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Company Profile: InSource

By Joe Tito
 Wiring Harness News

It's not uncommon for a contract manufacturer to take an indirect journey to harness production. It's a big part of what makes these Company Profiles so interesting. It's also why I was excited to have a chat with Larry Manz, Director of Sales & Marketing at InSource. We first met Larry at the WHMA Conference back in February. The InSource booth was next to ours at the event and we inevitably struck up a conversation with Larry and his cousin Fred Manz from Marketing and Sales at the company. We later caught up with them at the exhibitor party at the recent EWPT Expo in Milwaukee. What were they doing exhibiting at these events? Well, that's an interesting story in itself, and we'll get to that later.

To learn the whole story, Larry took us back to the early 1990's when

his father Ken, InSource founder, was a key engineer at a manufacturer of components and peripherals for the HVAC industry. "He held several patents there and was instrumental in the freon recycling and recovery industry," Larry described. "Prior to that, they didn't know they needed to care about freon emissions."

Around that period, the EPA came out with with an SAE standard to deal with the problem. Ken sat on that committee and played a key role in drafting the regulation that launched R-134a, which did not have the ozone depleting properties of R-12 and R-22 refrigerants. Within his company, he helped develop the first equipment that would recycle the R-12 and R-22 refrigerants, capturing the ozone depleting elements of the gases.

The company flourished in this new industry, but as a union shop, the labor costs were quite high. As competitors jumped in, they feared losing business to Mexico or China. Ken saw



InSource boasts many innovations in their harness operation. Will Manz, Tony Manz, Fred Manz, and Nick Flint show BraiderBot at EWPT '22.

an opportunity to become a contract manufacturer supplying the company, thus keeping good jobs in Ohio. In fact, that was the inspiration for the name of his new company, InSource.

He began in 1997 with a 2,520 ft.² facility making one product, a refrigerant identifier. The briefcase sized unit had a substantial amount of wiring and InSource actually bought the wires from a local supplier. "Then, in 1998, we purchased a wiring harness company in central Ohio that served the forestry equipment industry and began to make our own wires for the product," Larry said. "We had new products that came in, and by the end of 1998, we were building harnesses as a contract manufacturer."

It was at this time that they added another 9,000 ft.² of manufactur-

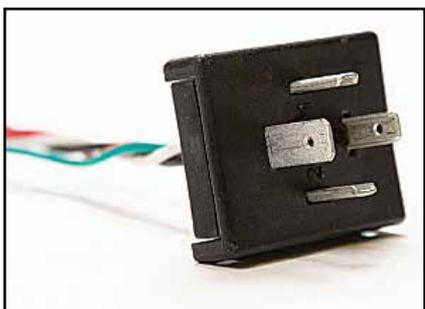
ing space. The company's growing engineering department also added Embedded C software capabilities as they started production of leak detectors and vacuum gauges.

In order to bring in new business, Ken hired a family friend as a sales consultant. "This was before everybody was using the internet, and he would go to the library and sit down with The Thomas Registry looking at the target markets and regions we had identified. He made cold calls and asked for an appointment," Larry chronicled. "Sometimes he would get them, sometimes he wouldn't — it was a different world then."

In the early 2000's, the company

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Sealing Electronics With Vacuum Impregnation



Vacuum sealed assembly.

Electronics have made products faster, safer, and more reliable. They have become so prevalent that they're practically a commodity in the same way aluminum and steel are. As this trend continues, manufacturers need solutions that address the leak paths that occur

naturally during manufacturing these components.

However, the connection is not commonly made that vacuum impregnation is just as effective for electronic assemblies, including wiring and plastics. All engineers know that plastic components must be protected before assembly to ensure optimum effectiveness. Still, when it comes time to prepare their parts for shipping to the customer, most turn to more familiar, but less effective methods like O-rings, epoxy, silicone or topcoats.

Yet, this lack of information could affect the quality of parts and ultimately lead to a failing or poorly per-

forming product in the field. Whether you're a design engineer for a vendor or an installation engineer for an OEM, your reputation as an individual and a company relies on your knowledge of the latest techniques in avoiding field failures. Only then can you deliver a quality product to the customer that can be relied upon every time.

Vacuum impregnation is a process that was developed in the 1940s to seal die cast aluminum porosity. Over time, the process has evolved to seal other materials in addition to aluminum.

This piece is a guide that will help you understand how vacuum impregnation seals electronics and the benefits of vacuum impregnation. **The Vacuum Impregnation Process**

Generally, the process occurs in the following four steps:

Step 1: The part is placed in an impregnation chamber, where a deep vacuum is created to evacuate air from the leak path.

Step 2: The evacuated leak path is filled with sealant by covering the part with the sealant while under vacuum. When the vacuum is released, positive pressure is applied while the part is still covered.

Step 3: The part is moved to a wash/rinse station. Here, the residual sealant is washed from the part's internal passages, taps, pockets, and features where the sealant is undesirable.

Step 4: The part is moved to a cure station. Here, the impregnated sealant is polymerized in the leak path.

Why Electronics Need to be Sealed

A leak path is any gap or void between materials in an electronic component. These gaps or voids happen during manufacturing when different materials contract at different rates due to their natural properties. These voids may not

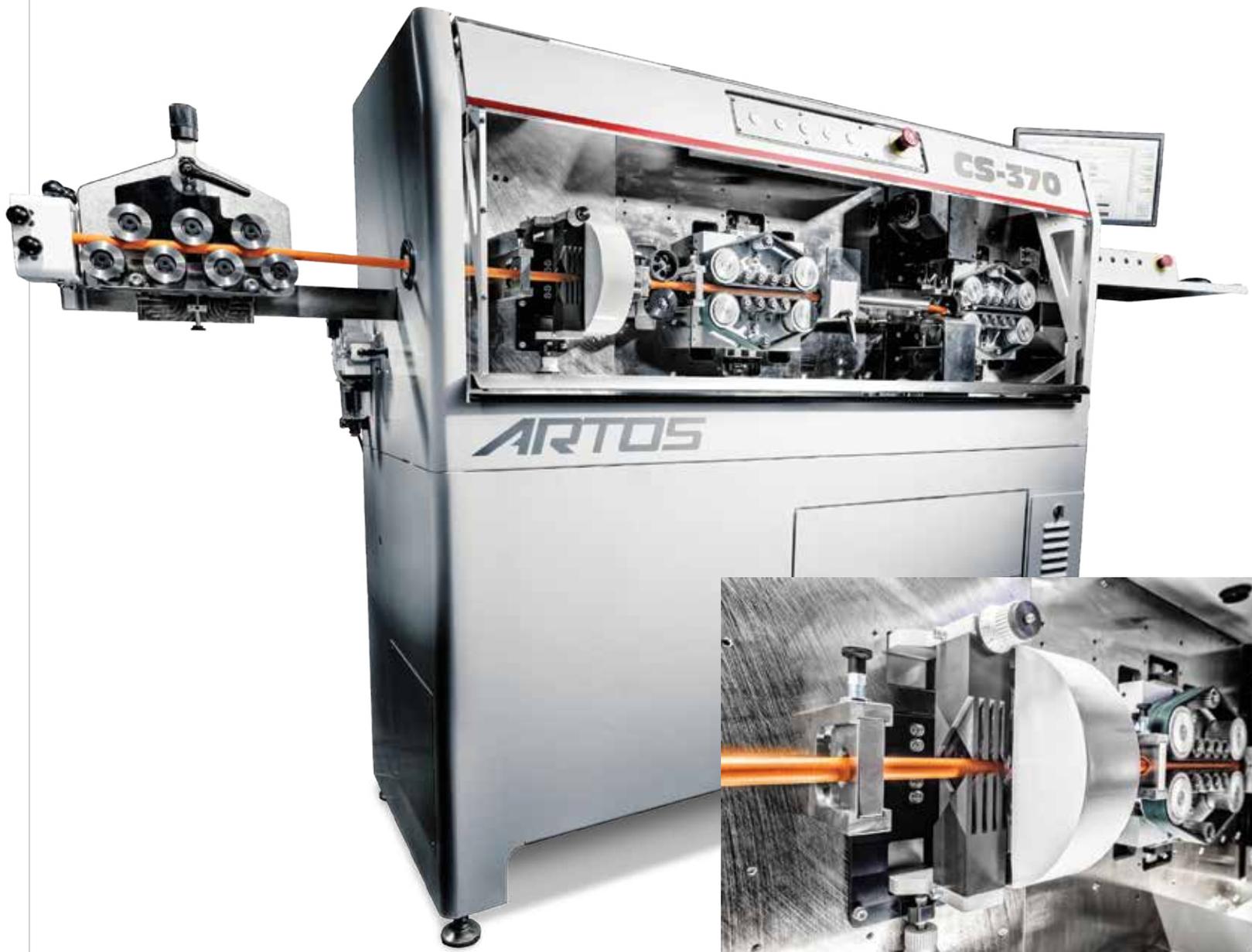
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From the Editor

I had a couple subjects I wanted to touch on, so here goes:

EWPT 2022 - We had a very successful show and the comments from other exhibitors were very positive. We did notice a lack of visitors from abroad and OEMs seemed a bit underrepresented. That was expected, however, and our overall experience was quite positive. One interesting item of note for me was the number of new people in our industry—both on the visitor and exhibitor side. It was great to see so many new faces along with the familiar ones we missed so much.

WHN Rebranding - Did you notice our new look at the show? It was definitely time for some fresh branding, and we decided to debut it at the show. We will be rolling it out to the print publication and website throughout the remainder of the year.

Birdhouses - I got a lot of feedback from the *Are You Still Building Birdhouses* piece in the last issue. It dealt with having to part ways with customers who no longer fit your business model. I'd like to do a follow up article and I'd love to hear **YOUR** thoughts. Take a glance at the article in the May/June issue (or enter the word 'birdhouses' in the search box at www.wiringharnessnews.com). Drop me a line—it would be greatly appreciated.

Keep plugging away!

Joe



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Jack Dennehy Retires

After 50 years in the business, Jack Dennehy, Owner of Composite & Wire Machinery, has decided to retire. If you know Jack, you can probably guess he is not one to talk about himself. But after a fair amount of arm twisting, he acquiesced to spending a few minutes with me talking about his years in the industry. "I had a couple key employees retire," Jack said, "so after 50 years in the braiding industry, I decided to retire." At 82, Jack is as sharp and spry as ever and decided to finally pursue a more leisurely lifestyle. "God has been good to me health wise, so I decided it was time to slow it down."

Jack stopped taking new orders in May of 2021. "We still had a banner year! We had those machines built and shipped out by October," he detailed. He has spent the past months winding down the business and is finally at a point where he can relax. "I was very fortunate in that another company in town had their eye on my real estate for the last three years. They approached me when they found out I was going to wind it down and they bought the building. So, everything just kind of worked out lovely."

Jack has kept his old phone number and email address and hopes to stay in contact with folks in the industry. He has decided to refer his customers to John Tomaz at Wardwell Braiding when they call him for parts or new equipment. "I've always stuck with the New England design, so almost any parts for my machines they will be able to get from John."

As a testimony to Jack's hard work and attention to detail, one of his good customers bugged him to build them some machines late last year. "They said, c'mon Jack...you must have some spare parts to build some machines. But I told them 'no, I'm done guys.'" Jack has a tremendous amount of respect for his loyal customers who made it all possible for him over the years. "I was selling to the grandchildren of people I sold to back when I was with New England Butt," he recalled proudly.

Jack asked me to keep this short, so I will. I speak often about the class and dignity of folks in this industry, and Jack Dennehy is a wonderful example. I'm so honored to call him my friend, and so appreciative of the wisdom and knowledge he has shared. Join me in wishing him all the best in retirement.

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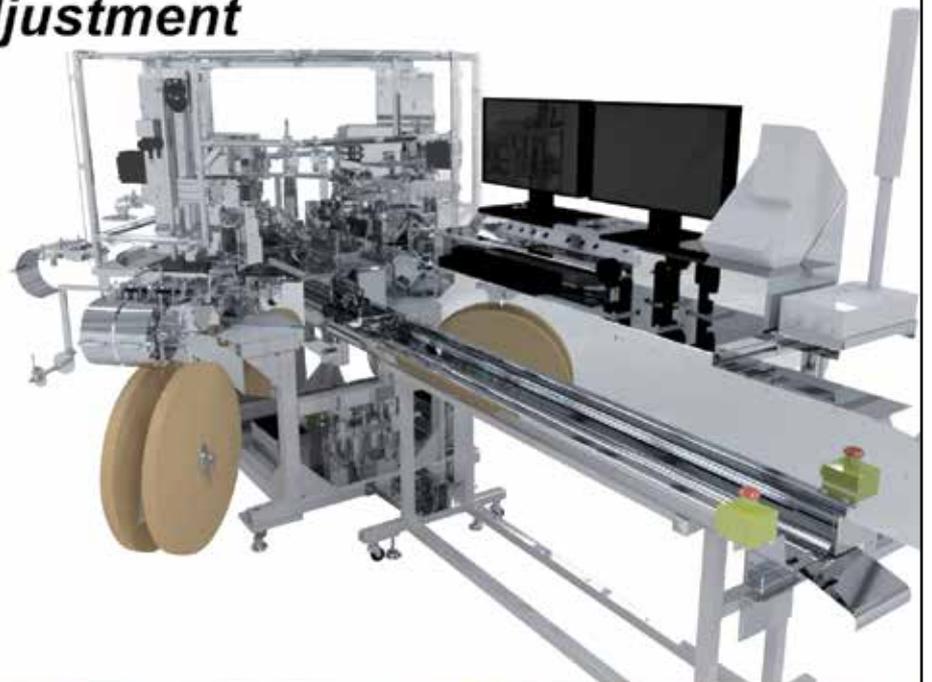
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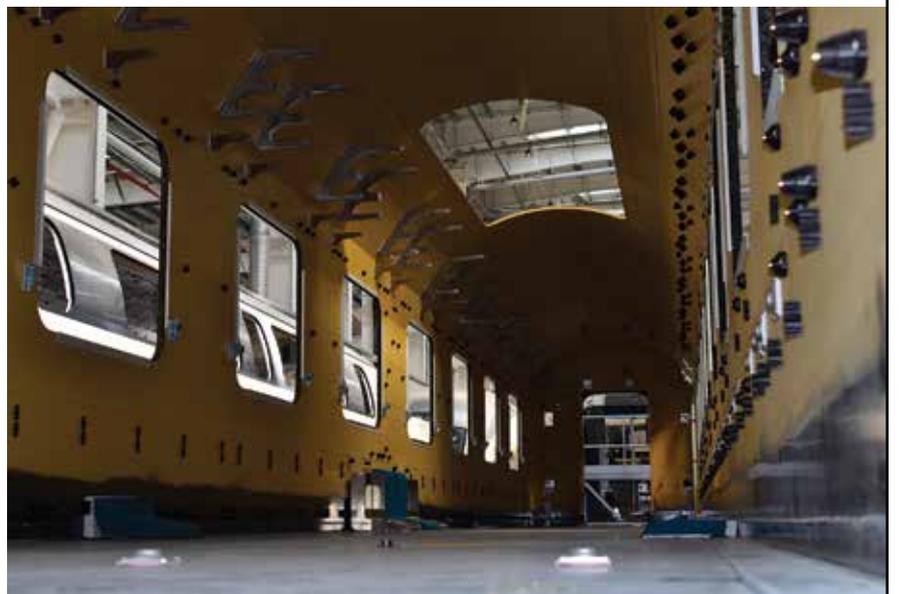
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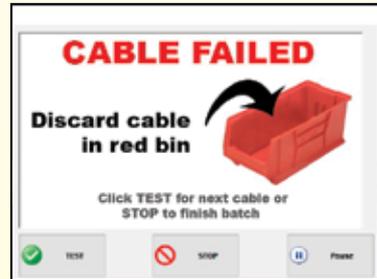
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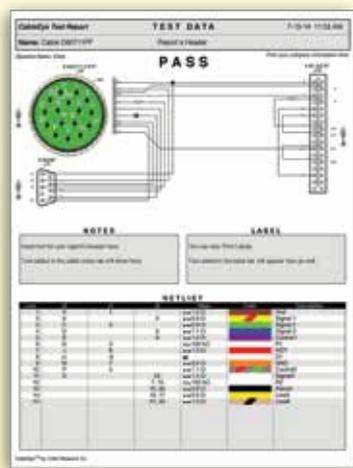
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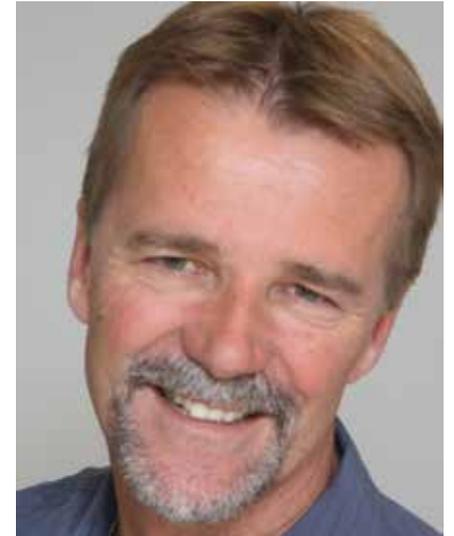
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LEADERSHIP

PUTTING INSIGHTS INTO ACTION

Top 10 Tips: Successful Manufacturers Get Things Done

By Paul Hogendoorn



Paul Hogendoorn

I'm continuing the Top 10 Tips gleaned from successful companies and leaders that I've worked with over my 40-year career. Although the two Tips shared in this column (Tip 8 & 9) are very similar and intricately related, they are also critically distinct.

The first tip comes from something someone said to me many years ago in a non-manufacturing context, but it is something I have observed plenty of times in successful manufacturing operations. It was said by a colleague on a church board many years ago, as the two of us were assigned yet another task (on our already compressed personal schedules). He said: "if you want to get something important done, then ask a busy person."

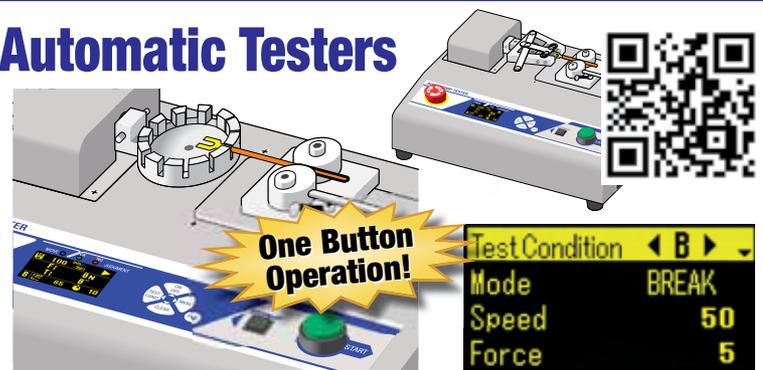
Here's why that's a great tip. Truly busy people in manufacturing have a knack for getting things done - that's why they're busy people. They are not looking to put new things on their list but instead are trying to

find the quickest way to get an item off their list. Yes, there are people in manufacturing (like everywhere in our society) that know how to make themselves busy or keep themselves busy, but successful company leaders innately know the difference between routinely busy people and truly busy people that get things done. How do I know this is true? Easy. A task that is critical and really needs

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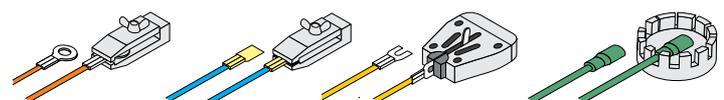
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Top 10 Tips: Successful Manufacturers Get Things Done

Continued from page 8

to get done seldom gets assigned to a person with a track record of managing never ending projects that seem to go on and on, they get assigned to people trusted to deliver an outcome. Without even deliberately knowing they delegate tasks in this way, they do. The truly busy people get assigned the important tasks because the expectation is that they will get the task done, while the routinely busy people have a knack for keeping visibly busy (and therefore important) by keeping projects open and problems unresolved. Truly busy people know how to delegate, when

to stay out of the way, and when to roll up their sleeves and just do it themselves. Their focus is getting the important tasks done and making themselves less busy. Routinely busy people are looking to remain busy (or important), and often without knowing they are doing it, they keep tasks open and keep themselves positioned as a critical communications conduit; they resist closing the task out to get assigned another task, or worse (in their minds), have no important task assigned to them. Truly busy people don't have this aversion, because as soon as they have any bandwidth at all, other important

tasks are assigned (or reassigned) to them. What I've observed over the last 4 decades is that most progressive company and department leaders already instinctively know this, they just aren't aware of it. The key is to not burn out your truly busy people, but instead, let them graduate up the ranks as they succeed, confident that there is another high achieving candidate ready to follow their lead and fill their shoes.

The second tip comes from someone I was also on a board with. We faced many challenging situations together, some big, some small. His closing mantra was "leaders find a way."

And indeed, they do. The leader is not the person with the position or title, or the education, or the letters behind their name. The leader is simply the person that finds a way when others don't or can't. In all of our workplaces, there are many people that can point out the reasons why something can't get done, and in fact, we often admire, empower, and even promote individuals that have great abilities to foresee or articulate problems that others can't see. But how does that get a company ahead? At best, it keeps the company from going backwards - but it doesn't pull the company forward. Not going back-

wards does not equal going forward. Many managers are to some degree inclined to keep companies from going backwards, but leaders are more often inclined to find a way forward. There are leaders in every organization, in roles up and down the org chart. In the most successful organizations I have encountered, the people that find a way (leaders) are supported, encouraged, and appreciated. In less successful organizations, the folks that have a knack of finding a way become discouraged and move on. If a leader's true role is to develop new leaders, the company's culture will foster and encourage its people to imagine, plan and persist - to find ways to move forward, and not just prevent ways of moving backwards.

This is a key differentiator that I've observed that sets succeeding and thriving manufacturers apart: they build on the people that take them forward. As they empower, enable and grow those people, they build their businesses.

Who are those people in your organization - the ones that find a way and get things done? Are you building on them?

Feel free to send me a note at Hogendoorn.paul@gmail.com if you have tips to share. We are in this together!

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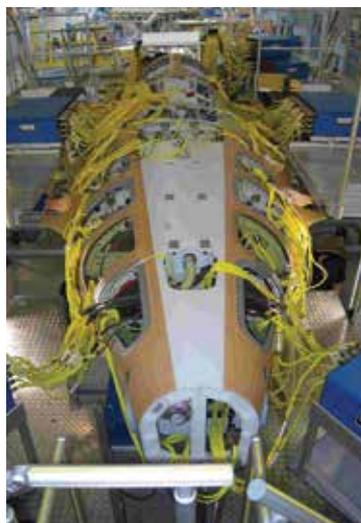


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Thermosleeve USA Announces Move to Central US Location

WHN speaks with Vice President about the move and other developments.

I recently got an email blast from Thermosleeve announcing their pending move to a new location. I knew the company had changed hands about a year ago, and thought it was a good time to contact them to get more details about the move, and see what other changes may be taking place there.

I chatted with Tim Bagley, Vice President of Thermosleeve USA, and he brought me up to speed. "We purchased the business about a year ago and we have grown it tremendously in the old location," Tim reported. The company is currently located in California and Tim mentioned it can take 5 to 6 days to ship product to the East Coast. "The new building in Noblesville Indiana will allow us to ship coast to coast within a couple days. This central location means we'll be able to service our customers faster. At the same time it's a much bigger facility and will allow us room for growth and space for additional

inventory to meet our customers' demands for heat shrink tubing."

The new facility will also house Thermosleeve's sister division Cable Tie Express. The Cable Tie division made the move in late May/early June, and the Thermosleeve move should be final by the end of July. "Our goal is to do the move in stages so that we don't disrupt our shipments," Tim indicated. "We're going to start shipping overstock product from the new facility in late June. Then, during the month of July, we will slowly transition the remaining product lines into the new location." The company already has staff in the new facility, and the existing staff in California will be fulfilling orders until the move is complete, so there will be no disruption in service.

I asked Tim to explain their phenomenal growth over the past year. "First, we've been very aggressive in the marketplace promoting the company and calling on new customers. Also, we began working with national wire distributors in the US and Canada to promote the brand and develop new opportunities," he explained.



Tim feels confident the number one thing that helped propel their recent success has been their investment in stock. "As you know, over the past 12 to 14 months, inventory has been gold. While our competitors have been out of stock, we've been able to capitalize in that we have product on the shelves and can ship right away."

Tim is very happy with the success they've had over the past year, and looks forward to the future in Indiana. Stay tuned for further developments as Tim and his team intend to take on new challenges to better serve the industry. Check out Thermosleeve at www.thermosleeve-usa.com. Don't forget to also take a look at their sister company, Cable Tie Express, at cabletieexpress.com.



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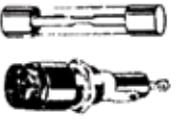
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Sealing Electronics With Vacuum Impregnation

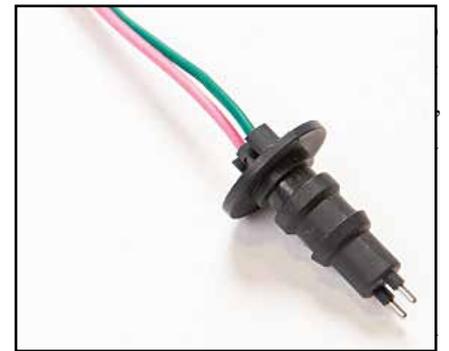
Continued from page 1

be visible, but they are disastrous. Moisture or corrosive agents can seep into the leak path, causing a part to be ineffective, leading to a field failure.

The automotive industry needs vacuum impregnation because specifications often demand that components like fuel pumps, wiring harnesses, or encapsulated coils meet leak requirements to protect them from road salt and moisture, leaks from the transmission or brake fluid, or gasoline.

Most electronic parts must also be protected from heat, whether from an engine manifold or the hot temperatures inside today's high-powered Pentium computers. Heat can cause plastic and metal to fluctuate at different temperatures, loosening the joint and reducing effectiveness.

If one seals a part with a rubber O-ring, it will become brittle and then crack over time. Likewise, if one puts a dollop of silicone around the connectors on the surface, that silicone is exposed to the elements, resulting in expansion, contraction, and thermal breakdown. Even a topcoat has the potential to crack,



process can be used for sealing all types of electronic components. Traditionally, it's mainly been used for things you might find under the hood of a vehicle, such as a connector, wire assemblies, and wire harnesses. But the drive toward zero fault tolerance has prompted the sealing of parts used in electronic equipment, even in commercial equipment. This includes computer cables, windings for electric motors, and portable wireless applications, where mechanical shock can cause connection failures.

The Benefits of Vacuum Impregnation

With electronics, there are three main reasons why vacuum impregnation is used.

1. Seal Leak Paths: Vacuum impregnation prevents fluids from leaking by sealing the leak paths.

Continued on page 16

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Sealing Electronics With Vacuum Impregnation

Continued from page 1

Vacuum impregnation permanently seals the leak path, and the sealant will last the part's life.

2. Prevent Corrosion: From either oxidation or galvanization, corrosion reduces current-carrying capacity and causes part failure. Vacuum impregnation prevents corrosion by sealing the leak path that oxygen and moisture can follow.

3. Enable Design Freedom: Vacuum impregnation does not change the part's dimensions, allowing engineers to design and make parts to the net shape. Since the process does not leave any sealant on the surface, an engineer does not need to incorporate dimensional allowance.

Vacuum impregnation seals parts that may otherwise have been scrapped. The process ensures the

part quality and helps ensure profitability.

In Summary

The surge in electronics has made porosity sealing crucial. Properly sealing the porosity ensures the component's quality meets its performance requirements. Vacuum impregnation is the most effective solution for sealing leak paths and preventing corrosion while enabling design freedom.

Many thanks to Andrew Marin of Godfrey & Wing for helping compile this article. Godfrey & Wing markets equipment, resins and other peripherals for companies who wish to engage in this game-changing technology for their OEM customers. They can also perform vacuum impregnation as a custom service to harness manufacturers who wish to offer this technology.



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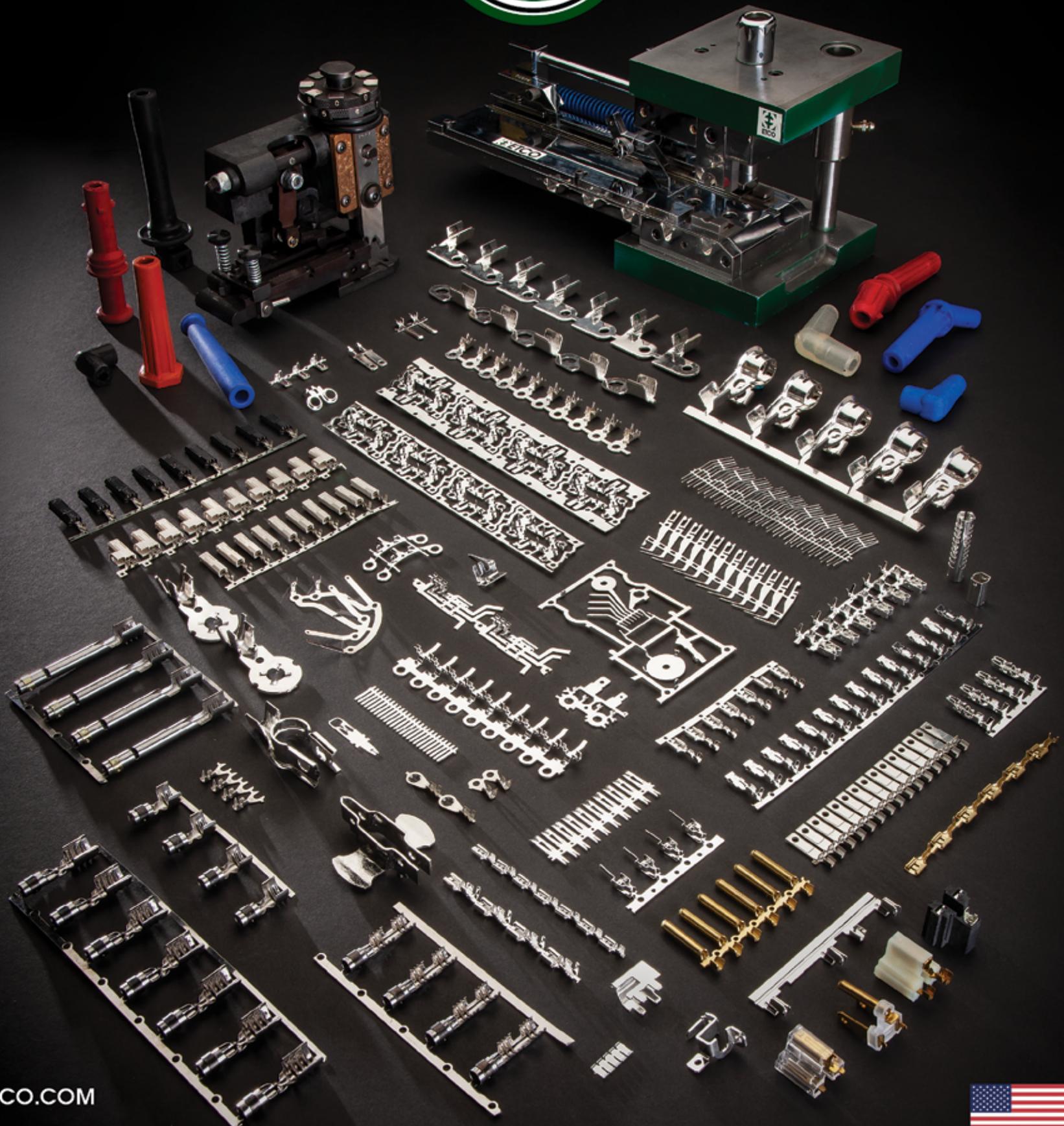


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M & A 101: Lessons learned from decades of deals

Help Overcoming COVID's Disruptions - Part 2

By Loren Smith

The disruption COVID wreaked on the wire harness industry was--and to some degree continues to be--substantial. And while the Payroll Protection Program (PPP) was well known and widely used by those in our industry, I want to make sure my colleagues are aware of another federal government program that can help offset some of the overhanging COVID pain: Employee Retention Credit (ERC).

Unfortunately, ERC was not well publicized and is not well understood. Many harness companies never heard of it, or they and their advisors have checked into it and concluded they are not eligible.

The Employee Retention Credit was part of the March 2021 legislation of the American Rescue Plan Act, which expanded and extended the ERC program and allows eligible employers to benefit from both the PPP and the ERC.

I recently became aware of a division of a well-known consulting firm whose total focus is helping companies navigate the complex



Loren Smith CEO
Blue Valley Capital

rules for applying for ERC funds. They do this by using their own specialized software to put a dedicated infrastructure in place that is totally focused on the ERC application process. They have performed this service for many companies like ours, securing refunds as high as \$26,000 per employee.

I have already put a number of harness owners in touch with this firm with exceptional results. All had heard of the ERC, but their initial investigation led them to conclude

that they were not eligible.

The window on the ERC legislation is closing, but there's still time to apply, and the program has ample funds in place. If your company has fewer than 500 employees, and if you have not applied for or received ERC funds, please let me know if you'd

like me to help you get in touch with this firm.

Loren Smith can be reached at lms@blvcapital.com or www.bluevalleycapital.com.



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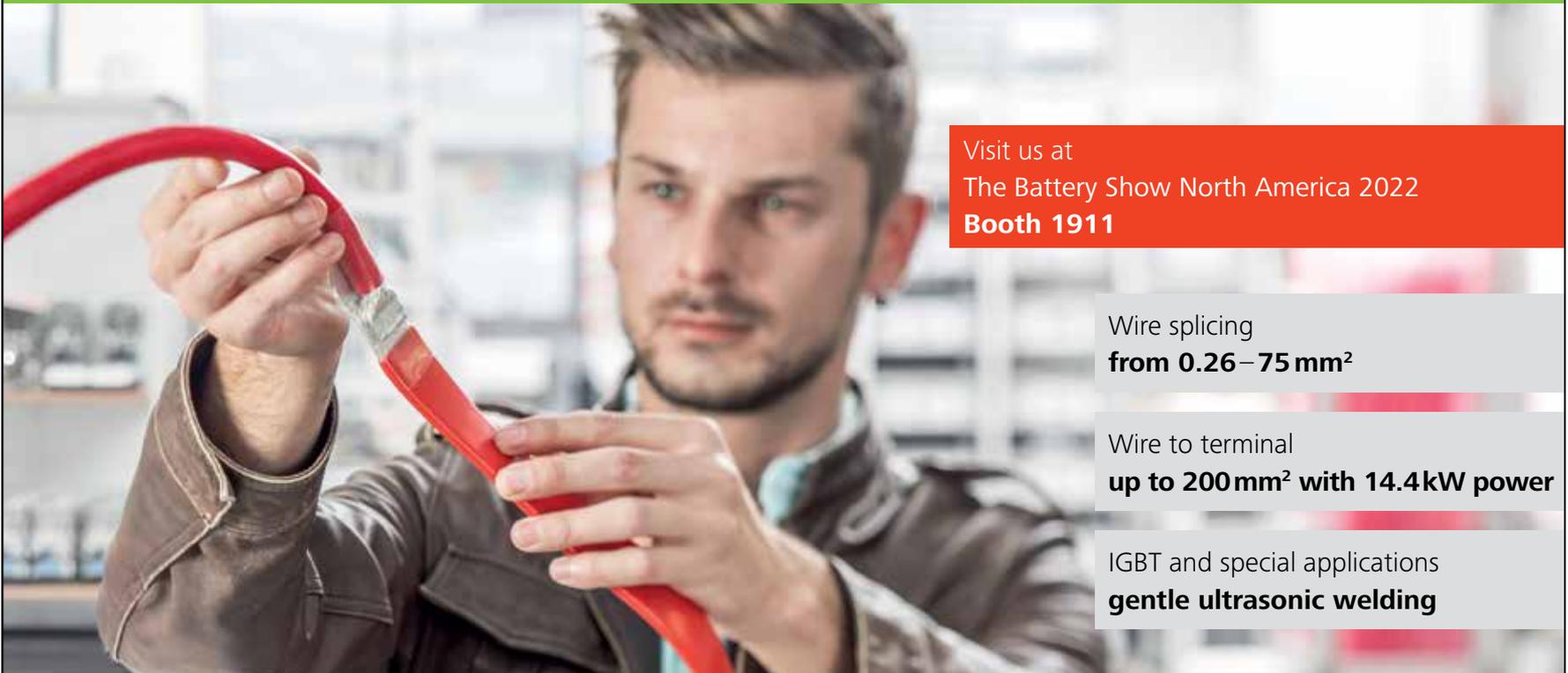
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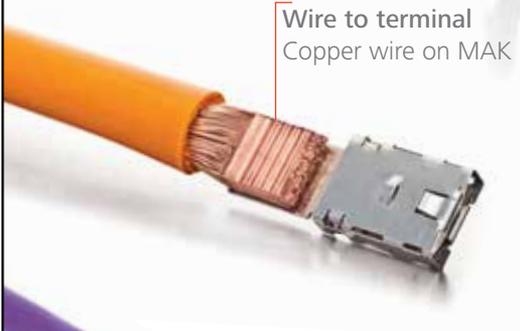
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THE POWERHOUSE OF ULTRASONICS

InSource

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began to build harnesses and chassis assemblies for the emergency vehicle market. On the HVAC component side of the business, they also began to supply copper tubes and brazed assemblies. By the mid-2000s, they began development on a groundbreaking agricultural product. "We were instrumental in the design of a system that could track the seed placement of corn," Larry detailed. "Basically, it was a small laptop that went in the planter and connected a bunch of sensors to gather data. It was wildly successful, and the company kept coming out with different electromechanical

modules that could make changes to the seed placement, versus just getting readings, so it was really an agriculture technology revolution."

These products required a great deal of custom PCBs. "By 2010, we decided that in order to drive our own destiny with lead times, we would start to build our own circuit boards." In the 13 previous years, the company had gone through 10 different circuit board manufacturers. "They just couldn't understand that in the agriculture business, if you miss a planting season, you have nine

Continued on page 23

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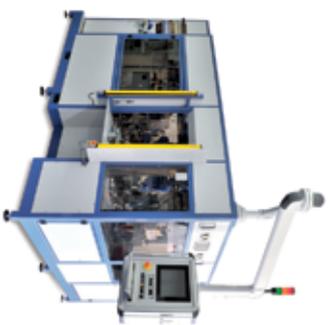
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InSource Continued from page 21

months before you can launch into the next cycle. You can't miss the target no matter what," he implored. "We didn't get into building circuit boards for ourselves based on cost, even though we were able to keep that margin. It was because we needed the parts when we needed them."

Larry described some of the other technology enhancements the company made along the way to further their position as a crucial supplier to their customers. Among the most significant were the addition of automated crimping stations, laser etching of connectors, overmolding capability, and braided looming of harnesses. These enhancements greatly in-

creased the companies design options and consistency. "We were also one of the first to go with ultrasonic splicing in the markets we serve. At that point it wasn't even a UL recognized connection, but we were able to work with them and demonstrate that if you ultrasonically splice wires and put heat shrink over them, it's as good or better than a butt connector."

InSource developed a rather innovative solution in their overmolding process to help keep their customers tooling costs to a minimum. They actually designed a modular system that has three interchangeable sets of two-piece

Continued on page 25



Harness layout boards using the pegboard method.



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InSource

Continued from page 23

tooling for common connectors. This gives them an arsenal of modular tooling options. “The connector body might be straight, or a 90°, but everything else is the same. It’s the same cable and connector end. Or it’s the same connector and same body, but the cable diameter is different. So, once we have that set, we can just exchange them with different modules, so it’s very rare that we have to charge a customer for tooling,” Larry indicated.

Quick Response Manufacturing

On the heels of their ISO certification in 2016, and along with an additional 12,000 ft.² of production space, InSource launched its Quick Response Manufacturing system

(QRM). Larry began his explanation of QRM saying there is definitely a Lean Manufacturing element to QRM, but that Lean Theory concentrates heavily on machine time. “What Lean does not focus on, specifically in a high-mix/low-volume shop like ours, is the time in between. We focus on MCT (Manufacturing Critical Time) which goes from the day the order is placed to the day you ship it to the customer.”

InSource analyzed what was happening in their facility and noted there were a lot of times when nothing was being done. “The order was placed, and we would wait for parts to come in. Then, after another wait

Continued on page 27



One of InSource’s harness cell teams.



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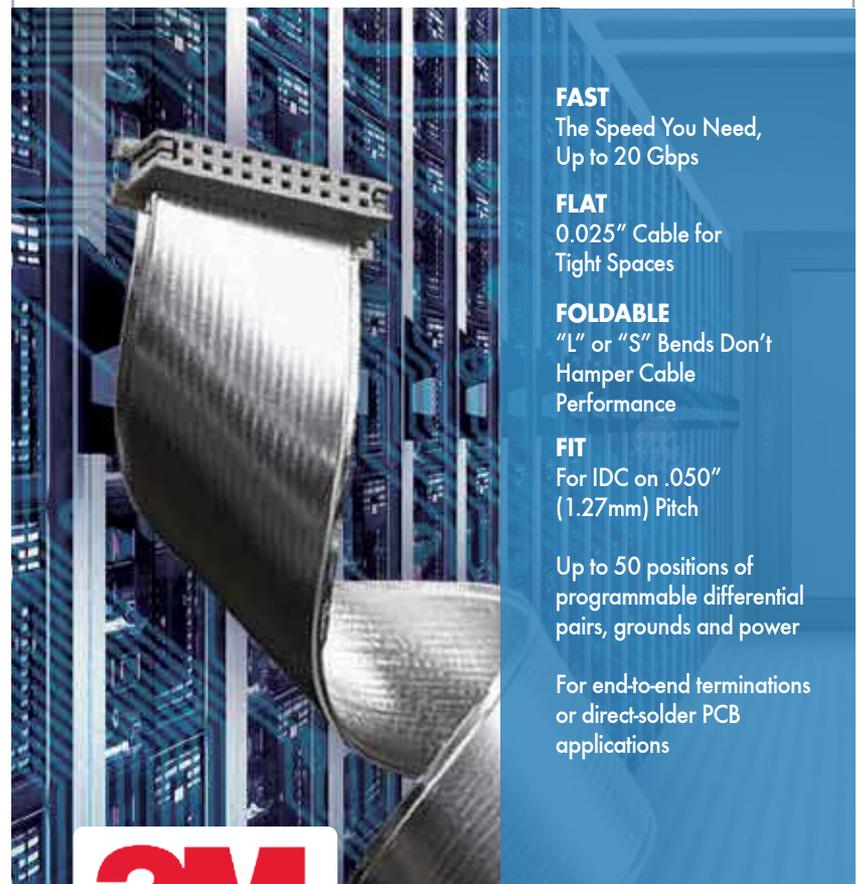
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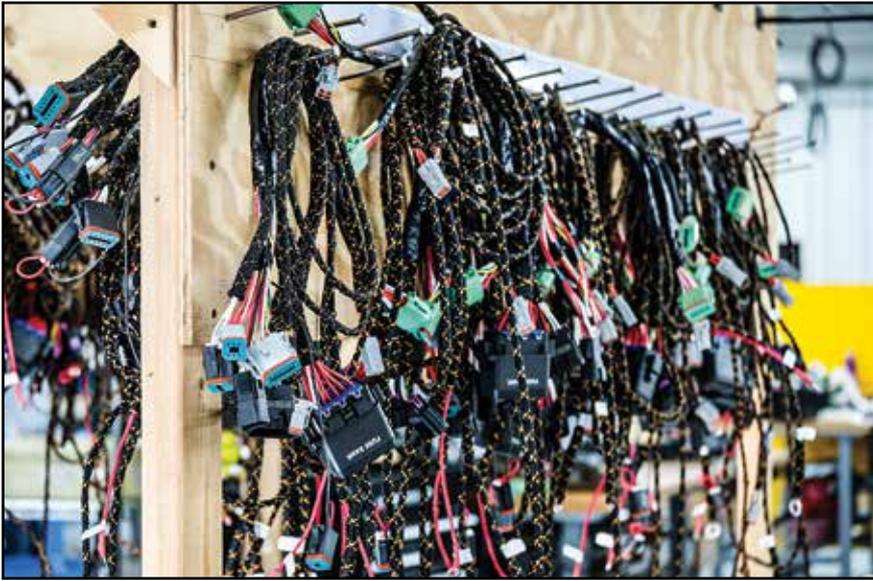
App-controlled portable printer for wire marking

With the new battery-powered THERMOMARK GO label printer and the MARKING system app, you can create labels anywhere! Continuous and pre-cut formats for flag labels, wrap-around labels, and cable markers affixed with a wire tie are easily printed. The THERMOMARK GO joins the THERMOMARK GO.K handheld printer in helping users quickly create and print labels around the shop and in the field. Both printers are available alone and as a set.

www.phoenixcontact.com/us-go

InSource

Continued from page 25 _____



Harnesses ready to be tested and braided.

for machine time, it ran and sat off in the corner waiting for the next machine. The more orders you run through such a system, the longer the time between jobs,” he noted.

According to Larry, most companies handle this by extending their lead-times, but they found the longer the lead-times, the less accurate their forecasts were. “When you focus on what happens in between jobs, you naturally shorten your lead-times, and the focus of QRM is that once you start a job, it doesn’t shut down until it ships to the customer.”

InSource has been able to reduce their MCT dramatically. They went from averaging 56 days (including

materials acquisition) when they first started the analysis, to about 28 days today. “Build days” went from 21 days to about 14.

QRM does require much stronger partnerships with suppliers, however. “I can tell you the “build days” number is actually up from our low of eight days about two years ago, so we have actually lost some ground because of supply chain issues,” he lamented.

The company actually has nine cells running. Each cell has its bespoke cutters, splicers, braiders, testers and all the things it takes to produce a particular product. Instead of

_____ Continued on page 28

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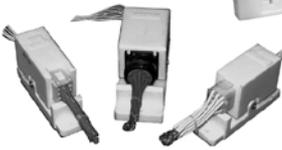
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InSource

Continued from page 27

cutting all of the wire for a particular order at once, for example, it's done in smaller batches. This enables InSource to be very flexible with respect to product changes and re-designs. "One of the biggest benefits of the system is the customer can change anything they want because we're manufacturing in smaller batches."

JobFlow

That brings us to the February WHMA conference, and the recent EWPT Expo in Milwaukee where Larry and his

crew were exhibiting. But they weren't exhibiting the products from InSource. They were gauging the response to a new product from their newest business unit called JobFlow.

Like most manufacturers, InSource has purchased a lot of equipment and experimented with different manufacturing strategies through the years. "In every case we've been chasing the same thing: higher output efficiency," Larry contended. "More specifically, how can we get more jobs completed with the resources we already have."

In order to accomplish this goal, InSource has come up with many adaptations to existing products. Some of these innovations have been so successful, the company has decided to explore marketing them. One such product is their BraiderBot (See page 1). It's an add-on for common harness braiders that allows a single worker to run multiple braiders at once, thus removing a lot of the repetitive boredom from the job. Its robotic arms allow it to be operate hands-free on straight runs. Built-in sensors make sure there's a perfect cone angle for clean consistent braids.

Other sensors watch for, and automatically stop, at branches and termination points. For a quick look at this product, go to the YouTube search box and enter BraiderBot.

InSource has traditionally maintained three separate business units, those being Electronics, Refrigeration, and Wire Harness units. JobFlow will join them as the fourth unit. Each unit shares the functions of sales administration and finance, but they all have their own engineering, quality and production teams.

InSource is a family-owned business, but Larry and the management team seek to deemphasize that. "We like to look at the whole company as a family," he stressed. "We work with our employees so they can take time off when they need and can have hours that work best with their family needs. That's something that we've always tried to maintain; that we care about these people and we think of them as the InSource family. We have a great deal of loyalty with our customers. The community thinks highly of us, and that is certainly our desire."



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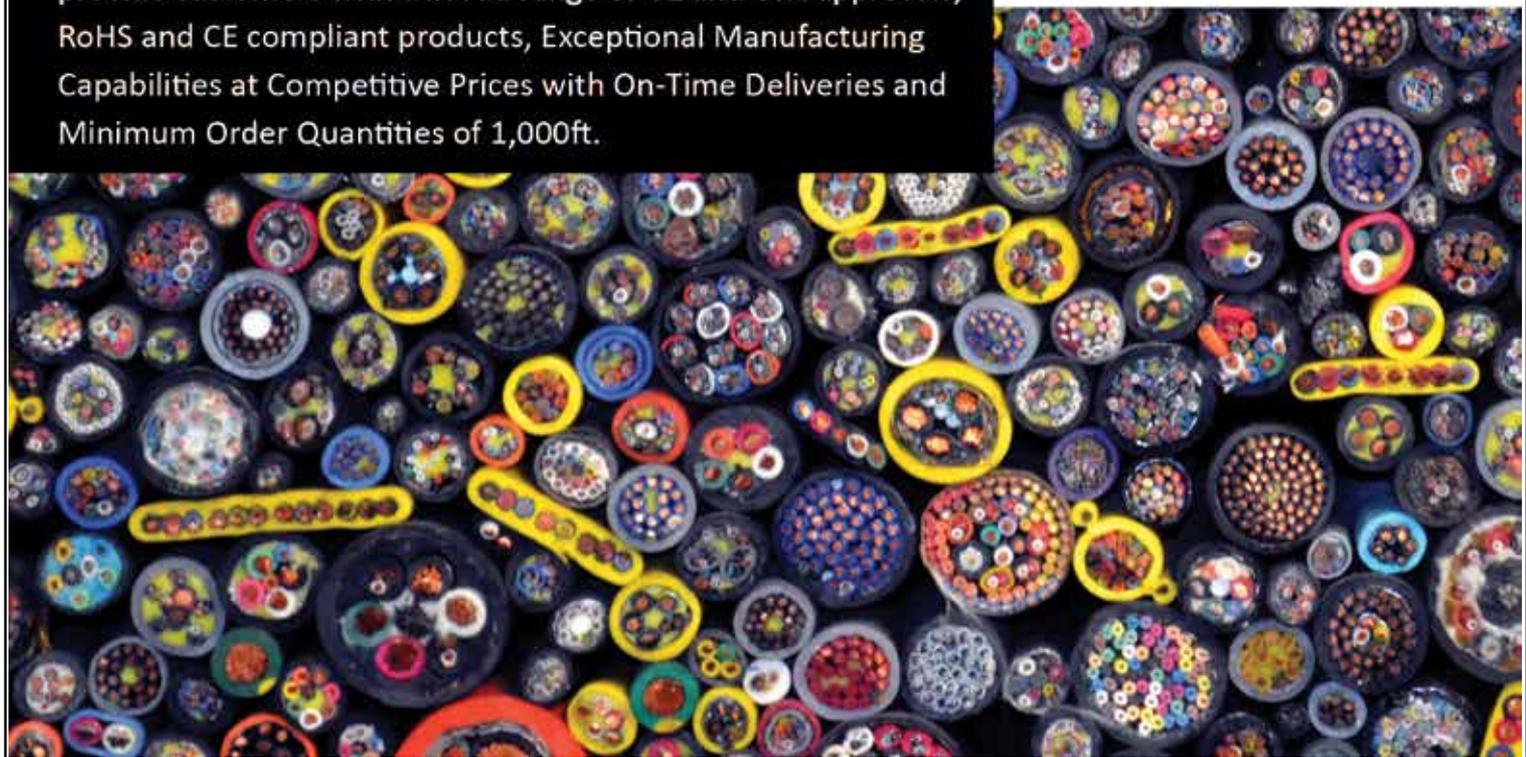
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EWPT EXPO NEW PRODUCT

DMC's LaceLok® Cable Lacing Fasteners



Daniels Manufacturing Corporation® (DMC) is proud to introduce LaceLok® Cable Lacing Fasteners. This revolutionary product is an entirely new way to provide secondary support for wire harnesses.

For more than 50 years, hand tied lace or plastic cable ties have been the only options for wire harness secondary support. These methods have serious ergonomic, safety, and inconsistency issues. Hand tied lace often causes fatigue and injury due to the repetitive motion required. Hand tied lace can also be applied inconsistently from operator to operator, or even from the beginning of the shift to the end of the shift due to operator fatigue. Plastic cable ties often cause safety hazards due to the sharp edges that can occur on the cut end of the cable tie. Plastic cable ties are also prone to loosening over time resulting in additional stress on the wire harness. For these and other reasons, plastic cable ties are restricted for use per AS50881 and NAVAIR 01-1A-505-1.

LaceLok® combines the ease of cable ties with the abrasion and chemical resistance of lacing tape. The LaceLok® system consists of Cable Lacing Fasteners (CLF) and the LaceLok® Installation Tool. The CLF is constructed with the same Nomex® lacing tape used in hand tied lace. The Nomex® lace is attached with aramid fiber to an ultra-high temperature thermoplastic fastener head to create the CLF. The CLF can withstand extreme

temperatures from -65°C to 260°C and are resistant to hydraulic fluid, jet fuel, lubricating oil, and isopropyl alcohol. CLF comes in a variety of lengths from 6 inches to 24 inches long and can be wrapped multiple times to provide tensile strengths of 55lbs to 165lbs.

Using LaceLok® is simple and ergonomic. The user wraps the CLF around the bundle and then through the CLF head. The end of the tape is loaded into the LaceLok® Installation Tool. The operator squeezes the trigger and the tool automatically tightens and cuts the end of the CLF. The innovative LaceLok® Installation Tool automatically applies the correct amount of tension every time making results consistent and repeatable and therefore eliminating the risk of over or under tensioning wire bundles.

The LaceLok® system is available for purchase, approved for use per NAVAIR 01-1A-505-1 and is pending qualification under the MIL-DTL-32554B and MIL-DTL-32555A. For more information visit DMC's website at dmctools.com/products/lacelok/.

About Daniels Manufacturing Corporation

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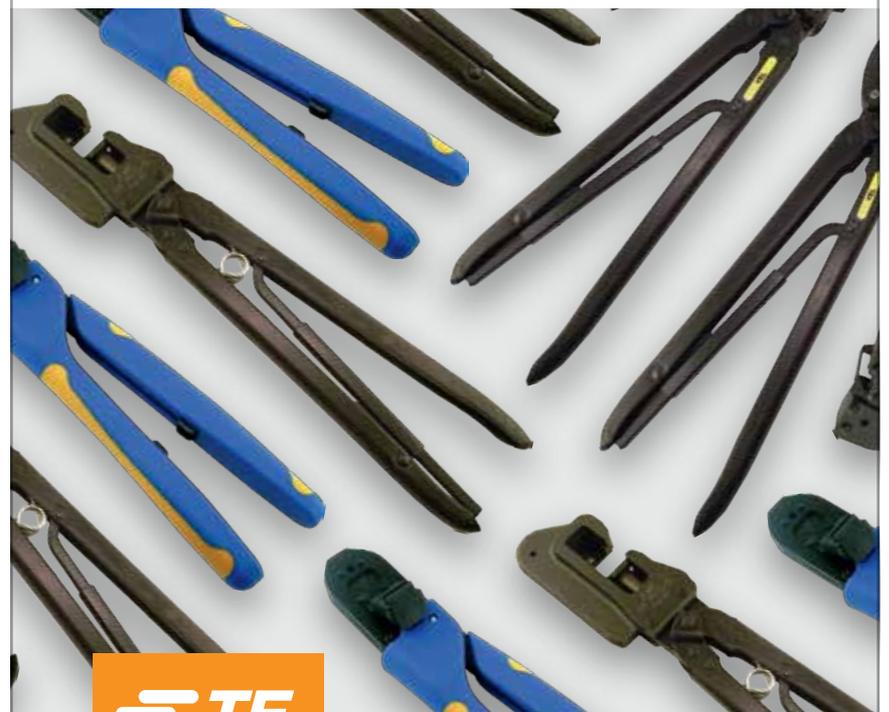
From left to right: Ryan Totolo, DMC Assistant General Manager; John Conner, Engineering Manager; Mike Timney, National Account Executive.

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Why Exhibit at M-EXPO - An Exhibitors Perspective

Several companies exhibiting at M-EXPO 2022 were interviewed for their insight regarding the upcoming show. You will learn about the importance of M-EXPO in this region through these interviews. Visit www.mexpowire.com to learn more.

Why is the M-EXPO show important to the wire harness industry?

“We have been serving manufacturers in Mexico for over 30 years and see tremendous opportunity to expand our service coverage and build business relationships with additional manufacturers,” states Khoi Nguyen, Director of Marketing, LAPP Tannehill.

“One thing I really like about M-EXPO is that it is very, very industry-specific. People are coming there to

learn more about wire cutting, stripping, product wire management, crimping, and things like that are very specific. So, you know your audience is prequalified. Not everyone needs the parts and products that you offer but you know they are prequalified because they touch the things you represent and understand what you do. So, engagement there is a lot higher,” states Jeff Barth, President and Founder, JWB Manufacturing.

“The fact that we’re going there for the first time and making a presentation in Spanish designed to address the local population says that there is a need for that. Over the past six years at EWPT, we saw a diversity of attendees coming from Europe, Canada, and Mexico. Unfortunately, due to COVID, we saw a lot less this year,

so I think holding a show in Mexico is very important to the industry to bring the message where it’s needed. Again, bringing solutions to a sector of the industry that may not be able to travel to the US,” states John Tomaz, Wardwell Braiding.

Why is your company exhibiting at the upcoming M-EXPO Wire Processing Technology Expo on September 27-29, 2022?

“There’s more manufacturing of wire harnesses in Mexico than anywhere else, even the Americas. As a result, Mexico has a strong focus for harness manufacturing, and this is our new main focus for our software – manufacturing harnesses,” states Fergus Kendall, CPO and Co-Founder, Cadonix, Inc.

“More than ever, as leaders in our

teams, companies, and industry, we need to prioritize the carving out precious time to step out of the day-to-day and look out ahead and ‘out there’ for both challenges and opportunities BEFORE they happen or pass us by.

Otherwise, we’ll always be in reactive mode with respect to change. While the Web and digital communications are great, Google can only do so much with providing in-depth, practical, real-world awareness of problems and solutions that may or may not be in our field of vision. You don’t know what you don’t know, and you can’t ‘Google’ what you’ve never heard of.

That is why M-EXPO is so important for our industry, as it sits at the crossroads (figuratively AND geo-

graphically) of what is happening in our industry. Bringing together like minds who are encountering problems that we may also be experiencing (or that may be hiding right around the corner for us), along with people who are at the forefront of solving these challenges with technologies, practices, and people resources that we may not be aware of. With all the uniqueness of our industry, the ROI from sending our thought leaders to M-EXPO and engaging with other like-minded thought leaders is immeasurable,” states Khoi Nguyen, Director of Marketing, LAPP Tannehill.

“As I continue to expand my business and reach, I enjoy working with Mexican companies. Many of these companies are US-based and are either shoring or re-shoring, so there are a lot of commonalities. I enjoy the value systems of the people in Mexico. In Mexico, it’s more relationship-based than transactional-based. Networking is a big part because it is a very tight-knit industry, and I feel very comfortable going and talking with anyone about their business and my business. It’s a great networking thing; you never know who you will meet and hear their challenges. Some people are nervous about sharing too much about their business, but that’s not me. I look for individuals who want to develop a deep relationship, not just a transactional one,” states Jeff Barth, President and Founder, JWB Manufacturing.



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From left to right, Manuel Vitasse, Sam Myers, and Gavin Wasko.

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Mecal by Starn is the distributor and manufacturer of the Mecal product line in North America. The partnership of Mecal and Starn Tool, creating Mecal by Starn, provides world class applicators and spare tooling for the wire harness industry. Mecal was established in 1976 with the aim of supplying the wire harness industry with the best crimping equipment available. In less than 30 years Mecal reached and kept a respected position at the top of its market. Starn Tool and Manufacturing is Meadville, PA's oldest tool and die shop established in 1945, they are a leader in precision machining. Together their products are extensively used by the automotive, communication and IT industry, and wherever a high-quality connection is needed.

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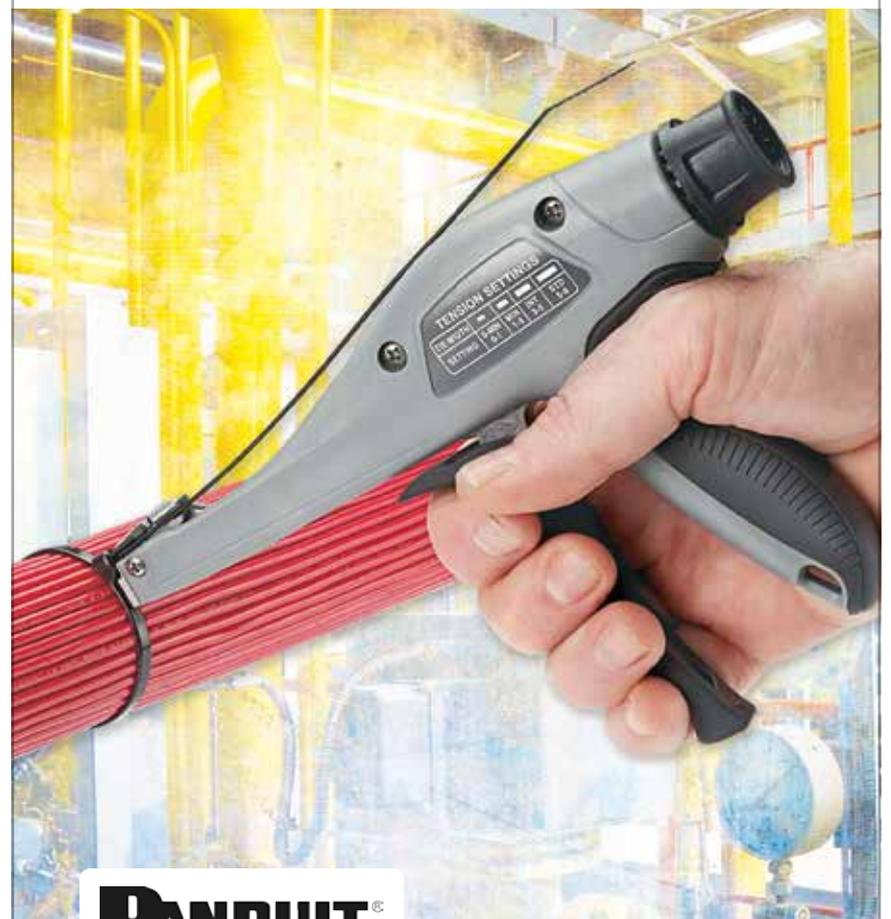




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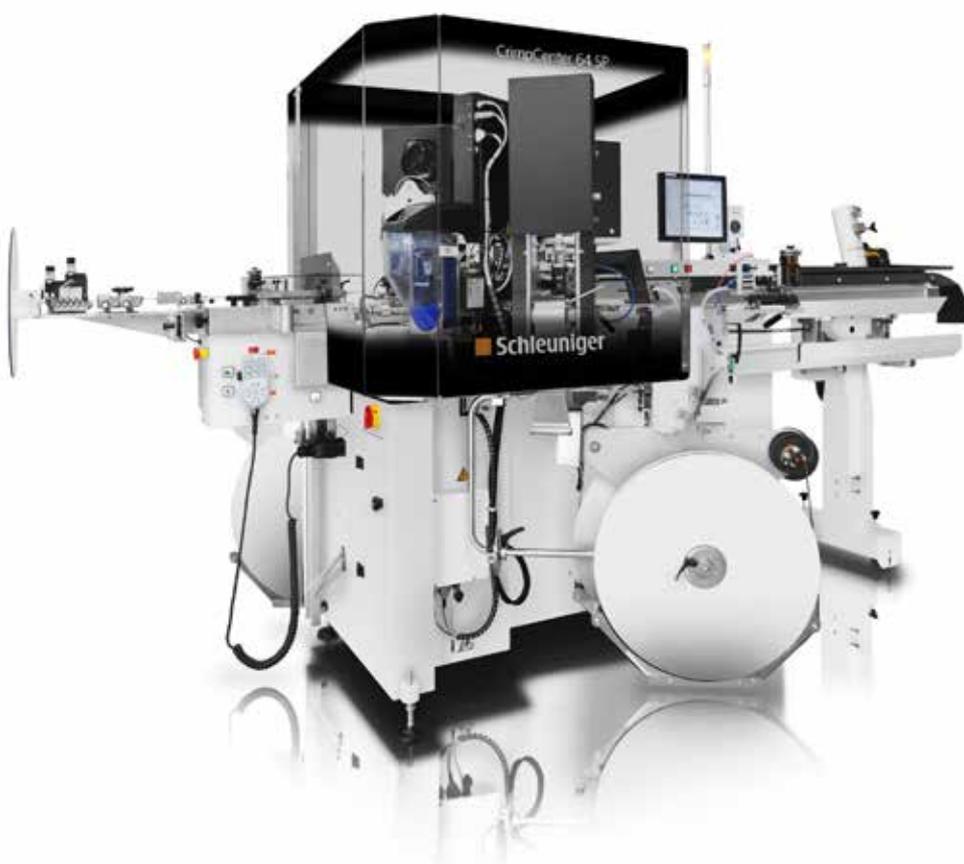
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The story of Teflon® began April 6, 1938, at DuPont's Jackson Laboratory in New Jersey. DuPont chemist, Dr. Roy J. Plunkett, was working with gases related to Freon® refrigerants, another DuPont product. Upon checking a frozen, compressed sample of tetrafluoroethylene, he and his associates discovered that the sample had polymerized spontaneously into a white, waxy solid to form polytetrafluoroethylene (PTFE). PTFE is a high-molecular-weight compound consisting of carbon and fluorine. Perfluorocarbons or PFCs, are organofluorine that contain only carbon and fluorine bonded together in strong carbon-fluorine bonds. The carbon-fluorine bond is referred to as the strongest in organic chemistry because of stability added by its partial ionic character; it forms the strongest single bond to carbon. The ionic character is a result of the electronegativity of fluorine. It induces partial charges on the carbon and

fluorine atoms, leading to electrostatic attraction, making the bond short and strong. PTFE is a thermoplastic polymer, which, at room temperature, is a white solid with a density of about 2.2 g/cm³ and melting point of 327°C. Its mechanical properties will degrade above 260°C. Polytetrafluoroethylene (PTFE) is a synthetic fluoropolymer of tetrafluoroethylene that is widely used in wire and cable and tubing products today. PTFE is inert to virtually all chemicals, and it is the most thermally-stable of all carbonaceous insulating compounds. It is considered the third most slippery material in existence. Because of PTFE's chemical inertness, it cannot be cross-linked like an elastomer. It has sunlight and moisture resistance. Because PTFE's electrical properties are stable across a broad range of frequencies and its -90°C to 250°C temperature range, PTFE has been a standard in the aerospace/defense industry for many years. Popular specifications include MIL-DTL-16878, MIL-W-22759, MIL-DTL-17 and MIL-DTL-27500. It is also used in numerous commercial applications. PTFE is an excellent dielectric for coax cables due to a low dissipation factor and low dielectric constant at low and high frequencies.



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3. At this point the PTFE insulation looks like string cheese

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- PTFE has excellent resistance to damage during soldering

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Disadvantages of PTFE Wire and Cable and Tubing

- It is eight to 10 times the cost of PVC

- Lengths can be short due to the ram extrusion process, typically up to five lengths per reel

- It must be etched in order to terminate in an epoxy connector

- Etched wire has a relatively short shelf life

- Etched wire colors are muted

- It has cold-flow properties also known as “creep”

Reference https://www.chemours.com/Teflon/en_US/assets/downloads/pdf/teflon-introduction-fluoropolymers.pdf



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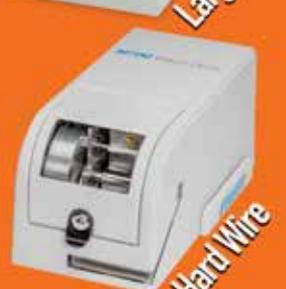


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Recent Changes to DoD's CMMC Cybersecurity Framework

CMMC Version 2.0

In the January/February issue of last year, WHN introduced readers to the DoD's new cybersecurity protocol that it will require of all prime and subcontractors. In the article, we interviewed Nicholas McBride, Cybersecurity Consultant at Ecuron, who took us through the steps for compliance. Nicholas recently contacted us to provide important updates for the CMMC Protocols.

There is a link to our original report at the end of this article for full review. Basically, the Office of the Under Secretary of Defense for Acquisition and Sustainment, in conjunction

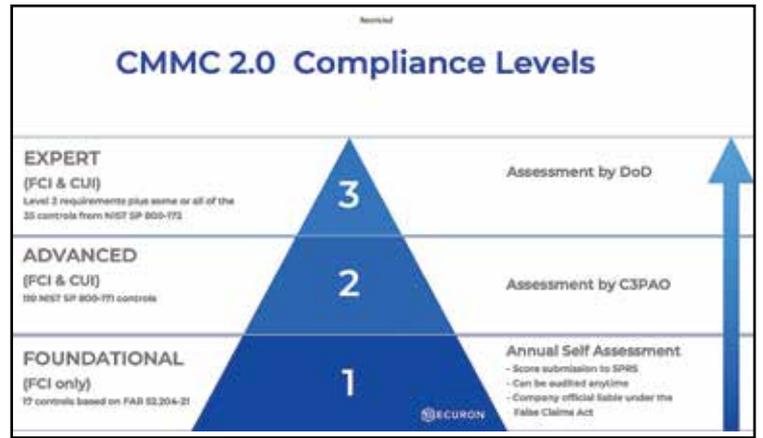


FIGURE 1. CMMC Security Levels for Version 2.0

with DoD stakeholders, have developed the new CMMC Certification as a means to protect sensitive information from a range of cyber threats. The intent is to combat the loss of intellectual property and certain unclassified information from

the DoD supply chain. This past November, the DoD put out a rule saying they were changing the CMMC program. It has taken a few months for the changes to obtain a level of clarity, and Nicolas outlined the major changes for us.

The previous version was version 1.2, and the new version is 2.0. "The two big take-aways were that they got rid of all of the requirements that went above and beyond the NISTSP 800-171 controls. So that means there were an additional 20 controls for CMMC at Level III. They removed those and it is now just the same 110 controls from the NIST standard," Nicholas detailed. He also mentioned they got rid of the additional maturity requirements but warned that even though they are not explicitly mentioned, they are implicitly required.

The next big difference is the streamlining of the security levels. The old CMMC model had five levels, with most people aiming for Level I or Level III (Level II having been an intermediary step, and not really a compliance level). The new version only has three levels (fig. 1). Level I has not changed. The new Level II is the same as the old Level III (eliminating the intermediary step), and the new Level III is the same as the old Level V, (eliminating the old Level IV intermediary step). It is still expected that most companies will

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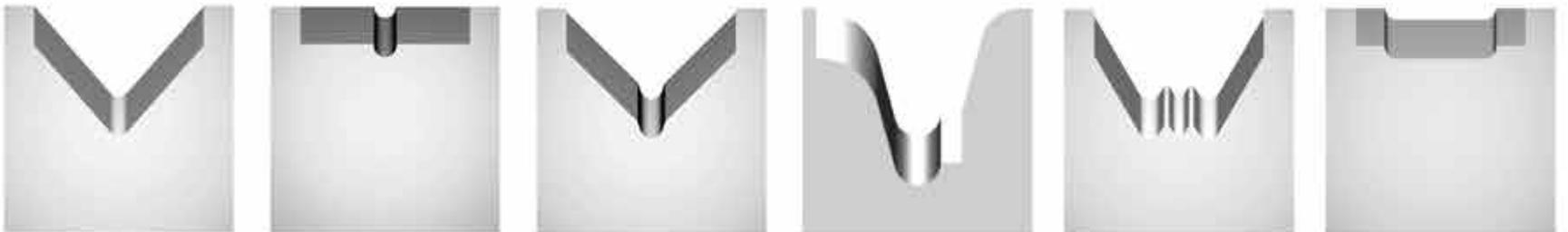
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Recent Changes to DoD's CMMC Cybersecurity Framework

Continued from page 36

need Level I or Level II certification, with only a small subset requiring the new Level III.

"The next thing they changed is the rollout," Nicholas advised. "The previous CMMC Version 1.2 had a phased rollout up through 2025, releasing more contracts every year, starting with 15 last year, all the way up to several hundred by 2025." Instead, they announced, somewhat ambiguously, there will be a cutover date, likely within the next 9 to 24 months. "There have been updates since then in which they have stated they want that date to be May of 2023," he clarified.

The DoD also stated that CMMC Certification may not be necessary for every single contract following May 2023. "They are still slightly unclear on whether it will be every contract, or just a majority of contracts. But my personal speculation is that most people will need to think about it because, if nothing else, the prime contractors are going to be asking for those certifications for their own vendor risk management programs."

Under the CMMC Framework, the DoD will certify third party assessment organizations who will be able to certify companies to CMMC. Nicholas disclosed that, to date, no companies have been authorized by the DoD to audit companies for certification. "There are still a few minor details they are trying to hammer out, and current speculation puts it around August 2022. Hopefully by then, the 3rd party companies will start performing certification assessments. One thing we do know for sure is there are currently 213 companies who are 3rd party candidates, but they still have to go through their own CMMC assessment from the federal government." Asked why the holdup on accreditation of the 3rd party companies, Nicholas said the DoD wouldn't be specific, but indicated the auditing companies were having difficulty developing documentation for the maturity levels.

Current Prime Contractor Requirements

Even though there is ambiguity on the part of the government on dates of implementation and the number

of contracts affected, the basic framework is in place and all subcontractors should be well on the path to certification by now. More importantly, he advised that most prime contractors are taking steps to make sure their subcontractors are implementing the framework. "Over the past year, prime contractors have been sending out self-assessment questionnaires (SPRS) to their subcontractors asking if they have assessed their cybersecurity practices against the NIST SP 800-171 guidelines. The next thing they will often ask is if companies have implemented multi-factor authentication and encryption and whether or not the encryption is up to a Federal Information Processing Standards (FIPS) validated standard. This is because the DoD is highly concerned about multi-factor authentication and FIPS validated encryption is now the mandatory standard."

Nicholas mentioned the prime contractors are also asking if their subcontractors have adhered to the basic cyber security protocols has put forth by FAR 52.204-21, and whether or not they are planning on becoming CMMC registered, and what the timeline for that is.

Nicholas summed up the current situation with CMMC. "It's still coming. They've tightened up their timeline and made it slightly less complicated, but they are still being just as strict about ensuring that people meet the requirements. We fully expect this to be in place by May 2023."

About Ecuron

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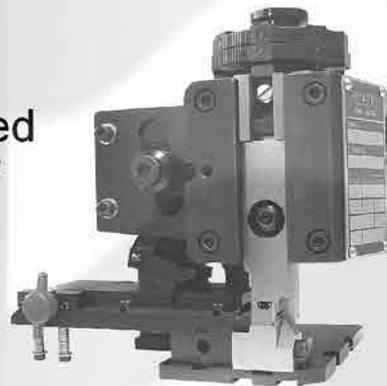


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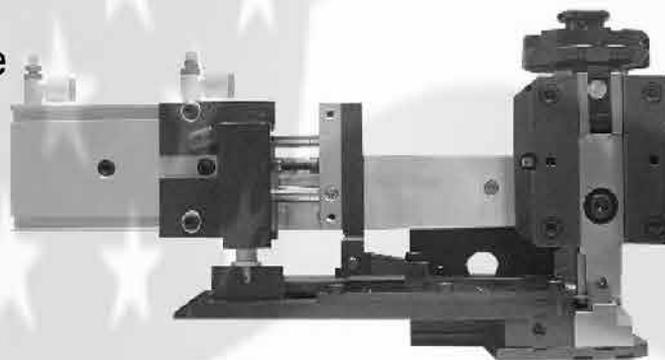


Model 1700

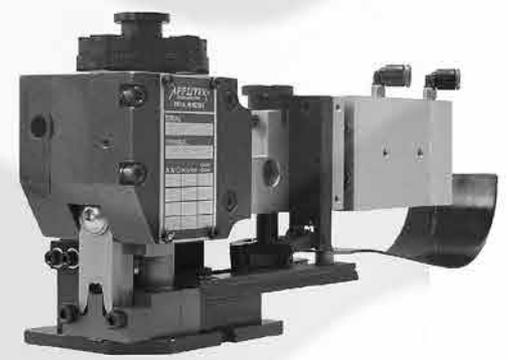


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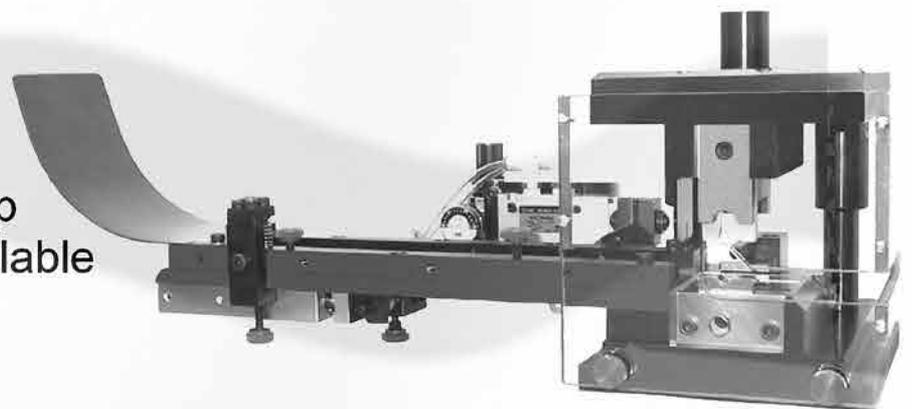


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EWPT EXPO NEW PRODUCT

CAMI Research Introduces M2Z Low Voltage Multi-Conductor Cable Tester

CAMI Research Inc. (Acton, MA), manufacturer of the CableEye® brand of automation-ready cable and harness test systems, will release the model M2Z low voltage test system at the EWPT in Milwaukee. In addition to checking for opens, shorts, and miswires, this entry-level tester checks for intermittent faults and diode orientation. The control module has 128 test points and includes a probe socket with probe. The M2Z ships with comprehensive, automation-ready software that allows for tester management, troubleshooting, pass/fail testing, and testing of any product volume and mix from prototyping through to batch testing.

Configuration

A leader in the development of PC-based cable and wire harness test systems, CAMI offers the CableEye suite of products complete with accessories - including auto-detected, plug-in connector boards for fast, convenient set-up and testing of standard cables. When pre-populated and pre-configured boards are used, the software automatically displays a graphic of the connectors in addition to the wiring under test. The tester can be readily programmed to do the same for custom boards and fixtures. These boards are designed to fit all CableEye testers.

With a single click, the wiring schematic switches to a customiz-

able netlist view which can be set to display wiring colors. In both views, a large PASS/FAIL indicator is clearly visible and distinctive audible tones are played.

Each test board may be paired with other CableEye adapter boards to accommodate any combination of connectors. An incredibly versatile test system, most CableEye testers are expandable to accommodate large and complex harnesses, and users can connect, and configure them in numerous ways — set up an array of QuickMount™ housings fitted connector boards, plug custom interface cables directly into any of the 64 pin headers on the control and expansion modules, or use a test interface panel, perhaps on a rack-mounted system. Not just for testing, CableEye systems provide complete cable management offering features not available on any other cable test equipment, and may be used to test unlimited types of connectors.

The entry-level M2Z provides basic continuity measurement in cables



and small wire harnesses. It is suitable for cables carrying digital signals or any electronic signaling where small amounts of resistance in the cable or connections will not affect the function of equipment to which the cables are connected. The entire cable may be scanned for intermittent connections at a fast cycle rate to test for bad connections that may result from motion or flexing. The unit has 128 test points which is enough to test cables or wire harnesses with up to 64 conductors. Other models can be expanded up to 2,560 +24 test points by connecting expansion modules

(128-points permodule).

A probe is included which works with our software to identify unterminated wires. Other models include a remotecontrol socket to be used for either an optional external foot-switch, or for a custom remote control to extendpanel indicators and test button, and an accessory socket for minihook connectors or a probe for use withAutoBuild™ guided assembly.

M2Z Software

The M2Z ships with comprehensive, automation-ready software that allows for tester management, troubleshooting, pass/fail testing, and testing of any product volume and mix. Touch-screen compatible, the software provides maximum flexibility for the widest range of test needs: From prototyping and R&D through to batch testing, from High Mix Low Volume (HMLV) through to Low Mix

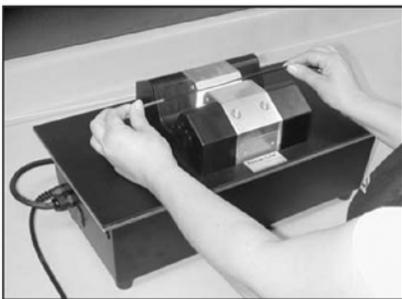


Continued on page 42

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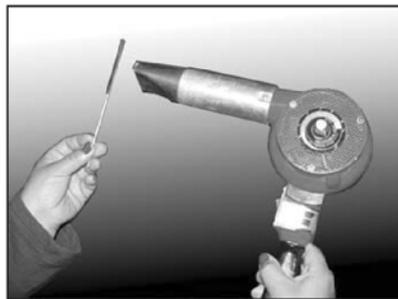
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M2Z Low Voltage Multi-Conductor Cable Tester

Continued from page 40 _____

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Cristina and Hugo Alvarez

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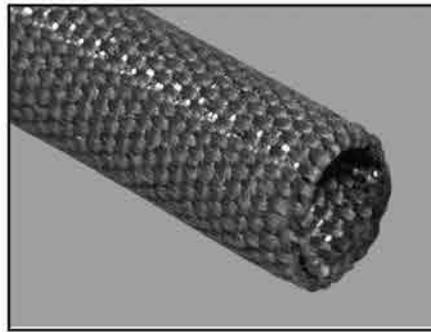
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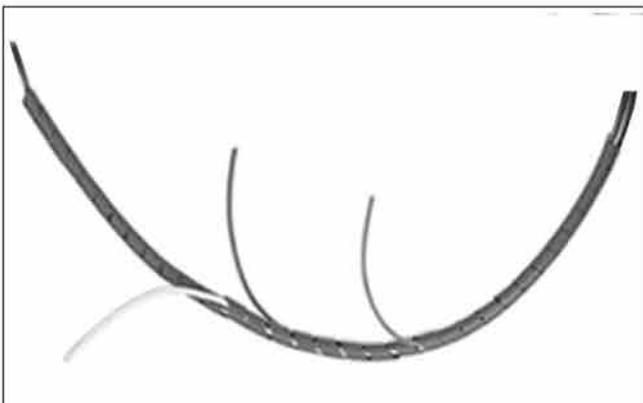
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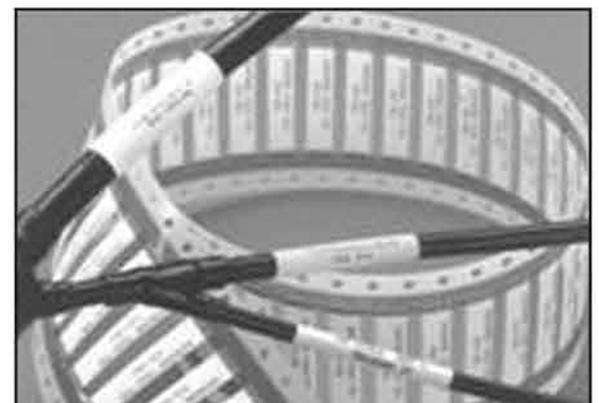
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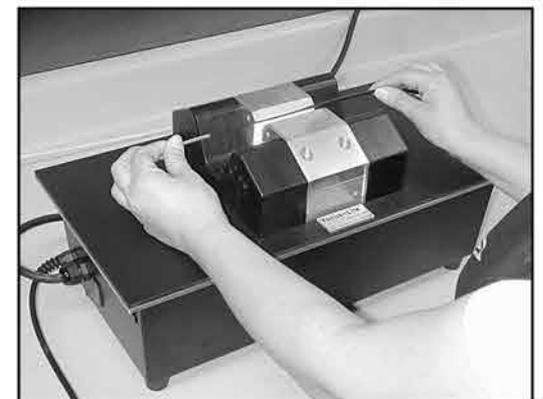
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Back to Basics

Hybrid Connectors - More Than the Sum of Their Parts

Gerhard Liewer, Product Marketing, Pluscon circular, Phoenix Contact

Equipping machines, systems, and automation components with separate cables for signals, data, and power

is time consuming and costly. With more complex regulations and control tasks comes greater cabling complexity and, thus, a greater impact on the availability of the entire system. Hybrid connectors - for transmitting signals, data, and power over a single cable - offer a way out of this dilemma.

The versatile hybrid connectors are more than the sum of their parts: they provide a new level of flexibility when cabling highly automated systems. Along with the established application for cabling servo motors, M23 and M40 hybrid connectors are well-suited for a variety of sophisticated tasks.

solutions were bus systems. Hybrid connector technology, now available in M40 size, can now be paired with hybrid servo cables. This makes it possible to implement serial communication with signals, data, and power. To do this, each device in the supply chain is equipped with two device connectors. One of these is equipped with pin contacts and the other with socket contacts. The connectors are based on the familiar servo motor design and combine suitable contacts for transmitting signals, data, and power in one housing. This makes hybrid connectors suitable for high voltages and currents.

Hybrid connectors for serial cabling

In frequency-controlled drive solutions, the circuit connecting the control cabinet to the engine still commonly uses a star distribution. Previously, almost all serial cabling



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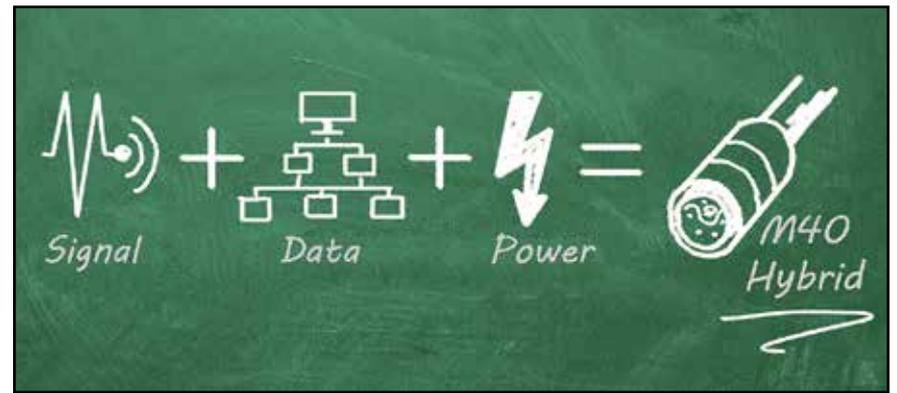
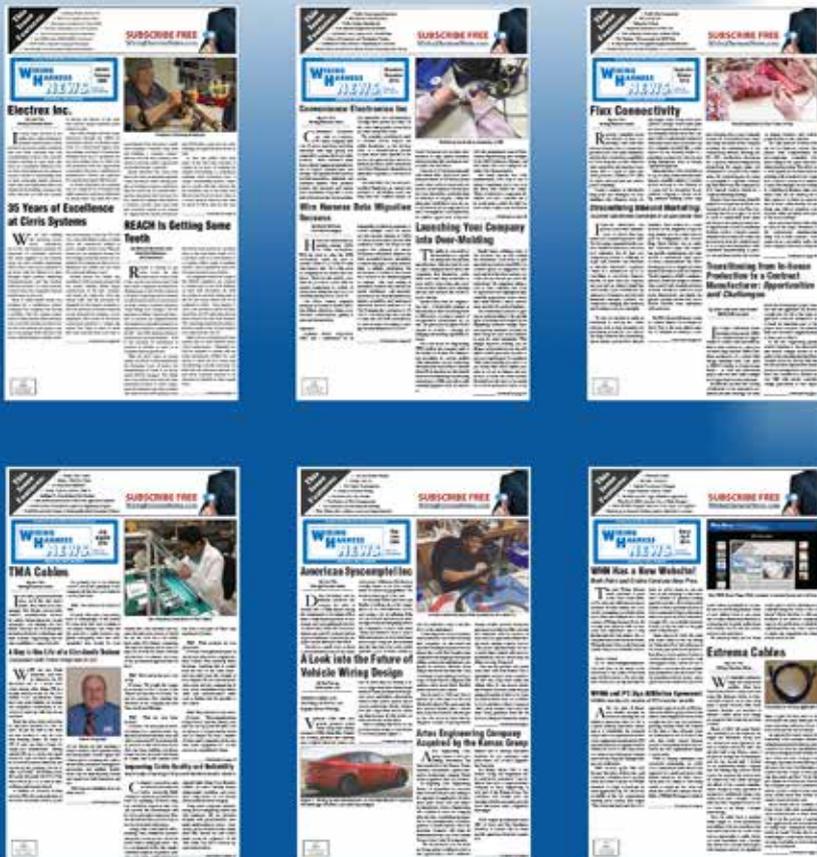


Figure 1. Intelligent solution: hybrid connectors simultaneously transmit signals, data, and power.

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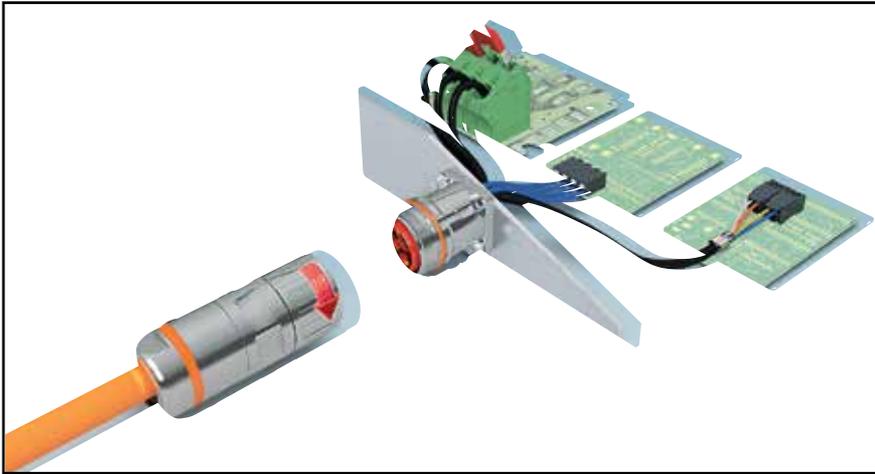


Figure 2. Fast-locking system: SPEEDCON locks cables and device connectors with just half a turn.

Higher system availability, lower costs

Hybrid connection technology does more than just reduce the space requirements on the device or in the control cabinet. Machine and system cabling has become much more organized, because it only requires routing a single cable. The resulting narrower cable routes also reduce the costs for the cable run and cable duct.

Hybrid system cabling also offers easy start-up and repairs for devices, machines, and system parts, as it reduces required connections by two-thirds. For example, many machine and system builders carry out the startup process during in-house manufacturing. After successfully passing this test, the systems must be quickly and securely dismantled, packaged, and shipped, and then once again brought into operation by the end customer. A fast-locking connection system is particularly helpful in these cases. Just half of a turn reliably locks the cable connector system to its

counterpiece. Devices can be connected quickly and reliably in this way with only two hand movements (Figure 2).

More functionality, same size

The newest M40 hybrid connectors have a broad area of application. For example, for distributed servo drivers, some models implement a three-phase supply including L1-3, N, PE signals as well as direct current supplies with up to 850 V DC. Connectors that use different codings and colored housing markings can help prevent incorrect insertion.

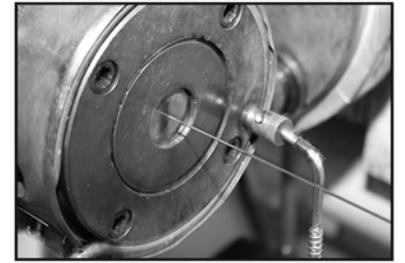
Easy, reliable assembly can be enabled by choosing models designed with larger, more robust contacts. Regardless of the connector size, variations that use four-position CAT5 elements for data transmission are great due to their compatibility with nearly all common bus systems and custom data interfaces.

Continued on page 46

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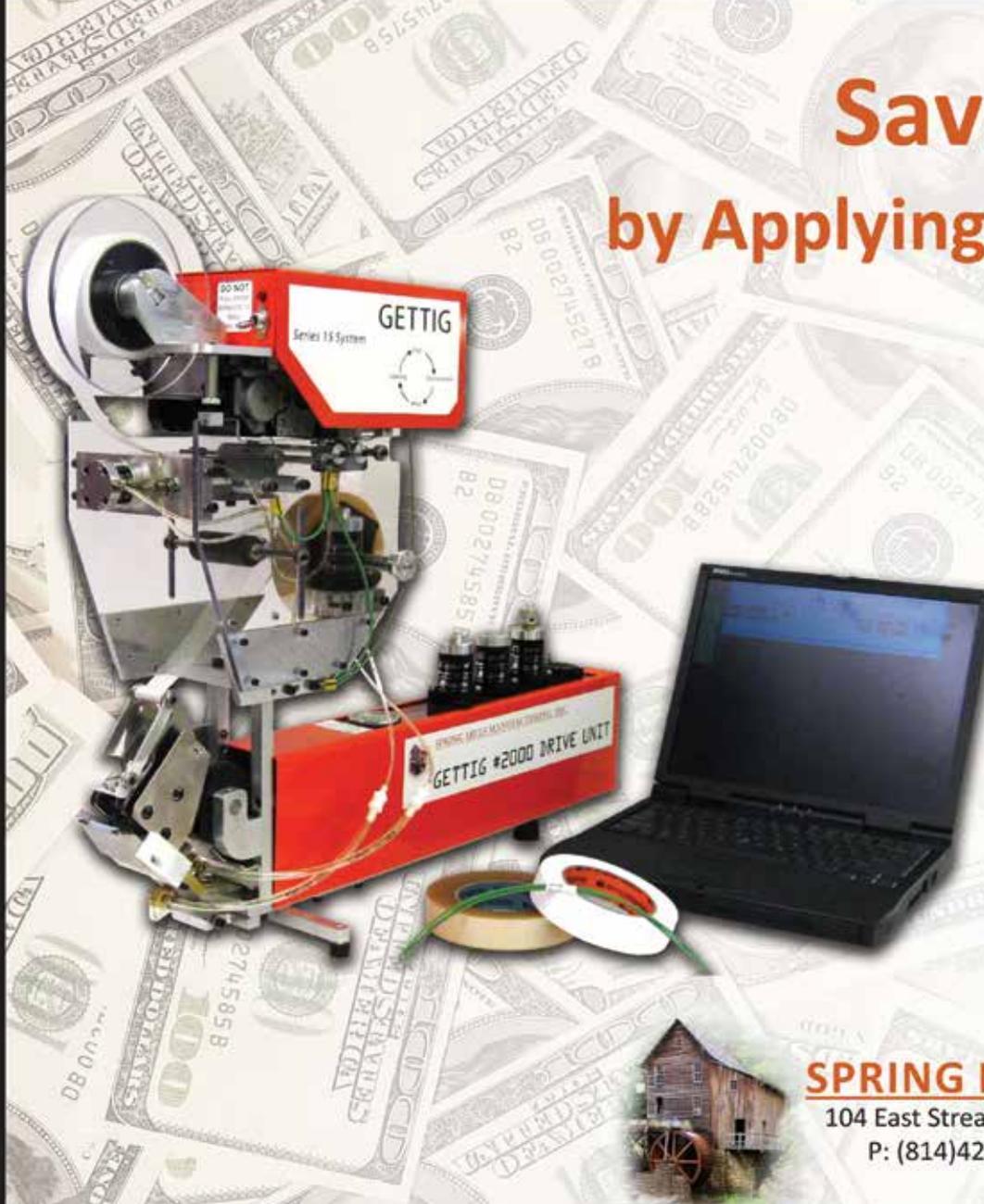


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Hybrid Connectors - More Than the Sum of Their Parts

Continued from page 45

Versions for numerous applications

The CAT5 data element can be replaced by a 4-position unshielded signal element in applications that do not require a shielded data interface. For this reason, a connector is available with eight 1 mm signal contacts, which offers the same performance features as the power contacts. Cur-

rents up to 8A per contact and a wire cross section up to 1.5 mm² make it possible to implement applications for control electronics including hardware shutdowns. Signal contacts allow voltages of up to 500 V AC to be supplied, thanks to appropriate air clearances and creepage distances (Figure 4).

Numerous housing designs are available both in terms of cabling and



Figure 3. Space advantage: round hybrid connectors are compact and as a result save a great deal of space.

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Summary

Automation technology is advancing steadily, especially in relation to the Industrial Internet of Things (IIoT). As part of this, large companies in the automation industry are opting to consistently network their products on the controller and communication level. Industrial applications, machines, and systems are equipped with intelligent control units and interfaces on an ever more regular basis. There is an enormous range of applications for M23 and M40 hybrid connectors, as this affects almost all areas of automation.



Figure 4. Transmission in the most confined space: featuring four contacts per signal (top left and right), data (center), as well as power (bottom), and +PE (top), the M40 hybrid connector allows for versatile use.

About Phoenix Contact

Phoenix Contact produces future-oriented components, systems, and solutions for electrical controls, networking, and automation. With a worldwide network reaching across more than 100 countries with over 17,100 employees, Phoenix Contact maintains close relationships with its customers, which are essential for shared success. The company's wide variety of products makes it easy for engineers to implement the latest technology in various applications and industries.

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The Battery Show and Electric & Hybrid Vehicle Technology Expo

The Battery Show, North America's largest and most comprehensive advanced battery technology event, and Electric & Hybrid Vehicle Technology Expo, the only trade show and conference exclusively dedicated to the drive train and power system in electric and hybrid electric vehicles, announced their return to the Suburban Collection Showcase in Novi, Michigan with a sold-out show floor and more than 700 exhibitors booked to date.

Slated to take place from September 13-15, 2022, the co-located trade show expanded the show floor to accommodate an extra 8,000 NSF, packed full of hundreds more industry-leading suppliers. Notable exhibitors confirmed include 6K Energy, American Battery Solutions, Beckhoff Automation, DEWESOFT, Engel, Festo, IMA Spa, Lion Energy, Magna Powertrain, Marelli, National Instruments, Navistar, Thermo Fisher Scientific, and Xalt Energy, among others.

"With the global battery technology market forecasted to grow from 92 billion in 2020 to 152+ billion by 2025, consumers and OEMs alike are increasingly interested and investing in an electric and battery-powered future," said Kayle Kvinge, event manager of The Battery Show and Electric & Hybrid Vehicle Technology Expo.

Kvinge continued, "We're proud to provide an outlet for networking and facilitate peer-to-peer educational content to help professionals in the advanced battery and automotive industries keep up with the ever-changing demands of the future."

The 2022 edition excitingly reveals new and returning programs included in this year's agenda, featuring an expertly curated four-track conference and an all-new 'Ride and Drive' program where attendees can demonstrate and test drive vehicles comprising all-new E/HV technology on the public roadways. More details on the all-new program to come.

Additionally, registration for the event is officially live and on track for attendees to meet with brands from all leading and emergent categories, including new methods of advanced battery design and latest technologies, battery manufacturing development, market supply chain, and regulatory outlook.

Returning Programs:

Conference - The three-day educational conference brings together battery and EV/HEV manufacturers, industry experts, thought leaders, and academics to discuss and help solve your manufacturing, supply chain, and production challenges, in addition to must-attend keynote sessions.

Open Tech Forum - Serves as the epicenter of the expo floor, hosting panel discussions, live demos, thought leadership presentations, and more.

Product Showcase - Get an under-the-hood look at new technologies from more than 25 exhibiting companies. Each exhibitor will host 15-minute live demonstrations offering a close examination of new and improved solutions for your applications.

New 2022 Features and Programs:

Battery Tech Theater - Access industry-leading educational sessions provided by suppliers such as ATS

Automation Tooling Systems, Thermo Fisher Scientific, Tekscan, and more.

Ride & Drive - Drivers test vehicles on the public roadways while accompanied by a representative from the sponsoring company. This program will be offered from 10:00 a.m. to 3:00 p.m. September 13-15 at the Suburban Collection Showplace Red Lot 1.

Oktoberfest - Oktoberfest celebration in Novi, Michigan. Network with the advanced battery and electric & hybrid vehicle community over German beers, pretzels, bratwurst, and more on Wednesday, September 14.

For further information please visit TheBatteryShow.com

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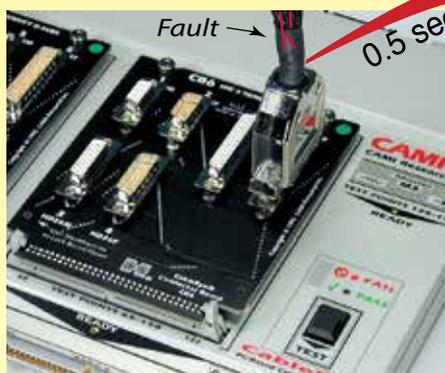
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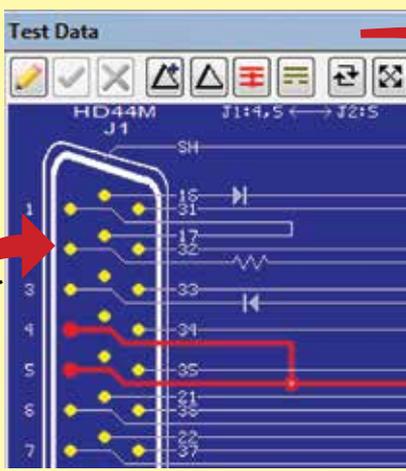
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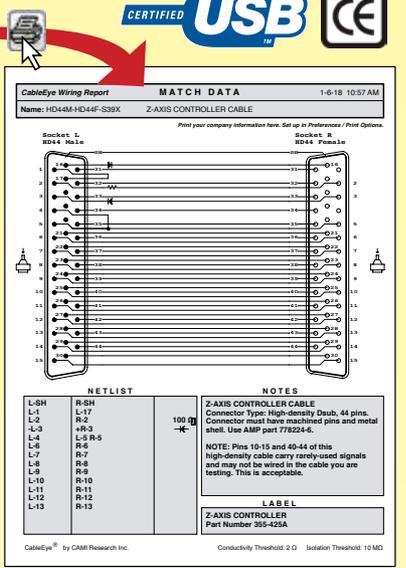
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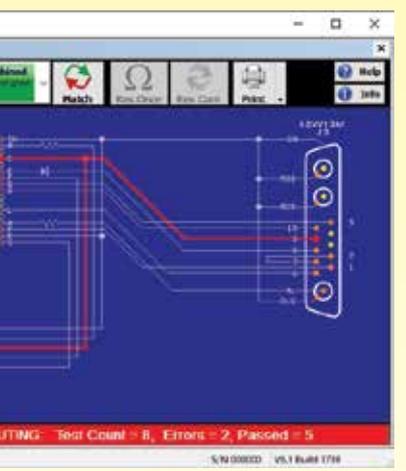
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Box Builds to Brave The Elements: Understanding Enclosure NEMA Ratings

The name of the game with industrial enclosures is the capacity to protect the sensitive electronics that power industrial automation processes as well as safeguard the human beings that interact with these enclosures from electrical harm. And a large part of this protection stems from combatting the variety of harsh environmental conditions in today's manufacturing environments, be it indoors, outdoors, or some combination of both.

In order to achieve this, automation architects need a concrete understanding of how industrial enclosures are classified based on their ability to protect the components and humans alike. For North American manufacturers, this is where the **National Electrical Manufacturers Association (NEMA)** ratings play a mission-critical role in helping automation architects select the right enclosure based on the production environment and potential environmental hazards to enclosure protection and/or security.

UL standards, written by Underwriters Laboratories and product certification to the standards provided by the global certification organization UL, often have NEMA ratings specified in the standard. The NEMA ratings designate the level of protection industrial enclosures provide against environmental influences

such as dust, dirt, water, corrosion, ice formation, and other forms of ingress.

Let's examine in closer detail the different levels of NEMA standards for a better understanding of the ideal enclosure for industrial manufacturing applications.

How do NEMA ratings work?

Before we look at how the NEMA system rating classifies industrial enclosures in terms of safety and protection, it's important to understand the difference **between NEMA and its close cousin, IP ratings**, as confusion between the two is somewhat common.

In the most nuts-and-bolts sense, both NEMA and IP ratings classify enclosures by their ability to combat the ingress of solid and liquid particles while taking into account the potential for electrical interference or harm. NEMA ratings take into account protection and safety on a more environmental level including the potential for corrosion, damage, or harm from atmospheric conditions, and the capacity for electrical fault. Because the two systems are based on different testing parameters, there's no direct correlation, but rather an approximate correlation between NEMA and IP ratings; they are often used in concert to more accurately and holistically ascribe protection characteristics for industrial

enclosures.

In today's global manufacturing landscape, it's also important to note IP ratings are an international standard while NEMA ratings apply predominately to only North America.

While NEMA provides more than 600 standards for industrial enclosures and electrical cabinets, the most common NEMA ratings in today's manufacturing space are:

- **NEMA Type 1 and 2:** This classification denotes an enclosure's protection against human contact with electrically charged components in environments with dripping or light splashing water. NEMA 1 and 2 rating combats faults in normal atmospheric conditions and is suitable for use in general manufacturing applications.

- **NEMA Type 3, 3X, 3S, and 3RX:** NEMA 3 ratings designate enclosures that provide weather-resistant protection. This includes industrial enclosures that are rain tight, protect against ice formation, and are resistant to corrosion while also protect-

ing against falling dirt and other airborne particles.

- **NEMA Type 4 and 4X:** Engineered for indoor and outdoor use, NEMA 4 and 4X rated enclosures are watertight, dust tight, sleet-resistant, and designed to combat splashing water and/or hose-directed water streams. In addition, NEMA 4X enclosures are corrosion-resistant and are ideal for use in a variety of applications including the food and beverage industry.

- **NEMA Type 5 and 12:** Industrial enclosures designed under NEMA 5 and 12 standards protect against falling dirt, circulating dust, and other large airborne agents including lint, fibers, and flyings. In addition, NEMA 5 and 12 rated industrial enclosures protect against dripping and splashing water as well as non-continuous spray of non-corrosive coolants. NEMA 5 and 12 enclosures are engineered for outdoor use in such applications as material handling space for distribution hubs.



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NEMA ratings and industrial enclosures

With an understanding of the most common NEMA ratings used in modern manufacturing, it's important to also understand what we mean when we say industrial enclosures. Just as there is some confusion about the difference between IP and NEMA ratings, so too is confusion about what industrial enclosures, IT cabinets, and junction boxes actually are and how these different industrial housings function as part of an automated production process.

The biggest difference in discussing these different boxes or cabinets is the misinformation surrounding them. Any enclosure housing electrical or electronic components can be referred to as an industrial enclosure, so that would include junction boxes. However, IT cabinets are often misconstrued as industrial enclosures. Industrial refers more to the environment (industrial factory vs. IT data center) or the controls within (industrial controls vs. IT equipment). So, each of these terms refer to very different parts of your automation infrastructure and help manufacturers carry out very different tasks.

- Industrial enclosures house and protect the mission-critical industrial panels and control manufacturing components that help power, control, or protect (switchgear) a manufacturing operation. Often used interchangeably with electrical cabinets, industrial enclosures are used in a variety of production environments and must range in NEMA ratings based on the environment in which the enclosure is deployed. Designed and engineered for innovation, durability, and reliability, Rittal's industrial enclosures solutions include small and compact, wallmount, modular, and unibody to meet a variety of NEMA rating

needs and industry applications.

- Junction boxes are a common element of an industrial automation infrastructure in that they house wire connections and protect these critical connections from environmental hazards that can have circuit faults, large-scale disruptions in production, and even fires. Rittal's line of junction boxes are engineered for a wide range of industrial applications and NEMA standards to help manufacturers enclose wire connections with superior protection and durability.

- IT cabinets house and protect IT components such as Edge computing equipment designed to gather, sort, and store large

amounts of data manufacturers produce via their automated production sequences. Much like industrial enclosures, Rittal's IT cabinets come in a variety of NEMA classifications to help manufacturers leverage data nearest the point of origin in a variety of industries and applications.

Many thanks to Rittal North America for providing this article. No matter your NEMA rating or type of enclosure need, Rittal's innovative approach to design and engineering will help you leverage superior protection and safety in creating an industrial automation framework that promotes productivity, efficiency, and growth.

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UPDATE
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New Advertiser Offers Low-Cost Crimper

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Over the past few issues of WHN, FKN Systek has introduced their C200 tabletop pneumatic crimp tool. It accepts a variety of dies, operates on standard shop air, and has a pressing capacity of 1200kp. The tool offers quick and easy changeout of dies and operates in a linear fashion unlike

a standard scissor crimp which can wear out tools quickly.

Two crimp contact positioning and holding systems are available. A simple crimp contact star for standard contacts, or a positioning slide for holding both the crimp contact and the wire. A tool set for IDC Ribbon Cable assembly is also available

and the company produces custom dies for unique crimping needs.

WHN caught up with Klaus Heilmann of FKN Systek to find out more about the company. They began in 1996 in Millis Massachusetts with the sole purpose of supplying equipment and expertise to the electronics assembly industry. Their main product line has been PCB depanelizers and other PCB manufacturing peripherals. Following their customers' needs, they branched into harness assembly tools and even a wire pull tester. "What sets us apart from our competitors is the ability to supply custom solutions," Klaus detailed.

Although their standard equipment provides a wide variety of crimping options, he noted there are many occasions where unique geometry or particular designs call for non-standard applications. "Our in-house engineering and design team work with our customers to develop the tools they need to make their crimp process efficient and economical."

Standard tools are in stock, and ready to ship. If you have any questions or would like to discuss a special crimp application, you can contact them at (508) 376-2500 or send an email at fkn@fknsystek.com.

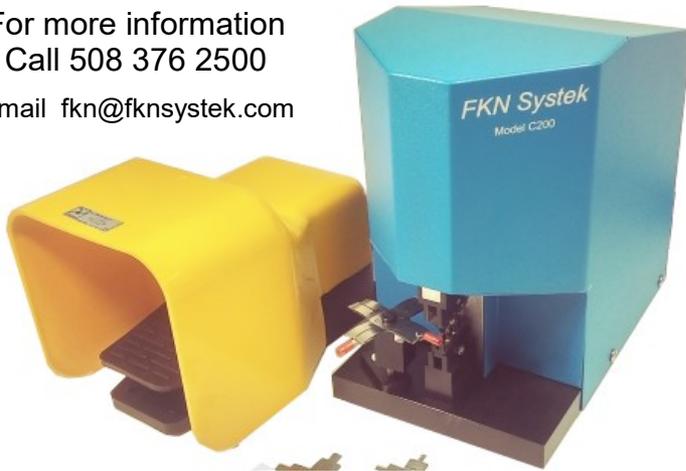
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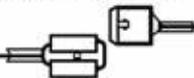
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NEWS PLUGS



Wire Applicator Tooling Speeds Production and Reduces Changeovers

Custom crimp applicator tooling for attaching electrical terminals to wire, producing the strongest mechanical connection with the highest electrical conductivity, is being introduced by ETCO Incorporated of Bradenton, FL.



ETCO Applicator Tooling is custom manufactured from the highest quality tool steel to precisely match OEM electrical terminal attachment requirements and features a specialty coating that improves wear resistance. Proven to extend tool life by up to 140%, the coating allows the tooling to create a crimping slide without friction which increases production speeds and reduces

the frequency of changeovers. Offering greater toughness and lubricity to produce high quality crimp connections and cut tooling costs, the ETCO Applicator Tooling coating exhibits a compressive strength of -1.3/-1.5 GPa and a 0.30-0.35 dry coefficient of friction against steel. The coating also reduces the need for sharpening and shimming by re-coating the same applicator tooling.

ETCO Applicator Tooling is priced according to customer requirements and price quotations are provided after receipt of prints.

For more information contact: ETCO Incorporated, (800) 689-3826, www.etcocom.com.

Secure High-Density Push Pull Connector

PEI-Genesis offers LEMO's B-Series push pull connector: a secure, push pull latching system with high-density panel spacing, 360 degree EMI shielding and quick mating or unmating.

This LEMO push pull connector series is designed for indoor or vacuum-tight applications, making it an ideal choice for test and measurement instrumentation, medical devices, research, audio/video and applications where a highly reliable, quick-mating connector is needed.

Modular insert configurations include a wide range of high-density or hybrid electrical contacts, including solder, crimp, PCB straight or elbow, fibre, coax, thermocouple, pneumatic, fluidic or high voltage contacts. LEMO's proprietary keying system allows for a higher contact density while preventing mismatching. This LEMO push pull connector series includes the family size range of 0B to 5B.



PEI-Genesis' Value Add Services are available for the LEMO B-Series with rapid turnaround. Contact us today to discuss your next application.

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NEWS PLUGS continued



Lacing Tape Scissors Comfortable to Hold & Cuts Fast

An industrial-duty, ergonomic scissors that is designed for cutting lacing tape, cable jacketing, fiber and mesh insulation, other non-aramid fibers, and more has been introduced by Xuron Corp. of Saco, Maine.

The Xuron® 440 Mini-Scissors is an ergonomic hand tool that is well suited for cutting lacing tape and other fibrous materials. Eliminating awkward conventional finger loops, these lightweight scissors have soft rubber hand grips with an internal return spring, and produces a clean, square cut.



Featuring precise cutting tips and the mechanical leverage found in pliers, the Xuron® 440 Mini-Scissors cleanly cuts soft sheet metal up to 0.005" (0.1 mm), soft plastic, and non-aramid fibers. This compact scissors is ideal for repetitive assembly and repair tasks.

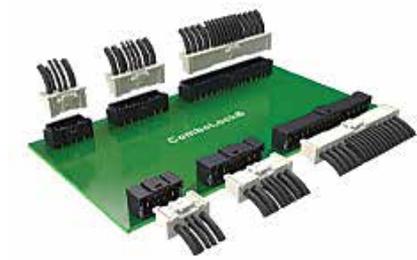
The Xuron® 440 Mini-Scissors is priced at \$26.25(list); made in the U.S.A. A complete product catalog and price list are available upon request.

For more information contact Xuron Corporation, 62 Industrial Park Rd, Saco, ME 04072-1840. Visit www.xuron.com

Amphenol FCI ComboLock Wire-to-Board Connector System in Stock at TTI

TTI, Inc., a leading specialty distributor of electronic components, announces the availability of the ComboLock Wire-to-Board Connector System from Amphenol FCI. This system is a modular, reliable and compact hybrid wire-to-board connector system that saves space and allows for simpler assembly and cable management. ComboLock Wire-to-Board Connectors feature a hybrid 1.00mm pitch signal and 3.00mm pitch power configuration with an active latching feature. These devices have a nominal current carrying capacity of 10A/pin maximum for power and 1.5A/pin maximum for signals where power wire sizes range from 26AWG to 18AWG and signal wire sizes from 30AWG to 24AWG.

Typical applications include con-



sumer, industrial and data solutions, to name a few. They are in stock and available today at TTI.

WireMasters Connects With Conesys as an Additional QPL-approved Value-add Distributor Partner

WireMasters is excited to announce a recent global partnership with California-based connector manufacturer, Aero-Electric Connector—A division of Conesys (Aero-Electric). WireMasters can now assemble Aero-Electric Mil-Spec connectors in their Mexicali, Mexico value-add connector facility.

As a category-C distributor for Aero-Electric, WireMasters is QPL approved to value-add the following connector product lines:

- MIL-DTL-38999 Series I, II, and III
- MIL-DTL-26482 Series 2
- MIL-DTL-83723

With the addition of this partnership, WireMasters now maintains more than \$10M in component inventory on-the-shelf—ready to be assembled into mil-circular connectors and quickly shipped for your application.

WireMasters has built a strong reputation in the industry through service excellence for wire and cable. It was a natural evolution to broaden our product portfolio over the last few years to become a trusted source for everything in your harness. The WireMasters approach to service has led to an exponential increase in demand for value-add connectors over the past twelve months. Adding Aero-Electric to our list of connector component suppliers for QPL-approved assembly is just one of many ways that we're excited to meet the increased demand and to provide our customers with more options and shorter lead times for Mil-Spec connectors, stated WireMasters' VP of Supply Chain, Clint Mendinsky.

Through this partnership, WireMas-



ters looks forward to providing customers a cost-effective and customizable connector offering that Aero-Electric can provide. With a common goal of superior quality and excellent service, WireMasters and Aero-Electric are destined for a successful partnership.

"We are excited to have WireMasters as a Value-Add distributor of Aero-Electric connector product. WireMasters continues to strategically expand its product offering and solidify their position within their customer base, and we are thrilled to support this ef-

fort and move forward together," stated Walter Neubauer, Jr., CEO of Conesys, Inc.

For more information about connectors from WireMasters, contact your WireMasters Account Executive, call us at 855-WM-38999 (855-963-8999) or visit www.wiremasters.net

TactoTek® licensee Nanogate is Ready for IMSE® Manufacturing to Benefit Home Appliance, Consumer Electronics, Medical, and Automotive Markets

TactoTek, the global leader in developing and industrializing in-mold structural electronics (IMSE) technology, announces that its licensee, Nanogate, a leading global specialist for design-oriented high-tech surfaces and components, is ready to mass produce IMSE parts. Nanogate recently completed the IMSE Builder® technology transfer and has verified IMSE manufacturing capabilities.

TactoTek's IMSE Builder includes intellectual property rights, know-how, and instruction for IMSE manufacturing, testing, and quality assurance, as well as access to the database of TactoTek-verified materials and components. TactoTek has a hands-on technology transfer process to ensure that licensees master IMSE manufacturing before undertaking production projects.

"The transfer of IMSE manufacturing technology begins with in-person training using IMSE Builder documentation to increase general technology understanding, help adaptation to IMSE processes, materials, and testing, and prepares our licensees for manufacturing. Nanogate specialists worked alongside TactoTek employees on our IMSE production floor to provide real hands-on experience with IMSE manufacturing, testing, and QA," says Marko Suo-Anttila, SVP Professional Services TactoTek. "The last technology transfer step was producing parts under serial conditions at Nanogate's own facility at Fohnsdorf, the 'SKINLINE', to verify that their team had the skills and capabilities to succeed."

Nanogate is part of the Techniplas Group and is globally known for producing high-quality, high-tech surfaces for home appliances, consumer electronics, medical, aviation, and automotive markets.

The Techniplas Group runs 28 sites worldwide with production, sales, and/or technology hubs and employs just under 4,000 staff members. The Austrian facility is the first factory ready for IMSE manufacturing.

According to Stefan Moitzi, General Manager of the Nanogate 'SKINLINE' facility at Fohnsdorf, "TactoTek's technology transfer process is very thorough and leaves nothing to chance—our team is confident in their ability to produce high-quality IMSE parts, having done so in both TactoTek's factory and our own. We have strong demand across the markets that we serve to integrate electronic functions in a wide variety of high-quality cosmetic surfaces, and that's a perfect fit with IMSE technology; moreover, today's increased emphasis on ease of sterilizing surfaces makes the seamless construction even more appealing."

About TactoTek

TactoTek is the leading provider of Injection Molded Structural Electronics (IMSE) solutions that integrate printed circuitry and electronic components into 3D injection molded plastics. Leading IMSE use cases include human-machine interfaces (HMI), connectivity, and electronic styling features for automotive, smart homes, appliances, and other markets. TactoTek develops and industrializes IMSE technology, creates mass production-ready IMSE prototypes, and licenses IMSE technology for 3rd party IMSE part design and global mass production.

TactoTek is funded by international leaders in finance and industry committed to advancing technology solutions that benefit consumers and the environment. TactoTek investors include 3M Ventures, Repsol Energy Ventures, Faurecia Ventures, Conor Venture Partners, Voima Ventures, Nordic Option Oy, Nidoco AB, and Cornes Technologies Limited. For more information, please visit www.tactotek.com.

About the Techniplas Group

Techniplas is a global supplier of sophisticated plastic components and design-focused, multifunctional surfaces that are primarily for the automotive sector, as well as the industrial, consumer goods, medical and other markets. The company's products follow industry trends like weight reduction and vehicle electrification, innovative operating concepts, high-quality surface finishes, and an increasing focus on convenience and safety.

The company serves customers and platforms around the world, focusing on technological expertise and collaboration with customers in the fields of design and engineering.



IPC Celebrating 10 Years of Success in India

Since 2010, IPC India Regional Office has helped OEMs, EMS, PCB manufacturers, cable/wiring harness manufacturers and electronics industry suppliers Build Electronics Better through skill training & certifications. The India office has certified more than 11,000 professionals from the electronics manufacturing industry in the region.

Electronics manufacturing has been growing quite significantly in India and IPC has supported the Government and industry mission by providing resources, helping electronics manufacturers create better quality products and enhancing job skills.

As part of the 10 years celebra-

tion, the IPC India office has started a series of activities like member networking events and skill challenge competitions throughout India from January 2022. It will culminate with the inaugural Integrated Electronics Manufacturing & Interconnections (IEMI) event scheduled in New Delhi on August 2 and Bengaluru on August 4, 2022.

The IEMI New Delhi event on August 2 will be dedicated to "India's Transformation into Emerging Tech, Industry 4.0 & Mobile Manufacturing Hub" and the IEMI Bangalore event on August 4 will be focussed on "India - Emerging Aerospace Electronics Hub".

The Indian wire harness market has been growing at a steady rate in recent years due to growth of automobile, aerospace, medical & consumer electronics manufacturing facilities. Wiring Harness companies from India will be participating at the Bangalore event focussed on aerospace sector.

The Government of India, IPC Members and several Indian & International Associations are supporting the event in India.

The global electronics industry event allows designers, manufacturers, traders, suppliers, service providers and technical experts to connect - communicate - collaborate - create

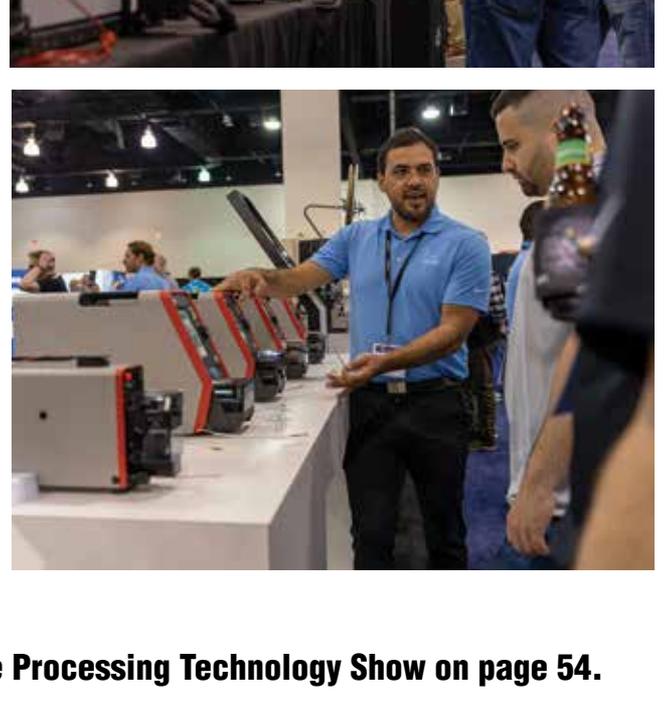
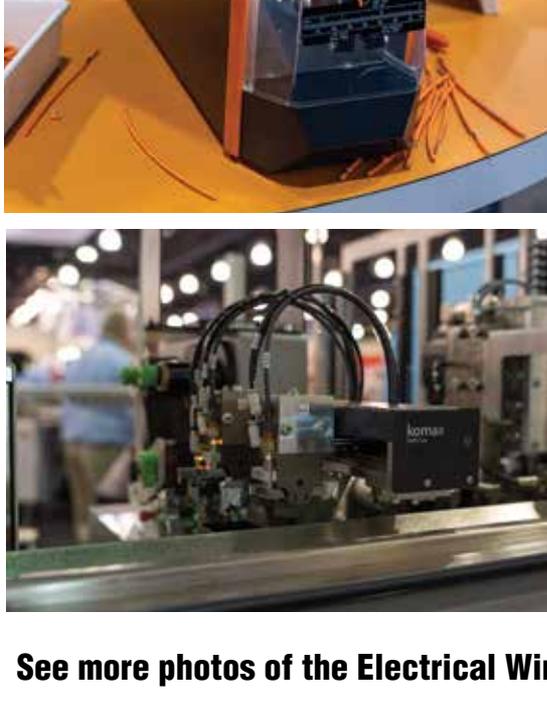
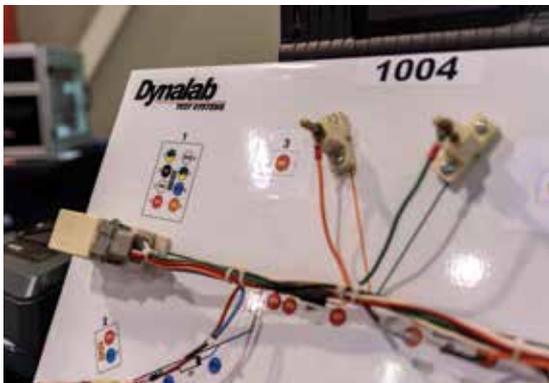
& develop relations. IPC is expecting 800+ delegates from India & international visiting the 2 cities.

IEMI 2022 will help forge new business partnerships and IPC hopes Wire Harness companies will find this forum key to expanding business horizons and will forge new strategic partnerships.

Event website: <https://www.ipcindia.org.in/iemi-website/>

IPC India Regional Office Contact - Gaurab Majumdar, Executive Director IPC, Phone: +91-80-26532211, Mobile: +91-9986366145, Email: ed-india@ipc.org, Web: www.ipc.org/ www.ipcindia.org.in

Great to be back In Milwaukee! Scenes from EWPT 2022



See more photos of the Electrical Wire Processing Technology Show on page 54.





WHMA Presents Awards at Recent Events

By Christine Siebert

Wiring Harness Manufacturers Association (WHMA) offers recognition awards each year to honor the accomplishments, leadership, and contributions of professionals working in the wire harness and cable assembly industry. These awards were distributed at the WHMA Annual Wire Harness Conference and the Electrical Wire Processing Technology Expo (EWPTE).

The first two awards, WHMA Hall of Fame and two WHMA Volunteer Excellence Awards, were presented at WHMA's 29th Annual Wire Harness Conference on February 16, 2022.

This WHMA Hall of Fame award recognizes extraordinary contributions with broad significance to the cable and wire harness industry and distinguished service to WHMA. Award recipients support the advancement of industry, consistent with the goals and mission of WHMA. This is the highest level of recognition WHMA can give to a member and is based on exceptional merit over the long term.

This year's inductees are Norm Sagon, NFS, and Bud Bowen, Winchester Interconnect.

Norm Sagon was recognized for his long-term service to WHMA as one of the association founders, Board of Directors member, and chair of the WHMA board, for many years of promoting WHMA and the programs of WHMA and for contributions to WHMA's mission to lead, educate and connect our members globally.

Bud Bowen was recognized for his long-term service, strategic leadership as a member of WHMA's Board of Directors, for his leadership representing WHMA's interest in the industry's acceptability standard, WHMA/IPC-A-620, and for contributions to WHMA's mission to lead, educate and connect our members globally.

"The Hall of Fame winners represent the best of the best—strategic, visionary and committed—Norm Sagon and Bud Bowen have demonstrated passion, dedication and a continued commitment to propel the harness, cable and interconnect industry forward," said Joe DeMan, chairman of the WHMA Board. "WHMA is honored to acknowledge the hard work of these exceptional leaders. They are truly the heroes and champions of our industry"

The next award is the WHMA Volunteer Excellence Award which honors individuals from WHMA-member

companies who have demonstrated ongoing leadership in WHMA activities and have contributed significant time and talent to the association and the cable and wire harness industry.

This year's recipients are Parker Garrett, EMSCO, and Cathy Hanlin, Precision Manufacturing Company Inc.

Parker Garrett was recognized for his contributions to the WHMA Board, the Board nominating committee, and his significant contributions to the WHMA annual meeting in the role of program committee member.

Cathy Hanlin was recognized for her leadership of the WHMA/IPC-A-620 committee, member of the A-620 "A-Team," and helping to achieve the highest rating of on-time comment resolution and on-time publication of the standard.

"The leadership shown by our Volunteer Excellence Award recipients has made a significant impact on WHMA and will do so for years to come," said DeMan. "We are privileged that Cathy and Parker have chosen to share their knowledge and expertise with us and with the entire global wire harness manufacturing industry."

WHMA introduced a new industry award, the WHMA Hall of Builders Award, during EWPTE in Milwaukee, Wisconsin on May 11, 2022.

The Hall of Builders Award was created to honor individuals from WHMA-member companies who have made significant contributions toward advancing the cable and wire harness industry. Hall of Builders inductees are industry veterans, leaders, and mentors retiring from active employment, but whose legacies live on in the wire and cable industry, today.

Tom Andrsek, sales manager at Pressmaster U.S., the first recipient of the WHMA Hall of Builders Award, epitomizes service and contribution to the cable and wire harness industry. Andrsek was personally involved in the development and introduction of more than 500 discrete hand tool crimp solutions for the North American market, promoting quality crimp solutions for 37 years.

"Tom is known by colleagues as the godfather of connector crimping and educated connector manufacturers on how to achieve a 'quality crimp' while continuing to build the North American Market," said Joe DeMan, WHMA Board chair. "We're thrilled to present him with the first Hall of Builders Award, and to thank him for his outstanding contributions



Randy Cherry presents Scott Morris of MarVac/Marsh Electronics with the IPC/WHMA-A-620 QML (Qualified Manufacturers List) Certificate.

to the cable and wire harness industry."

WHMA/IPC also recognized MarVac/Marsh Electronics for requalifying the IPC/WHMA-A-620 QML (Qualified Manufacturers List) program. QML is used to qualify EMS and OEM providers' assembly processes to IPC standards. MarVac's first 3-year qualification had expired, and the IPC Validation Services team renewed MarVac in late April. WHMA presented the certificate at the EWPTE show.

"MarVac Assemblies a division of

Marsh Electronics, Inc. has worked extremely hard to obtain this requalification to the IPC/WHMA-A-620 Qualified Manufacturers Listing (QML) for Class 2," said Randy Cherry, IPC Director, Validation Services. "We are pleased to recognize MarVac Assemblies for maintaining their participation in IPC's network of trusted QML suppliers."

To nominate candidates for future WHMA awards, visit <https://whma.org/recognition/> for award criteria and nomination form.



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- Listen to experts discuss the latest issues in our industry through our **FREE** Wisdom Wednesday webinars
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WHMA membership has provided our company the opportunity to share ideas, discuss challenges and innovate through networking opportunities. We have built relationships with colleagues, competitors, and industry specialists. Those relationships have been invaluable to our organization.

Jason Zoubek, Absolute Quality Mfg., Inc.



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For more information, contact [Jerry Canada](#), WHMA/IPC sales representative.



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- Write detailed work instructions, including charts and/or pictures when possible.
- Work with Engineering, Production and Quality Managers.
- Solve problems with customer cable designs.

Must meet ALL Requirements:

- **NO EXCEPTIONS** - 5 years **minimum** wire cable and harness manufacturing assembly experience performing **ALL** job responsibilities listed above.
- Work with limited supervision.
- Knowledgeable in the use of hand tools, wire strippers, crimping applicators.
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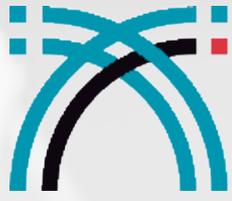
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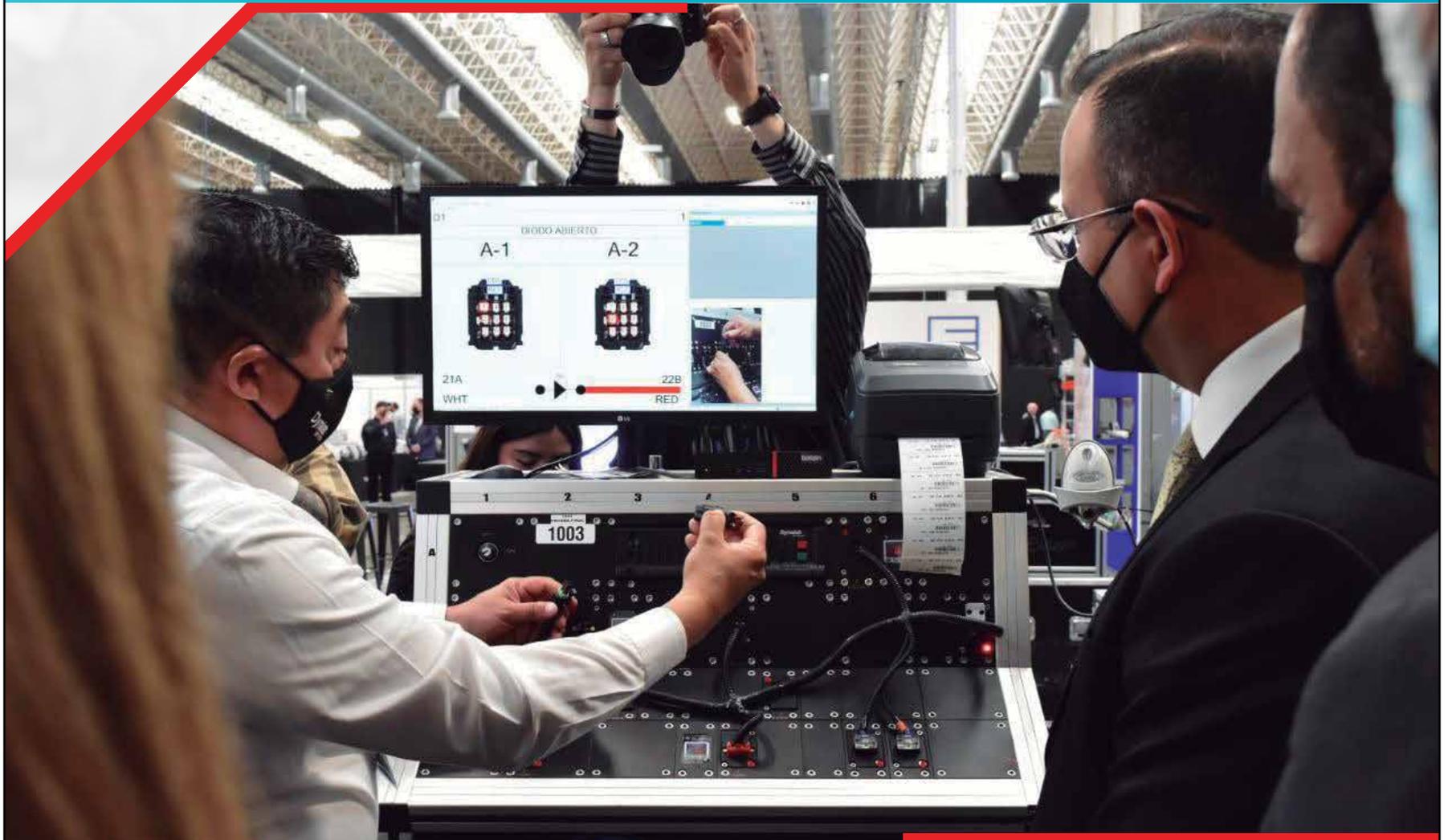
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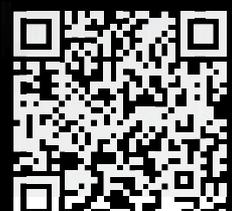
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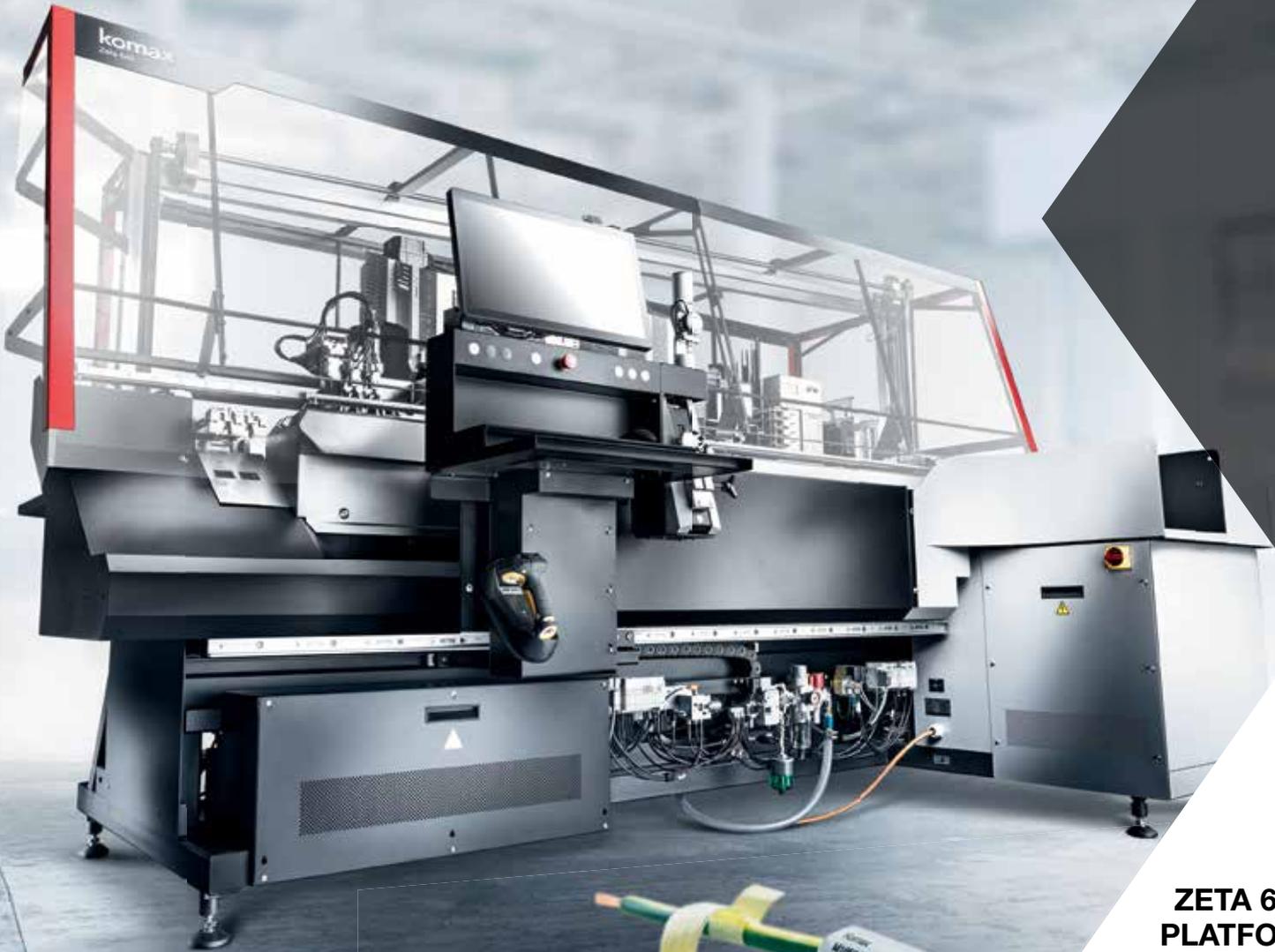
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