Director's Welcome

Greetings,

It's a busy time, so busy that we didn’t get a Winter newsletter out. I hope that all of you are staying busy too, but not so much that you can’t join us this October for ISA@Montreal 2018, a new multi-dimensional automation experience. CONDES is proud to be a part of this joint symposium with the other technical divisions, and I can’t wait to see all of the speakers being lined up. No matter your industry or role, I think you’ll find something useful and interesting. The event is 15-17 October, immediately following the Fall Leaders Meeting.

In this newsletter you’ll also find a whitepaper on data analytics in building automation systems. I hope that you enjoy it, and please don’t hesitate to send me any feedback or questions (j.parsons@jacobs.com). We’ll follow up in the next newsletter with your thoughts and maybe another whitepaper from you. Are you doing something new and exciting and want to share it with the ISA community? This is a great place to publish your ideas and get feedback from others in the automation construction and design world.

The ISA doesn’t work without its members. We are here to both serve the automation community and learn from it. Your membership is important, but so are the contributions you can make to the community, whether it’s in a leadership role or as a technical adviser to a standards committee, we all have something to add to this profession. Thank you for doing what you do and we’ll see you in Montreal.

- J Parsons, Director
Newsletter Editor’s Welcome

To all division members, welcome to the summer 2018 issue of our ISA Construction & Design newsletter. As we reflect on another season passed, I think we can all agree that there is much to look forward to in the automation world with new technologies and developments in application interfaces. It seems like it wasn’t all that long ago when Ethernet was considered an unsafe protocol and today we are exploring technologies that bring plant data to our homes and smart phones.

In this issue you will find an interesting article from Wikipedia on the history of Instrumentation and how far mankind has come within it, use this the next time you have to explain to someone what you do. There’s also a tidbit about cable testing and a white paper on “Data Analytics in Building Automation” from our very own J Parsons.

I truly hope you enjoy this summer newsletter and as always, you are welcomed to provide feedback or ideas towards future newsletters. Have a fantastic summer!

Yours truly
Ray Vandale
CONDES Newsletter Editor

“Ray’s do’s and don’ts”

I just completed a project in which we installed a very large oil sales pumping package into an existing facility. The existing facility had been around for many years and as such had many modifications completed by several engineering firms. The existing structural steel and cable tray was at capacity and the costs to install new structural supports and tray would have been very large. The distance from the pump package to the nearest Motor Control Center was 600 feet and so the decision was made to bury the new Armored Teck cabling required to facilitate this installation.

Burying cable also comes at a cost by the time you factor in equipment to complete the trenching, laying sand for bedding / backfill as well as the labor to finesse the installation. However, in this case burying the cable would be much more cost and time effective. Extra cable was taken into effect to allow for futures and the routing was thoroughly mapped on the plot plan for future reference.

This is where the quality testing of the cable becomes paramount. All Electrical / Instrumentation contractors have testing methods and documentation within their Quality Management Plan but certain aspects of quality can sometimes be overlooked or waived in the essence of budget and schedule. Relying on the manufactures test data is not enough to go by as cabling can experience damage in the installation process that may not be picked up on a visual inspection. Anything that we had saved would have been all for not if one of those cables was damaged and now buried in that trench.

Final testing of cables after installation could find any anomalies whether by the manufacturer or installer and eliminate commissioning or start-up constraints as well as future degradation of equipment from a maintenance perspective. Point to Point or continuity checks will also eliminate commissioning troubleshooting and guide you to a much smoother start-up.

Cable testing should be identified within every Request for Quotation as well as inspected and verified by the client’s site inspector upon completion of work.

Today’s do is “Do the quality testing of cabling to ensure you do not hinder your projects success”!
Three Strategies for Cable Testing

By Matt Collins, Business Development Manager, ide Systems

While we may like to think of the modern world as being wireless, cabling remains an important element in almost all electrical systems. It’s therefore essential that engineers know how to test cables effectively to ensure they are fit for purpose. This article explains what engineers should look for when testing electrical cabling.

It was in the early days of the twentieth century when renowned inventor and electrical engineer Nikola Tesla first conceived of wireless power transmission. Tesla’s idea was to erect a radio tower that could draw electricity from a power plant in Niagara Falls and transmit it wirelessly around the world. He described this as being “the motive power and thought transmitter of the near future”.

More than a century later, wireless power transmission hasn’t quite lived up to Tesla’s promise. Instead, the increasingly electricity-reliant equipment and systems of today still require the use of cabling to receive power. Yet this is only possible if the cable is in a suitable condition and fit for purpose, as a damaged or compromised cable run is unsafe and ineffective.

It’s therefore essential that engineers understand what to look for when inspecting and testing a cable. As a temporary power distribution specialist, ide Systems’ rental service supplies cabling to everything from music festivals to commercial facilities. All cables go through a three-step process of ensuring that cabling, whether it is single or multi-core, is fit for purpose.

Visual inspection

The first and most obvious step is to visually inspect for any signs of damage to the insulation of the cable and the plug and socket connectors. For temporary applications, the most common observable types of damage are slashed, shredded, crushed and cracked connectors.

However, not all types of damage are immediately identifiable. While it is easy to spot a slashed cable, many engineers may observe factors such as dirtiness as little more than an aesthetic problem. In reality, a mud-soaked cable may be indicative of ingress of water in the cable run, which can pose a health and safety risk.

Electrical continuity testing

If a cable passes the visual inspection, it must then go through a series of dead tests to be tested for electrical continuity. This test involves de-energising the cable, connecting an electrical tester end to end to determine if a complete circuit can be made.

This is an essential step as it tests the continuity of phases and earthing in the cable and ensures that the internals of the cabling are wired correctly. If a cable fails this test, it cannot be used reliably in a live application and must be removed from service, rewired and then retested.

Fit for purpose testing

The final stage is to test the cable to ensure it is fit for purpose, which ide Systems does with both Insulation Resistance and a live test.

Conducting an Insulation Resistance test, otherwise known as a megger, is critical in ensuring the cable is fit for purpose. It tests the current leakage through the conductor’s insulation material and, in doing so, tests are compliance to the BS 7671 wiring regulations.

Engineers connect an Insulation Resistance tester to the cable, select the test voltage and are then provided with an electrical reading. A high reading is a pass, as opposed to a low reading which indicates a problem such as water ingress, loose connection or damaged cable.

Even though cabling in outdoor applications should be appropriately IP-rated to protect against water ingress, this can change with use. If an IP-rated cable runs through the mud of a festival for extended periods of time, it may experience some level of ingress.

Once dead tests have been carried out and all test results have been recorded, only then will the engineer safely connect the cable to a known live supply to carry
out the live test. The cable is energised and a phase rotation metre is connected to the one end of the cable.

The engineer must then check that the phase rotation metre is displaying the correct sequence of neon lights, which indicates that the test is now correct and complete. Only then can it be marked as “ready for hire”.

While Tesla was correct about a great many things, wireless power transfer has not yet proven itself effective enough to be considered among them. Until that day comes, engineers must ensure that cable runs are fit for purpose and safe for use.

Instrumentation: History and Development

A local instrumentation panel on a steam turbine.

The history of instrumentation can be divide into several phases.

Pre-industrial

Elements of industrial instrumentation have long histories. Scales for comparing weights and simple pointers to indicate position are ancient technologies. Some of the earliest measurements were of time. One of the oldest water clocks was found in the tomb of the ancient Egyptian pharaoh Amenhotep I, buried around 1500 BCE. Improvements were incorporated in the clocks. By 270 BCE they had the rudiments of an automatic control system device.

In 1663 Christopher Wren presented the Royal Society with a design for a "weather clock". A drawing shows meteorological sensors moving pens over paper driven by clockwork. Such devices did not become standard in meteorology for two centuries. The concept has remained virtually unchanged as evidenced by pneumatic chart recorders, where a pressurized bellows displaces a pen. Integrating sensors, displays, recorders and controls was uncommon until the industrial revolution, limited by both need and practicality.

Early Industrial

Early systems used direct process connections to local control panels for control and indication, which from the early 1930s saw the introduction of pneumatic transmitters and automatic 3-term (PID) controllers.
The ranges of pneumatic transmitters were defined by the need to control valves and actuators in the field. Typically a signal ranged from 3 to 15 psi (20 to 100 kPa or 0.2 to 1.0 kg/cm²) as a standard, was standardized with 6 to 30 psi occasionally being used for larger valves. Transistor electronics enabled wiring to replace pipes, initially with a range of 20 to 100 mA at up to 90 V for loop powered devices, reducing to 4 to 20 mA at 12 to 24 V in more modern systems. A transmitter is a device that produces an output signal, often in the form of a 4–20 mA electrical current signal, although many other options using voltage, frequency, pressure, or ethernet are possible. The transistor was commercialized by the mid-1950s.[4]

Instruments attached to a control system provided signals used to operate solenoids, valves, regulators, circuit breakers, relays and other devices. Such devices could control a desired output variable, and provide either remote or automated control capabilities. Each instrument company introduced their own standard instrumentation signal, causing confusion until the 4-20 mA range was used as the standard electronic instrument signal for transmitters and valves. This signal was eventually standardized as ANSI/ISA S50, "Compatibility of Analog Signals for Electronic Industrial Process Instruments", in the 1970s. The transformation of instrumentation from mechanical pneumatic transmitters, controllers, and valves to electronic instruments reduced maintenance costs as electronic instruments were more dependable than mechanical instruments. This also increased efficiency and production due to their increase in accuracy. Pneumatics enjoyed some advantages, being favored in corrosive and explosive atmospheres.[5]

**Automatic Process Control**

In the early years of process control, process indicators and control elements such as valves were monitored by an operator that walked around the unit adjusting the valves to obtain the desired temperatures, pressures, and flows. As technology evolved pneumatic controllers were invented and mounted in the field that monitored the process and controlled the valves. This reduced the amount of time process operators were needed to monitor the process. Later years the actual controllers were moved to a central room and signals were sent into the control room to monitor the process and outputs signals were sent to the final control element such as a valve to adjust the process as needed. These controllers and indicators were mounted on a wall called a control board. The operators stood in front of this board walking back and forth monitoring the process indicators. This again reduced the number and amount of time process operators were needed to walk around the units. The most standard pneumatic signal level used during these years was 3-15 psig.[6]

**Large integrated computer-based systems**

![Pneumatic "Three term" pneumatic PID controller, widely used before electronics became reliable and cheaper and safe to use in hazardous areas (Siemens Telepneu Example)](image)

A pre-DCS/SCADA era central control room. Whilst the controls are centralised in one place, they are still discrete and not integrated into one system.
Process control of large industrial plants has evolved through many stages. Initially, control would be from panels local to the process plant. However this required a large manpower resource to attend to these dispersed panels, and there was no overall view of the process. The next logical development was the transmission of all plant measurements to a permanently-manned central control room. Effectively this was the centralisation of all the localised panels, with the advantages of lower manning levels and easier overview of the process. Often the controllers were behind the control room panels, and all automatic and manual control outputs were transmitted back to plant.

However, whilst providing a central control focus, this arrangement was inflexible as each control loop had its own controller hardware, and continual operator movement within the control room was required to view different parts of the process. With coming of electronic processors and graphic displays it became possible to replace these discrete controllers with computer-based algorithms, hosted on a network of input/output racks with their own control processors. These could be distributed around plant, and communicate with the graphic display in the control room or rooms. The distributed control concept was born.

The introduction of DCSs and SCADA allowed easy interconnection and re-configuration of plant controls such as cascaded loops and interlocks, and easy interfacing with other production computer systems. It enabled sophisticated alarm handling, introduced automatic event logging, removed the need for physical records such as chart recorders, allowed the control racks to be networked and thereby located locally to plant to reduce cabling runs, and provided high level overviews of plant status and production levels.

Applications

In some cases the sensor is a very minor element of the mechanism. Digital cameras and wristwatches might technically meet the loose definition of instrumentation because they record and/or display sensed information. Under most circumstances neither would be called instrumentation, but when used to measure the elapsed time of a race and to document the winner at the finish line, both would be called instrumentation.

Household

A very simple example of an instrumentation system is a mechanical thermostat, used to control a household furnace and thus to control room temperature. A typical unit senses temperature with a bi-metallic strip. It displays temperature by a needle on the free end of the strip. It activates the furnace by a mercury switch. As the switch is rotated by the strip, the mercury makes physical (and thus electrical) contact between electrodes.

Another example of an instrumentation system is a home security system. Such a system consists of sensors (motion detection, switches to detect door openings), simple algorithms to detect intrusion, local control (arm/disarm) and remote monitoring of the system so that the police can be summoned. Communication is an inherent part of the design.

Kitchen appliances use sensors for control.

- A refrigerator maintains a constant temperature by measuring the internal temperature.
- A microwave oven sometimes cooks via a heat-sense-heat-sense cycle until sensing done.
- An automatic ice machine makes ice until a limit switch is thrown.
- Pop-up bread toasters can operate by time or by heat measurements.
- Some ovens use a temperature probe to cook until a target internal food temperature is reached.
- A common toilet refills the water tank until a float closes the valve. The float is acting as a water level sensor.

Automotive

Modern automobiles have complex instrumentation. In addition to displays of engine rotational speed and vehicle linear speed, there are also displays of battery voltage and current, fluid levels, fluid temperatures, distance traveled and feedbacks of various controls (turn signals, parking brake, headlights, transmission position). Cautions may be displayed for special problems (fuel low, check engine, tire pressure low, door ajar, seat belt unfastened). Problems are recorded so they can be reported to diagnostic equipment.

Navigation systems can provide voice commands to
reach a destination. Automotive instrumentation must be cheap and reliable over long periods in harsh environments. There may be independent airbag systems which contain sensors, logic and actuators. Anti-skid braking systems use sensors to control the brakes, while cruise control affects throttle position. A wide variety of services can be provided via communication links as the OnStar system. Autonomous cars (with exotic instrumentation) have been demonstrated.

**Aircraft**

Early aircraft had a few sensors. "Steam gauges" converted air pressures into needle deflections that could be interpreted as altitude and airspeed. A magnetic compass provided a sense of direction. The displays to the pilot were as critical as the measurements.

A modern aircraft has a far more sophisticated suite of sensors and displays, which are embedded into avionics systems. The aircraft may contain inertial navigation systems, global positioning systems, weather radar, autopilots, and aircraft stabilization systems. Redundant sensors are used for reliability. A subset of the information may be transferred to a crash recorder to aid mishap investigations. Modern pilot displays now include computer displays including head-up displays.

Air traffic control radar is distributed instrumentation system. The ground portion transmits an electromagnetic pulse and receives an echo (at least). Aircraft carry transponders that transmit codes on reception of the pulse. The system displays aircraft map location, an identifier and optionally altitude. The map location is based on sensed antenna direction and sensed time delay. The other information is embedded in the transponder transmission.

**Laboratory instrumentation**

Among the possible uses of the term is a collection of laboratory test equipment controlled by a computer through an IEEE-488 bus (also known as GPIB for General Purpose Instrument Bus or HPIB for Hewlitt Packard Instrument Bus). Laboratory equipment is available to measure many electrical and chemical quantities. Such a collection of equipment might be used to automate the testing of drinking water for pollutants.

**Instrumentation engineering**

Instrumentation engineering is the engineering specialization focused on the principle and operation of measuring instruments that are used in design and configuration of automated systems in electrical, pneumatic domains etc and the control of quantities being measured. They typically work for industries with automated processes, such as chemical or manufacturing plants, with the goal of improving system productivity, reliability, safety, optimization and stability. To control the parameters in a process or in a particular system, devices such as microprocessors, microcontrollers or PLCs are used, but their ultimate aim is to control the parameters of a system.

Instrumentation engineering is loosely defined because the required tasks are very domain dependent. An expert in the biomedical instrumentation of laboratory rats has very different concerns than the expert in rocket instrumentation. Common concerns of both are the selection of appropriate sensors based on size, weight, cost, reliability, accuracy, longevity, environmental robustness and frequency response. Some sensors are literally fired in artillery shells. Others sense thermonuclear explosions until destroyed. Invariably sensor data must be recorded, transmitted or displayed. Recording rates and capacities vary enormously. Transmission can be trivial or can be clandestine, encrypted and low-power in the presence of jamming. Displays can be trivially simple or can require consultation with human factors experts. Control system design varies from trivial to a separate specialty.

Instrumentation engineers are responsible for integrating the sensors with the recorders, transmitters, displays or control systems, and producing the Piping and instrumentation diagram for the process. They may design or specify installation, wiring and signal conditioning. They may be responsible for calibration, testing and maintenance of the system.

In a research environment it is common for subject matter experts to have substantial instrumentation system expertise. An astronomer knows the structure of the universe and a great deal about telescopes - optics, pointing and cameras (or other sensing elements). That often includes the hard-won knowledge of the operational procedures that provide the best results. For example, an astronomer is often knowledgeable of techniques to minimize temperature gradients that cause air turbulence within the telescope.

Instrumentation technologists, technicians and mechanics specialize in troubleshooting, repairing and maintaining instruments and instrumentation systems.
Data Analytics in Building Automation
For Preventative Maintenance and Energy Management
By J Parsons, PE, LEED AP

Introduction
With the advent of the Internet of Things (IoT), building owners are looking within their existing building automation systems to provide that level of data which will inform them of how well their building is working. Most BAS systems already incorporate some form of data logging on controller I/O and variables, which is archived in a database on the control network. BAS manufacturers are now providing cloud-based analytics systems which use trend logs for predictive maintenance and energy management.

Data Trend Logs
Any project involving data analytics needs to start by looking at the type of data being collected. This includes not only the type of sensor or control output, but also the interval of the data logging. Let's start with the basic structure of a trend log, which is the time-value table. Every entry in the table contains the date and time that the sample was logged and the value of the sample. The trend log itself will have metadata such as the name of the control point, the unit of measurement, the controller that the point resides on, and the collection interval. This metadata can be stored as 'tags' which we'll get to in a bit.

Collection intervals fall into two categories, polling and change of value. Polling logs a sample at specific spans of time, usually in seconds. Change of value intervals a log sample when the value changes past a threshold. For discrete points, this is from 0 to 1 or 1 to 0. For analog points, a value differential is picked such as ±1°F or ±5% and when the current value is different from the last logged value by that amount, a new value is logged (this differential is also included in the trend log metadata). As we’ll see, when using trend logs for data analytics, polling intervals are best and they are typically 15 second intervals.

Data Collection
By default, a controller will save the most recent time-value pairs in internal memory, with the number of values stored determined by the memory size and configuration. In my experience, a controller should be able to hold 3 days of values (this gets you from Friday to Monday without data loss). Data beyond that period is stored in a centralized database on the control network. This database will pull older time-value entries at larger intervals, but not larger than the controller can store otherwise you have data loss. If you are following the 3-day rule on the controller, then a daily transfer is
sufficient. Also, the database should pull data from controllers at different times to prevent bogging down the network. Cloud-based data analytics platforms then receive the data from the central database. To maintain security of the control network, the data transfer is one-way out of the network. (You will need to have IT open specific ports in the firewall to allow traffic out.) The analytics platform will recreate the trend logs and add new time-value pairs as they are pushed from the control system database.

Figure 1: Control Network Diagram

Tagging
Within the analytics platform, the trend logs exist independent of each other. Even if two trend logs are from the same system (e.g., heating water supply and return temperatures), the software has no way of knowing that they are related. This is where tagging is important. To start, the software will try to apply tags based on the metadata in the log, but this information can vary in content and style by manufacturer. Most control systems will include controllers from different vendors; there may be a primary vendor for controllers, but your chillers or packaged air systems may also have a different type of controller with different types of trend logs.

Project Haystack (https://www.project-haystack.org) is an industry-backed effort to standardize tagging across BAS platforms. The Haystack tags both describe the data itself and where it is in the larger mechanical systems. For example, a trend log for a temperature sensor on the condenser water supply for chiller 3 may have tags of “temp”, “water”, “sensor”, “condenser”, and “entering” to describe the type of data, and tags of “chilledWaterPlant” and “equipRef:3” to describe its relation to the larger chilled water system.

Algorithms
With proper tagging, the software can now make connections between trend logs to find deviations and apply the correct algorithms. Many of these algorithms will come pre-programmed with the software to find standard issues that can arise. It’s important here to talk
about the difference between alarms on the control system and issues found by the analytics software. Control alarms are real-time and have nothing to do with the past values in the trend log. (It is entirely possible for an alarm-generating sensor reading to not get logged if the polling interval or change of value differential is set too high.) If a temperature deviates from set point by the given dead band for a given period, the operator gets an alarm and needs to investigate. At that point, the operator can refer to the trend log to see what the temperature was doing leading up to the alarm and may check other points in the system to troubleshoot the issue, but this is done outside of the control programming.

By contrast, the analytics software does not have access to real-time data. Remember that the most recent time-value pairs reside on the controller, and the pairs in the central database can be as much as a day old, therefore information in the analytics platform will be even older. Instead, the software looks at the data over time to find abnormalities that are otherwise missed in real-time. Here’s an example of the difference using a space temperature sensor: The controller has an alarm to alert if the space temperature falls more than 2°F below the set point, but the alarm only activates after 10 minutes to prevent nuisance alarms. At a set point of 71°F, the sensor has to read less than 69°F for more than 10 minutes. In fact, the temperature is usually around 69.8°F and occasionally dips below 69°F but not long enough to trigger an alarm. (See the 3pm temperature in the chart below.) There might be some complaints from people in the space, but there’s never an alarm so nobody knows that something may be wrong with the system.

![Example Room Temperature Trend Log - One Workday](image)

Figure 2: Sample Trend Log Data for 1 Day
The analytics software now looks at a month’s worth of data from the sensor trend log and the set point trend log and compares the two over time. The algorithm will send an alert to say that in the last month the temperature never actually met set point. It may compare that to a reheat valve position trend log to also note that the valve is always fully open. That alert can be tied to a work-order system to have a technician go look at the valve on their next walk around. Again, there’s no alarms in the control system, but clearly something is not working the way it should.
Another thing to be mindful of is that the trend logs should align in terms of time. If a sensor trend log starts at 11:05:10 am and polls every 15 seconds but the set point trend log starts at 11:05:12 am and polls every 30 seconds, there won’t be a single point in time where you have both a sensor value and set point value. To fix this, the software can normalize these values through extrapolation by taking the original trend log and creating a new one with set time intervals that are synced with every trend log in the database. Any algorithms are applied to this synced data to make the math easier. This is why 15 second polling is so effective; most data won’t change much in that period and the extrapolation acts as a low-pass filter.

Benchmarking
Some algorithms won’t have set point trend logs to compare other data to. Instead, the system relies on a benchmark that is established when the software is first brought online. But where does this benchmark come from? If this is a new control system on new construction, you should have the software online before commissioning. As each system is commissioned, the trend logs will contain the optimal values that are then identified in the software as the benchmark. On existing systems, some level of retro-commissioning will need to occur after the software is online. Anyone attempting to sell an analytics platform to a building owner should include retro-commissioning in the proposal. Without benchmarking, someone will need to create fake trend logs of static values or manually alter the algorithms to use static variables.

Physical energy meters on the building or systems should have trend logs to provide actual data, but more system or device specific energy usage can be calculated using the existing sensor data. Algorithms can be developed to look at current, temperature, pressure and flow to calculate energy usage in the system. These ‘virtual meters’ can help with troubleshooting energy usage across a building rather than just looking at the monthly energy bill.

Again, tagging of the trend logs is important here. With proper tagging, the software can create virtual meters automatically by finding related sensors and identifying where they fit in the equation. These meters are then combined and compared to the actual meter data to find energy losses that may be occurring outside of the controlled system. Weather and other environmental data can also be added to the platform to aid in the comparisons.

Energy benchmarking is handled differently in that the data is compared to itself in the past. When the software
is first brought online, energy benchmarking starts and continues throughout the next year. If the system is commissioned, then energy usage for that first year should be as expected. After the first year the software starts comparing current usage to the same period in that first year. When energy improvements are made or added to the system, a year’s worth of data is collected and can derive the new benchmark. It may be possible to load expected energy models into the software as your benchmark, but that ability will be platform-specific.

**Conclusion**

As you can see, data analytics is a powerful tool for building owners to identify problems, target maintenance actions and control energy usage. Installing an analytics platform comes with the additional feature of proper commissioning and benchmarking, key features of any energy efficiency project such as LEED (“Leadership in Energy and Environmental Design”)

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**ISA Members and ISA Member Leaders**

ISA members and ISA member leaders come from different areas of automation, but they have some things in common—all have a strong interest in improving the profession, improving their skills and improving their careers. Almost all ISA members face increased pressures on their time and attention. They have more to do at their plants while working hard to stay current on their field. The lack of time and attention often defies ISA members’ intentions to work with their fellow ISA members to improve the profession as a whole.

The ISA web site is a central tool to achieving all three goals. It provides technical information to help automation professionals at all levels to improve their knowledge bases. It also helps ISA members know what is happening in their profession and ISA. Members can find networking opportunities that help them know what is happening in their profession and even hear about new job opportunities. These meetings and the web site can be used together by ISA members and leadership to work together to improve the automation profession overall.

ISA members become member leaders by getting involved in sections, divisions or departments of the organization. The tools and resources leaders need are all found on the ISA web site.
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About ISA Construction & Design Division
The Construction and Design Division (CONDES) serves practitioners in all areas of automation, bringing together professionals involved in design, construction, and commissioning activities related to all types of facilities. CONDES supports development of applicable standards, recommended practices, and technical papers. Within the construction and design arenas, Division Members are involved in all facets of facility design and construction, building automation, safety and security, construction management, and commissioning of facilities and process systems.

After being dormant for several years, we are pleased to announce that our Construction and Design Technical Division is now active again! We have a new group of enthusiastic volunteer leaders, and great plans for 2018.