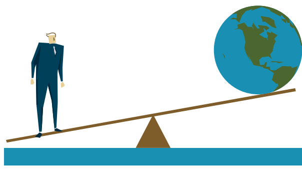
FEATURE

IN THIS ISSUE

DEPARTMENTS



> "Give me a fulcrum and a place on which to stand, and I will move the world."
>
> —*Archimedes, Greek Inventor and Mathematician*

EARTH'S PLASTIC PROBLEM

Our oceans are under assault; becoming a toxic waste dump for poorly discarded waste materials, but most particularly plastic. It is common knowledge these days that the chemical makeup for plastic materials such as plastic bottles, straws, plastic bags, etc. are not environmentally friendly and are non-biodegradable.

SO, WHAT'S THE BIG DEAL?

Plastic was invented in the late 19th century with mass-production starting around the 1950s when an estimated 2.3 million tons of plastic were produced. Almost 75 years later, the amount of plastic has grown exponentially to an estimated 448 million tons. Now, that's a lot of plastic.

YOU MAY FIND YOURSELF ASKING HOW DID WE GET HERE, AND WHERE DOES IT ALL GO?

Well, the answer isn't quite so simple. The truth is, no one knows exactly how much plastic ends up in the ocean, but scientists estimate that it could be between 5.3 million and 14 million tons each year. The majority of the waste has been carelessly disposed of onto land or into rivers which ultimately ends up in our oceans. Some beaches are covered knee-deep in plastic waste and others have what appears to be colorful sand which is actually small plastic beads the size of grains of sand or microplastic. It is unclear exactly how long it takes for plastic to degrade into its component molecules; scientists estimate around 450-plus years. An extremely long degradation process is one reason we are unable to pinpoint exactly where it all ends up, but it's safe to guess that it's everywhere.

A big concern about plastic in our oceans isn't the physical pieces of plastic, but rather the chemical makeup of the various plastics that pollute the sea affecting the marine life, which we ultimately consume. Ocean plastic kills millions of marine animals every year. Some, such as turtles and fish, are visibly harmed by becoming strangled or trapped in plastic waste. Most, such as whales & plankton, are harmed by consuming the smaller microbeads of plastic which they cannot digest.

Our plastic problem is just as complicated as climate change, but it starts with finding ways to stop plastic from getting into the ocean. Scientists & researchers have suggested that there are two ways that we can fix this. First, we redesign plastics with a readily biodegradable material. Second, we incorporate a global waste management tax which would ultimately help fund waste management in underdeveloped countries for education on how to properly dispose of this material.

Observing CLIMATE CHANGE FROM DEEP SPACE

The Deep Space Climate Observatory or DSCOVR is NOAA's (National Oceanic and Atmospheric Administration) first working deep space satellite originally designed by NASA for the observation of Earth. It is one of several Earth Observation satellites and is operated by NOAA from the NOAA Satellite Operations Facility in Suitland, Maryland.

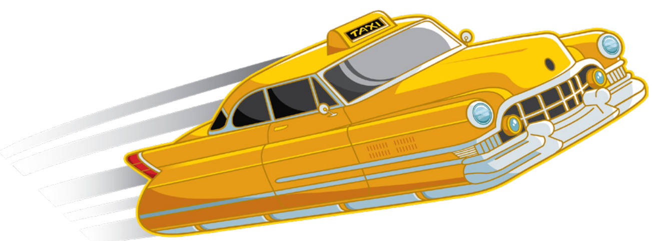
DSCOVR was originally proposed for Earth Observation by former Vice President Al Gore back in 1998. Due to budgetary restrictions and the end of the Bush Administration, the spacecraft laid dormant until 2011, when NASA, NOAA & the US Air Force agreed to move forward with the DSCOVR Program. After a few years of tweaks and testing, DSCOVR was officially launched into space by SpaceX on February 11, 2015.

WHERE IS IT LOCATED & WHAT DOES IT DO?

The satellite was placed in space to have a continuous view of the sunny side of the Earth and is uniquely set in a location never-before-used by operational spacecraft, approximately 1 million miles away, between the Earth and the Sun. Although data from DSCOVR will serve a multitude of scientific purposes, it was primarily designed to monitor and deliver valuable space weather measurements, such as solar winds, and to provide early warnings of potential coronal mass ejections (following solar flares) which could cause global power outages.

Additionally, DSCOVR observes daily Earth phenomena such as changes in ozone, aerosols, reflectivity, vegetation cover, cloud height, cloud fraction (what fraction of an area was covered by clouds on average each month), and overall climate monitoring. DSCOVR takes pictures of the Earth every two hours and submits these images along with scientific data. The image data it obtains transfers more quickly than from any other satellite, and the acquired space data it collects allows for accurate weather forecasting that is then carried out in the NOAA Space Weather Prediction Center in Boulder, Colorado.

DSCOVR has been in operation for four years. The ongoing acquisition of data will allow scientists to continue their study of the rapid progress of Global Warming and Climate Change.



The Future of Mobility: AUTONOMOUS VEHICLES

Remember when you were younger and would see flying cars in cartoons like "The Jetsons" or in movies like "Blade Runner"? Movies and cartoons depicting the future often included flying cars in their vision. Here we are in 2019, and we still don't have flying cars. So what gives?

While flying cars are currently not in the works, autonomous (or self-driving) cars are being developed, tested, and hitting the road. Most new cars these days are "level 3" vehicles, which means that it is operated by a human but have "smart" technology capabilities such as lane assist or smart cruise control. However, Tesla recently unveiled it's first custom AI chip, meant to be installed in two particular models to make the car autonomous (the Tesla Model S & X). This upgrades the vehicle to a "level 4," meaning there are two ways the car can be driven: by a human or the installed AI chip can take over and drive the car completely by itself. The plan is to ultimately have these two models equipped with the necessary hardware and software to convert them into fully driverless vehicles. This is just the next step into our future.

What do you think? Are we ready for vehicle autonomy? Only time will tell.

Case Studies:
A SELECTION OF RECENT ASSIGNMENTS

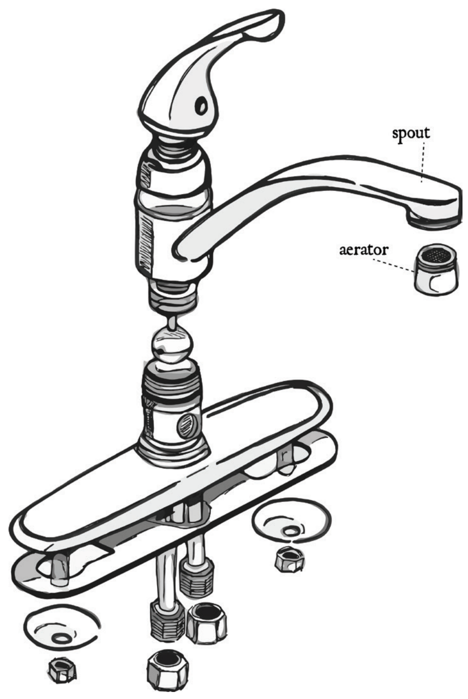
THE FOLLOWING ARE SELECTIONS OF RECENT ASSIGNMENTS (CASE STUDIES) BY A FEW OF EDT'S ENGINEERS ACROSS THE COUNTRY.

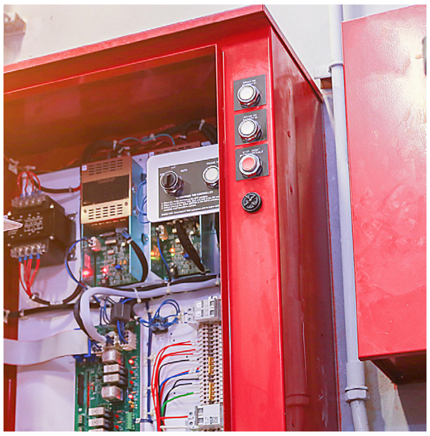
HOW CLEAN IS YOUR WATER?

By: Kenneth R. Ridings, P.E. | Oakland, California District Office

Have you ever wondered how clean the water is coming out of your bathroom and kitchen faucets? Homeowners are supplied potable water from the local water company and as water travels through the water company pipes and into the house pipes, particles and debris from the pipes may collect in the water along the way. Most faucets are equipped with an aerator and a small mesh screen that threads into the faucet spout. The primary purpose of the aerator and screen is to mix air into the water which restricts the flow and saves water.

However, over time, particles and debris in the water may become entrapped by the screen and further reduce water flow through the faucet. A sign of a buildup of debris on the screen is an uneven flow of water through the faucet. When this happens, the aerator and screen are easily removed by hand or wrench and can be cleaned and reinstalled. Occasional cleaning of the screen can improve the flow and cleanliness of water.





FIRE PUMP ENGINE AND CONTROL SYSTEM DAMAGE

By: Columbia, South Carolina District Office

Electrical components on the engine and the control system for a fire pump were damaged after electrical arc welding had been conducted in a facility. It was determined that the personnel doing the welding connected their ground clamps to metal supports for the fire pump control system. The metal supports had not been electrically bonded to the building frame. As a result, the welding current passed through the fire pump engine and control system.

MISUNDERSTOOD NPT ASSEMBLY PROCEDURE

By: David A. Bosko, MSME, P.E., P.Eng., CFEI | Oakland, California District Office

Many flood damage incidents are attributable to fractured brass NPT (National Pipe Taper) threaded pipe fittings. These fittings often fracture as a result of improper assembly torque. Unfortunately, because of under-trained or careless installers, many NPT fittings fracture because the installers mistakenly believe that the tighter the connection, the better the seal. This misunderstanding can lead to excessive stress and fracture of the fitting.

NPT fittings were initially designed for water pipe plumbing as the tapered fittings, when combined with pipe tape or dope, provide a reliable watertight seal. However, the procedure to assemble NPT fittings is often misunderstood by professionals and laypersons alike. NPT fittings do not form a watertight seal as a result of the assembly torque. NPT fittings are sealed by the entrapment of pipe tape or dope between the space that exists, regardless of tightening torque, between the thread peaks and valleys of the components being joined. Without the use of a sealant, a helical path between the threads will exist through which water can escape (see Figure).

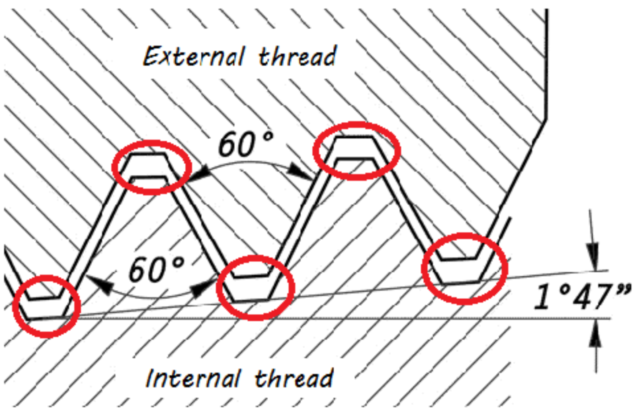


Figure – Red circles show where a helical gap between the thread peaks and valleys exist for water to escape without sealant (Figure from https://www.hoseassemblytips.com/what-is-npt/)

The ANSI B1.20.1 Standard covers dimensions and gaging of pipe threads for NPT threaded connections. ANSI B1.20.1 states with regards to tightening torque, "Due to application-specific variables such as materials, wall thickness, operating pressures, etc., no guidance is given in this Standard regarding joint-tightening torque. However, joints should be tightened beyond the hand-tight engagement position. Advancing the joint past hand-tight creates interference between external and internal thread flanks, produces a seal (with the use of a sealant), and helps prevent loosening of the joint. Overtightening may be detrimental to the sealing function of the joint."

Plumbing component manufacturers and plumbing professionals advise that when joining NPT fittings, the components should be fitted hand tight and then only wrench turned one to three turns further. However, the amount of further tightening should be judged by "feel." Connections should be snug but not tightened to the point that the components turn no further without great effort. The lubricating properties of Teflon tape or sealant paste, which allow components to turn more easily, make it even more critical to be careful in not overtightening during assembly. It is also commonly cautioned not to use more than 1.5 to 3 wraps of sealing tape as an excessive buildup of sealing tape can create added stress on the joint as well.

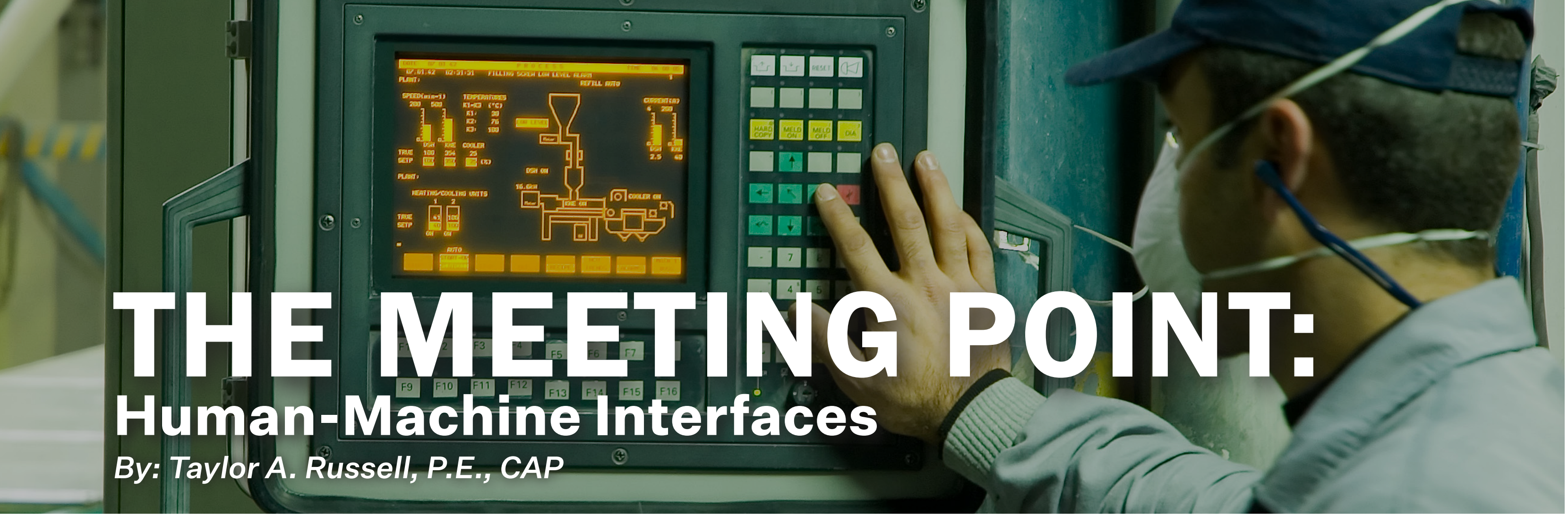
FROZEN & BURST CHILLED WATER COIL

By: Thomas W. Dombrowski, P.E. | New England District Office

During construction of a 1.25 million square foot building, two chilled water cooling coils associated with the air-handling units experienced ruptures and caused significant water damage to the building.

It was observed that the air-handling units were 100% outdoor air units (i.e. no return air from inside space) equipped with a steam heating coil, a chilled water cooling coil and with a low temperature control (freezestat) located on the air inlet side of the chilled water coil. The function of the freezestat is to protect water coils from exposure to freezing air temperatures by shutting down the air-handler if the air approaches freezing temperatures.

It was determined that the freezestat element sensors were not mounted in a manner consistent with the manufacturer's installation instructions and were, therefore, inadequate to protect the steam and chilled water coils from exposure to freezing conditions.



THE MEETING POINT:
Human-Machine Interfaces

By: Taylor A. Russell, P.E., CAP

CAN A POORLY DESIGNED USER INTERFACE LEAD TO A LARGE LOSS? YOU'D BETTER BELIEVE IT!

Who among us has not occasionally hit the wrong button on the remote control, or had trouble getting a device to work correctly because it was left in the wrong mode? Ever leave your smartphone volume up too high after watching a video earlier in the day? In day to day life, the results of these mistakes are just mild annoyances or the occasional ringing eardrums. When we see the same mistakes made with machines, vehicles, or process controls, the consequences can be far more serious.

Large losses resulting from poor interface design are not a new problem. One of the contributing factors to the 1979 Three Mile Island nuclear accident was a poorly designed indicator light. The light indicated when a close command was sent to a valve, rather than activating based on feedback from the valve itself. For several hours, as the situation at the nuclear plant deteriorated, the operators believed the valve was closed when in fact it was stuck in the open position. The resulting confusion delayed proper action for several hours, exacerbating an already bad situation.

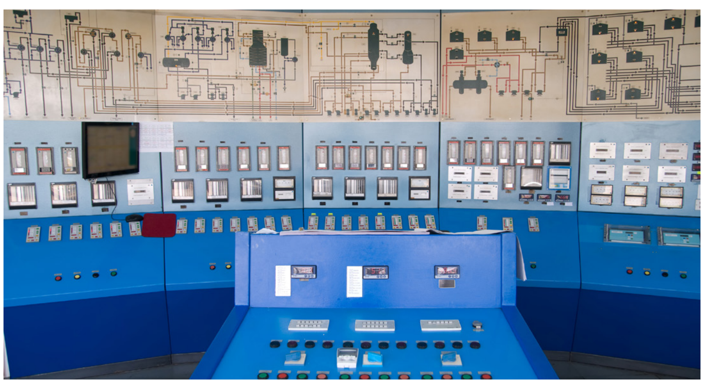


Fig. 1 - Traditional Industrial Control Room

THE ROOT OF THE PROBLEM

These days, automation is becoming ubiquitous in everyday life. We now automate everything from our homes, to commercial buildings, to industrial plants. As we place the control of increasingly complex machinery and processes into the hands of computers and controllers, the way in which people interact with these systems has demanded increased scrutiny. Investigations into incidents and accidents have repeatedly shown that a poorly designed interface can seriously confuse, impede, or even mislead the people tasked with operating a system. The result of this confusion will inhibit or delay operator response to abnormal situations, turning manageable situations into disasters.

The manufacturers of consumer electronics, such as smartphones and tablets, spend a great deal of time and resources working on user interfaces. A product with a clunky, confusing, or non-intuitive interface will quickly find itself driven out of the market by better-designed competitors. For commercial and industrial control systems however, the design of the interface has historically taken a back seat to other performance measures, sometimes with catastrophic results.

Investigations into commercial and industrial accidents and workplace safety have found that human error caused over 90% of reported incidents. “Human error” can mean a wide variety of things, but a primary factor in commercial and industrial incidents is often a lack of, or loss of, situational awareness by the system operators. The consequences of operators lacking or losing awareness can range from energy waste, to production loss or business interruption, to facility and equipment damage, to environmental contamination, or even injury and death.

MODE CONFUSION

Mode confusion (sometimes called "mode drift") is being confused about, or simply forgetting, what mode of operation a system is in. It is simply the result of human nature, but it's often overlooked when human-machine interfaces (HMI's) are designed. Who among us hasn't missed a phone call because we forgot we switched the phone to silent mode during a meeting? It seems like a simple concept, but as the automated systems have grown in complexity, so has the number of modes under which they can operate. The more modes available, the greater the chance of confusion.

An example of just how dangerous mode confusion can be took place in 2013. The Seastreak Wall Street, a passenger ferry, slammed into a Manhattan pier, injuring 79 people and causing hundreds of thousands of dollars in damage to the vessel and the pier. The ferry captain had selected a seldom-used control mode during the voyage. Forgetting this, when he transferred control from one bridge station to another in preparation for docking, the engines did not respond as expected. By the time the confusion was resolved only a few moments later, it was already too late, and the vessel could not be slowed in time to avoid a collision. The National Transportation Safety Board report on the incident cited, among other factors, that "…the propulsion control system on the Seastreak Wall Street used poorly designed visual and audible cues to communicate critical information about mode and control transfer status"

The result of mode confusion is not always so dramatic. A commonly encountered issue with building management systems (or alternatively, building automation systems) occurs when a single piece of equipment is left in the wrong mode.

Fig. 2 – Damage to Seastreak Wallstreet, Source: NTSB Accident report

Building engineers often have to disable automatic or remote control of a device to perform maintenance. If that device (say a chiller or valve) is left in local/manual control mode and operators are not alerted to this fact, the result can be massive energy waste, flooding, or premature failure of the equipment.

DIGITAL INFORMATION OVERLOAD

In the manufacturing and industrial arenas, operations are often overseen or run from a centralized control room. In days gone by, these rooms were often filled with large control panels, or control walls, filled with buttons, switches, and gauges. When these systems were designed, each and every device on the control panel had to be wired individually, so great care was exercised in selecting what functions and measurements were included.

In modern times, these control panels have been replaced with computer screens, and even the heaviest industrial machinery is commonly connected to a control system network. The practical takeaway from this is that where each piece of machinery used to have a few key parameters to monitor, they often each now have hundreds of available data points.

Building management system interfaces can often display data from hundreds of devices, crammed into one or two confusing screens.

The result is that operators are overwhelmed with digital data. In a corresponding development, this data is often displayed

Fig. 3 – Modern equipment package HMI

(Continued on the next page...)

numerically, sometimes in dozens of places on a single screen. Studies have shown that the human brain doesn't easily process numerical values. It requires an operator to read a number and compare that number mentally to a known "good" value, and then make a judgment. When this is done with a single value, it's not all that difficult. When keeping track of dozens of numbers, it becomes problematic.

ALARM MANAGEMENT

Another byproduct to the digital and networking revolution is the almost limitless ability of designers to create alerts and alarms. In those old-style control rooms, audible alarms had to be individually wired to annunciators, to trigger horns and flashing lights. Since each had to be wired individually and had measurable installation costs, great care was exercised to ensure that only the critical information was included. In modern systems, creating an alarm costs nothing in terms of additional hardware design, and is often accomplished by a few clicks of a mouse.

Again, we can see how this quickly became overwhelming for system operators. Alarm "floods" have become a major issue and instituting alarm management programs has become an important element of control system design.

COLOR, ANIMATION, GRAPHICS, AND LAYOUT

Control systems were, in the days of yore, their own world. The hardware and methods used were unique to control applications. As modern systems developed, they began to utilize more and more off-the-shelf technology. This led to the use of modern computers, monitors, touch-screens, and more recently, smartphones and tablets in control systems. This gave designers an almost unlimited palette with which to create these interfaces and at the time, there were almost no standards or best practices to follow.

The results were predictable. Some designers tried to recreate engineering diagrams and schematics on a screen. Others tried to paint a picture of the physical reality, actually drawing the machinery and equipment on the screen, peppering the displays with numerical information. The addition of wild color schemes, animation, and graphics has led to displays which are confusing, distracting, hard on the eyes, and provide lots of data, but very little useful information to the operator. Poor arrangement of the information and selectable objects can also create problems. In January of 2018, an emergency drill at the Hawaii Emergency Management Agency was in progress. One employee mistook the drill for a real event and initiated a "push notification" sending an emergency alert to all cell phones in Hawaii notifying them of an inbound missile attack. It took 38 minutes to cancel the alert and notify Hawaiians of the false alarm. One of the key items identified in the investigation was a poorly designed software interface that allowed a drill to initiate a real alarm but had no means of sending a cancellation or false alarm notice.

INDUSTRY STANDARDS AND BEST PRACTICES

The good news is that industry groups and professional organizations have closed the gap between the development of the interface technologies and the development of associated standards. The International Society of Automation (ISA), and the Electric Power Research Institute (EPRI), amongst other industry groups, have studied the problems and developed standards and guides for better interface design.

The many details and factors are beyond the scope of this article, but here are some of the key ideas:

> "...there is no problem so great or so complex that it cannot be blamed on the pilot."
>
> -Earl Weiner

• HMI's should be intuitive, enhance the situational awareness of the operator, and assist in the detection of, and response to, abnormal situations. There should be no confusion or guess-work on the part of the operator in determining what is taking place or in what mode the system is operating.

• Grayscale color design should be used to reduce eye-strain and enhance the use of other colors. Use of color should be judicious and consistent (e.g. if the color red is used to indicate an alarm, it should be used for no other purpose).

• Key performance data should be displayed in an analog format, or in graphs and trends. Values should be presented in context, not just as raw numbers.

HUMAN FACTORS IN DESIGN

While progress has been made, many interfaces are still poorly designed. Engineers and system designers tend to design for humans as they would like them to be, rather than how they are. A growing movement in recent decades has emphasized design based on the needs of the user. A central premise of this movement has been to resist the urge to blame the operator anytime something goes wrong. As Earl Weiner, a renowned pilot and safety expert who advocated for human-focused design for the airlines and NASA once famously stated: "…there is no problem so great or so complex that it cannot be blamed on the pilot."

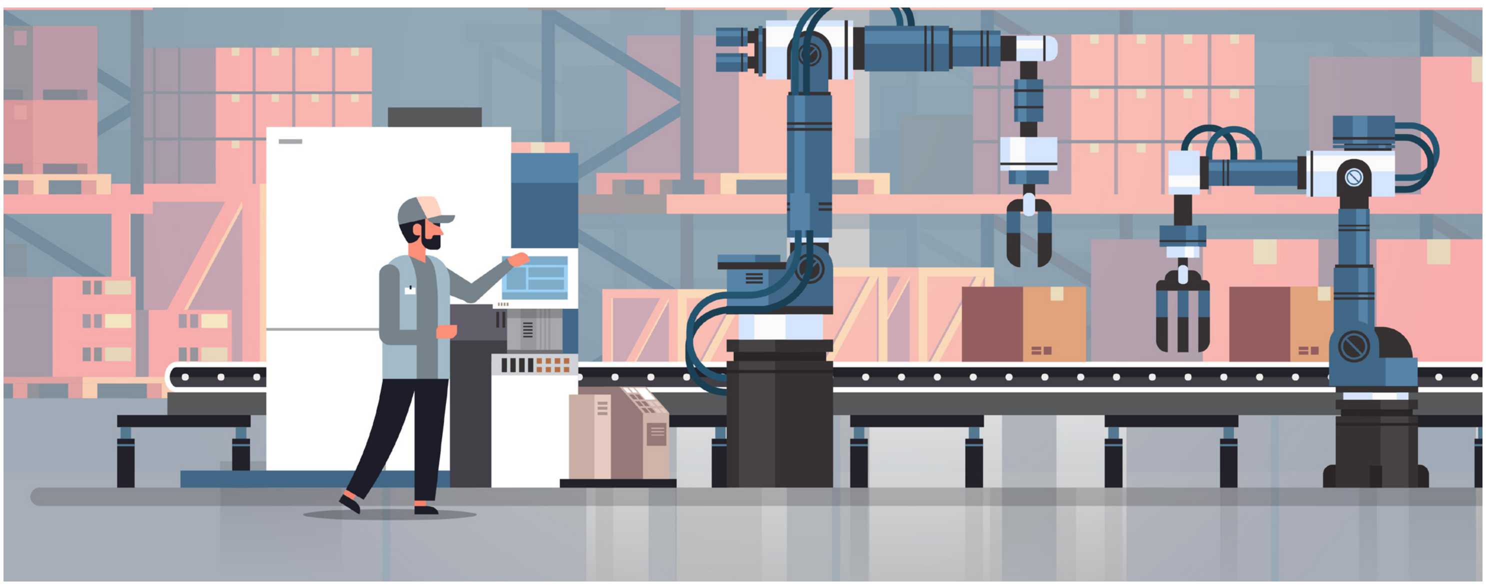
Indeed, when things do go awry, the response from both the government and the business world has been to focus on the operator, training, checklists, and procedures, etc. In reality, it's time to take a closer look at the crucial interface between the human and the technology.

ABOUT THE AUTHOR

TAYLOR A. RUSSELL, P.E., CAP

Oakland District Office | Concord, California

Mr. Russell provides consulting services in the areas of power systems (industrial, commercial, and residential) and in commercial and industrial automation. His expertise includes code compliance, failure analysis, damage assessment, and repair/replacement analysis, power generation and distribution systems evaluation, building automation systems (BMS/BAS), and industrial instrumentation and control systems (PLC/SCADA/DCS). A Northern California native, Mr. Russell followed a family tradition of serving in the United States Army before pursuing his higher education, receiving an honorable discharge. He attended New Mexico State University, graduating with a Bachelor's degree in Electrical Engineering with a focus on power systems. Prior to joining EDT, he spent two years in private consulting developing power grid and utility computer models in addition to having previously spent the next nine years working for the City of San Francisco designing power, instrumentation, and control/automation systems for city buildings, wastewater treatment facilities, port facilities, and pump stations.



GFCI VS. AFCI:
What's the Difference?

By: Edgardo López, P.E., CFEI & Jimmy H. Beard, M.E., P.E., CFEI

GROUND FAULT CIRCUIT INTERRUPTERS (GFCIs)

With electricity, there is the hazard of an electric shock or even an electrocution. Ground Fault Circuit Interrupters (GFCIs) are designed to minimize the risk associated with this hazard.

Since their introduction dating back to 1961, GFCIs have served to reduce the risk of electric shocks inside and around homes. A GFCI is a device that is installed in a receptacle or a circuit breaker or built into an extension power cord.

To protect against electrical shocks, the device makes a comparison between the current going through the system's hot wire and the current going through the system's neutral wire. When everything is operating as intended, the same amount of current flows in both wires. Should there be a difference in these current values, the GFCI stops the flow of current, creating an open circuit within the receptacle, the breaker, or the extension power cord. The interruption occurs very fast – on the order of 25 milliseconds (0.025 seconds) or less.

Consider, for example, a power drill that malfunctions while in use, energizing the metal casing of the drill. The amount of current from the receptacle to the drill will equal the sum of the current that returns from the drill to the receptacle and the current flowing through the person using the drill to ground. An electrical shock would be felt by the person due to the current flowing through him or her to ground. However, had the drill been connected to a GFCI, the GFCI would have sensed the amount of current difference returning to the receptacle and would have tripped, opening the circuit and stopping the current flow. The response would be fast enough to prevent the electric shock.

A requirement for GFCIs was first added to the National Electric Code (NEC) in 1971. The requirement began with single-phase receptacles in use at construction sites. Requirements expanded over time. In subsequent NEC editions, many other locations were addressed where the hazard of an electrical shock could be present. Today, GFCIs are required in locations such as kitchens, bathrooms, outdoor areas, garages, crawlspaces, basements, boathouses, and laundries.

Figure 1. GFCI Wall Outlet.

ARC FAULT CIRCUIT INTERRUPTERS (AFCIs)

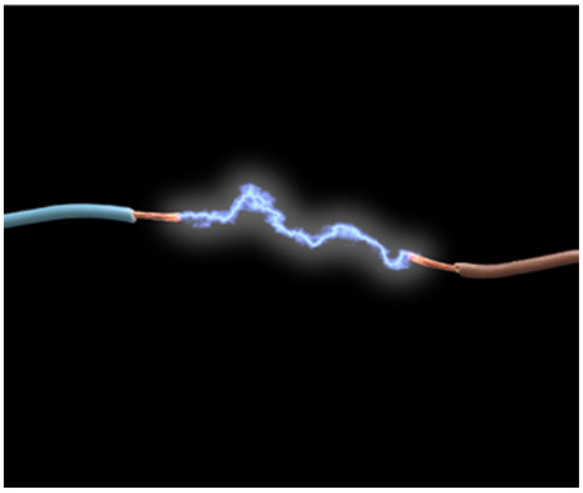
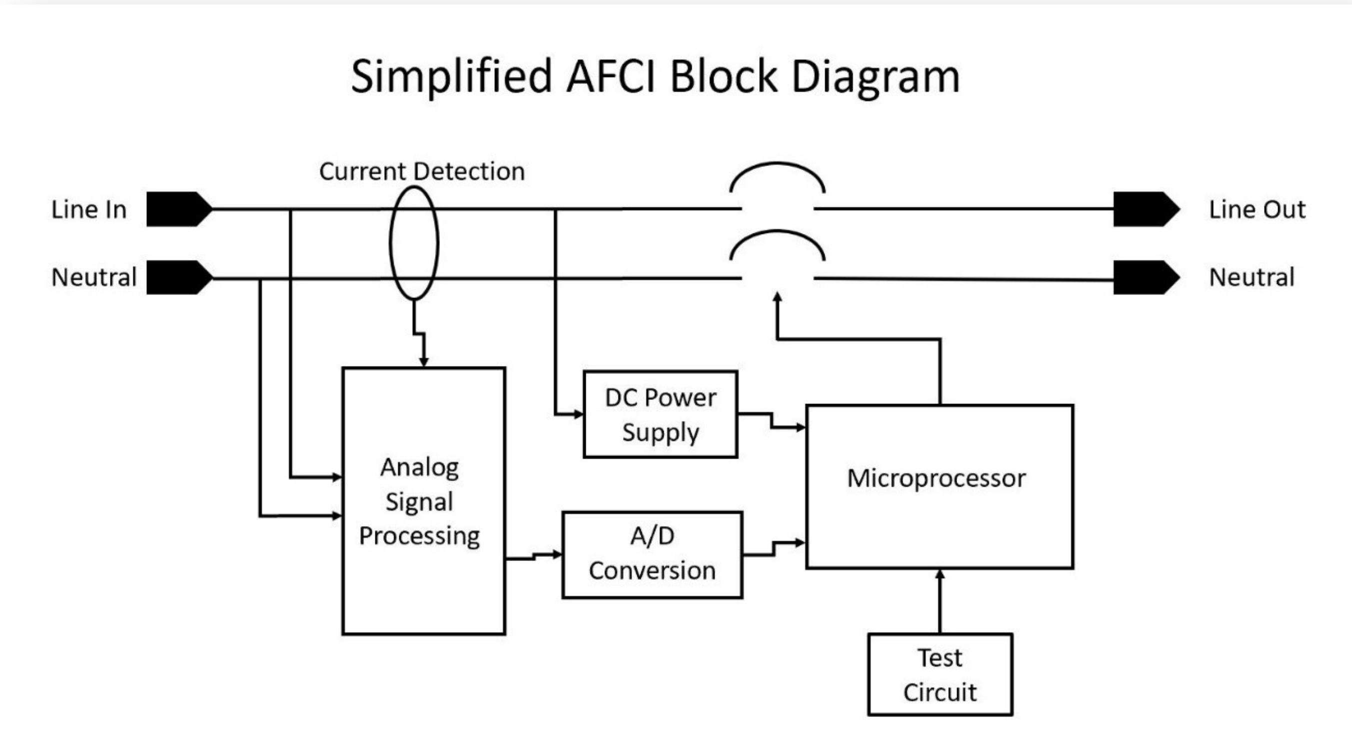


Figure 2. Electrical Arc

An electrical arc is the flow of electrical current through a gap between two separated conductors. One very familiar form of electrical arc is lightning. Lightning is an electrical arc through the atmosphere and is well-known for its ability to start fires. But there are other, less well-known sources of electrical arcs that also have the potential for starting fires. The electrical arcs that can form in the wiring in our homes can also be a potential fire hazard.

Arcs between electrical conductors (wires) can occur when the conductors are energized and in close proximity to each other. If the insulation between the wires is damaged, electrical current can begin to flow through the gap between the wires, creating an electrical arc. Electrical arcs typically emit bright light and can generate temperatures of several thousand degrees. The heat that is generated by the arc creates a potential fire hazard.

Because traditional electrical protection devices like fuses and circuit breakers do not provide adequate protection against arc-induced fires (Douglas A. Lee, 2002), a new type of device is needed. Recent advances in technology have resulted in the development of the Arc-Fault Circuit Interrupter (AFCI). This type of device is microprocessor-controlled and monitors the current flow in a protected circuit (MacBeth, 2003). The microprocessor in an arc-fault circuit interrupter will continuously monitor the voltage and current flowing in a circuit and interrupt the current flow if an arc is detected.



Arc-fault circuit interrupters have been required as part of the National Electrical Code since 1999 and were initially required only in bedrooms. However, the National Electrical Code requirements have been updated several times to include all 15- and 20-ampere, 120-volt circuits that supply lighting, receptacles, and other outlets. These requirements generally do not include bathrooms, unfinished basements, garages, and outdoor areas where ground fault protection is typically required (National Fire Protection Association, 2017).Arc-fault circuit interrupters are also required where certain modifications are made to existing wiring.

(Continued on the next page...)

Figure 3. AFCI Circuit Breakers installed in a load center

SO, WHAT'S THE DIFFERENCE?

The major difference between AFCIs and GFCIs is that an AFCI is designed to prevent fires that are caused by electrical arcs. GFCIs, on the other hand, are designed to prevent electrical shocks. AFCIs monitor the electrical current for high-frequency components that are characteristic of electrical arcing, while GFCIs simply compare the outgoing and incoming currents to make sure that they are equal. If the electrical current entering the GFCI equals the current that went out, then we can be assured that no electricity has escaped the electrical system, creating a shock hazard.

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ABOUT THE AUTHORS

EDGARDO LÓPEZ, P.E.

Columbia District Office | Columbia, South Carolina

Mr. López provides consulting services in electrical engineering for commercial, industrial and residential systems, including failure analysis, damage assessment and repair/replacement analysis; power generation and distribution systems evaluation; fire origin and cause investigations.

Prior to joining EDT, Mr. López was an engineering and project manager working in a variety of industries including power, pharmaceutical, building construction, building maintenance, and waste water treatment facilities. His experience includes electrical failure analysis; damage assessment; construction management; codes, permits and standards evaluation; power systems operation and maintenance; and the operation and maintenance of electrical and mechanical equipment.

STATE LICENSES:
Georgia, Florida, North Carolina, Puerto Rico, and South Carolina.

JIMMY H. BEARD, M.S.E.E., P.E., CFEI

Birmingham District Office | Birmingham, Alabama

Mr. Beard is a graduate of Mississippi State University. In 1996, he earned a Master of Science in Electrical Engineering from Mississippi State with a focus in communications systems. He provides consultation in the areas of cause and origin analysis of electrical system failures; scope of damage and analysis of costs to repair or replace electrical equipment; and engineering consultation related to fire investigation.

Prior to joining the firm, Mr. Beard spent 28 years in the communications industry. He has experience in design, construction, and maintenance of outside plant metallic and fiber optic facilities, pressurized cable systems, and digital loop carrier systems. Most recently as an Area Manager in Internet and Entertainment Services, he acquired experience in disaster recovery planning and operations, customer service metrics and analysis, and IP networking.

STATE LICENSES:
Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, and Tennessee.

2019 EDT CONFERENCE ATTENDANCE

CHARLES W. JACKSON, MBA
Director of Business Development

Greetings Everyone!

It has been a busy first half of the year and the second is expected to be just as busy. EDT has covered a lot of ground, and we are connecting with clients old and new. It is great traveling all over the country and seeing people who know me and our engineers. I love hearing a client tell me they are currently working with one of our engineers and how great they think that engineer is. If you are attending a conference, look for EDT!

EDT will not only be attending as an exhibitor, but we will also be presenting at a number of conferences this summer and fall. In August, we will have Taylor Russell (Electrical) from our Oakland, CA office presenting at the Claims Conference of Northern California in Tahoe, CA. In October, our Seattle Engineers will be presenting at the NAIIA Western in Las Vegas, NV. Also in October, Dr. David Hanks (Civil/structural) and Kyle Minden (Mechanical) will be presenting at NASP in Washington, D.C.. Finally, you can catch Nick Pontillo (Civil/structural) and Kevin Kirchmer (Civil/structural) at the PLRB Regionals in Minneapolis, MN, (September 10-11) and Concord, NC (October 22-23).

If you have need for an expert to present at your meeting or conference, let us know. You can contact me, Chuck Jackson, at cjackson@edtengineers.com or Dan Vipperman, Director of Strategic Marketing, at dvipperman@edtengineers.com.

WE CAN PRESENT ON A TOPIC OF YOUR CHOICE OR ONE WE ALREADY HAVE PREPARED.

We hope to see you soon!

CONFERENCE	LOCATION	DATES
Alabama Defense Lawyers Association (ADLA)	Destin, FL	June 12-15
Greater Kansas City Claims Association	Kansas City	June 20
Technology and Claims Symposium (PLRB)	Frisco, TX	June 25-26
St. Louis Claims Managers Council Annual Charity Scramble Golf Tournament	O'Fallon, MO	August 1
Claims Conference of Northern California	Tahoe, CA	August 28-30
PLRB Central	Minneapolis, MN	September 10-11
NAIIA Western Region	Las Vegas, NV	October 3-4
NAIIA Northeastern Region	Syracuse, NY	October 9-11
National Truck & Heavy Equipment Claims	Memphis, TN	October 10-12
PLRB Eastern	Concord, NC	October 22-23
NASP 2019 Annual	Washington, DC	October 27-30
PLRB Large Loss	Jacksonville, FL	November 13-15
International Workboat Show	New Orleans, LA	December 4-6

EDT
Forensic Engineering & Consulting
Post Office Box 8027
Columbia, South Carolina 29202-8027

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ENGINEERING DESIGN & TESTING CORP.

Corporate Office
1022 State Street
Cayce, SC 29033
(803) 796-6975

Birmingham District Office
2748 Alton Rd. Suite 100
Birmingham, AL 35210
(205) 838-1040

Columbia District Office
1105 State Street
Cayce, SC 29033
(803) 791-8800

Charleston District Office
1668 Old Trolley Rd. Suite 200A
Summerville, SC 29485
(843) 832-1052

Charlotte District Office*
5009 West W.T. Harris Blvd.
Suite A
(Northridge Business Center)
Charlotte, NC 28269
(704) 523-2520

Cleveland District Office
925 Engle Rd. Suite C
Middleburg Heights, OH 44130
(440) 239-0362

Dallas-Fort Worth District Office
990 N. Bowser Rd. Suite 740
Richardson, TX 75081
(972) 437-6200

Denver District Office
7342 South Alton Way, Suite 7A
Centennial, CO 80112
(303) 799-3967

Houston District Office
9756 Whithorn Drive
Houston, TX 77095
(281) 463-4548

Kansas City District Office
8405 Melrose Drive
Lenexa, KS 66214
(913) 859-9580

Mid-Atlantic District Office
7905 Browning Rd. Suite 114
Pennsauken, NJ 08109
(856) 662-0070

Mobile District Office
Post Office Box 1378
Daphne, AL 36526
(251) 210-6146

Nashville District Office
130 Seaboard Lane
Franklin, TN 37067
(615) 915-5255

New England District Office
425-C Hayden Station Rd.
Windsor, CT 06095
(860) 285-8000

Oakland District Office
2221 Commerce Ave. Suite A
Concord, CA 94520
(925) 674-8010

Orlando District Office
750 S. North Lake Blvd. Suite 1020
Altamonte Springs, FL 32701
(407) 865-9900

Santa Rosa District Office
52 Mission Cir. #124, PMB 167
Santa Rosa, CA 95409
(707) 578-9030

Seattle-Tacoma District Office
2006 48th Avenue Ct. Suite E
Building 11, Fife, WA 98424
(253) 345-5187

South Florida
Post Office Box 590487
Fort Lauderdale, Florida 33359
(954) 743-4500

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