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WIRING HARNESS NEWS

Voice of the industry

January February 2017

INDUSTRIAL INFO-TAINMENT

37 Years of Marine Wiring Proficiency at Pacer

Pacer Group headquarters in Sarasota, FL

By Joe Tito
Wiring Harness News

If you've ever traveled to Florida's beautiful west coast, it would be no surprise that it is home to Pacer Group, a major supplier to the marine electrical industry. Pacer is uniquely positioned having integrated three major industrial components into their business. At the heart is the 42,000 sq ft marine wire manufacturing facility at their group headquarters in Sarasota. Just east of there, in the town of Wauchula, Pacer has a similar facility where they manufacture electrical panels and wiring harnesses. Pacer maintains a 14,000 sq ft state of the art marine electrical component distribution center in Hollywood.

I recently chatted with John Swaitowski, President of Pacer Group, about the company and their unique position. "My father was in the wire and cable business up north, and started the business in Ft. Lauderdale in 1979," John began. It was a wire distribution business at the time, and as John's father quickly grew the business, they began to extrude and manufacture their own cable. "There was a lot of marine repair going on there, and it was a great business to be in."

The business continued to grow over the years, even through the tumultuous economic cycles that seem to disproportionately affect the marine industry. "The recession of the 1990's was actually beneficial for us because, as a smaller manufacturer, we became more accessible to the industry than some of the large wire manufacturers. The marine OEM demand was reduced to a point where a more agile supplier was required," John explained. Pacer outmaneuvered the larger firms, with their big overheads, and began to fill what would have typically been a distribution role.

In 1996, Pacer was approached by some of their marine OEM wire customers about making assemblies and harnesses. "At the same time, we saw that our wire volume was somewhat jeopardized as some of our other OEM customers began outsourcing to assembly contractors." There was no guarantee that the raw wire business would come back to Pacer in this changing environment, so they decided to venture into the harness assembly realm. "We have grown substantially, and have captured a good portion of that market, and virtually 100 percent of our customers are OEMs," he advised.

Pacer has added a lot capabilities to its arsenal through this growth. "We don't just manufacture wire harnesses; we make a lot of electrical panels, and we actually outfit the entire electrical system of the boat," John said. This level of integration means that Pacer has positioned itself as a wiring system production house for the marine industry. "We're not a job shop. Our capabilities include hydragraphics, powder coating, painting, and we have all the systems to give a pleasing look to an electrical panel for a boat."

Pacer engineers work directly with OEMs, and under recommendations published by the American Boat and Yacht Counsel, produce the harness assembly, battery cable assembly, and panel assembly to completely outfit an electrical system. "Just imagine a 28 ft. Pursuit, and look at all the electrical aspects of that boat; our products are in the entire electrical system."

The marine OEM industry is vastly different from other industries in terms

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The 2017 WHMA Conference Poised to be Another Winner

Marriott Rivercenter, San Antonio, TX

By Joe Tito
Wiring Harness News

Few investments beat those which enrich us personally and professionally. A few years ago, WHMA embarked on a journey to vastly upgrade the offering at their annual conferences. WHMA conferences of recent years have been unparalleled opportunities to learn, grow, share, and discover new approaches to many aspects of the wire harness business. The WHMA Conference Committee has chosen excellent motivational speakers, as well as personal and professional enrichment presentations, that are still yielding results. I recently spoke with Jim Manke, Executive Director of WHMA. It's clear the 2017 Conference, scheduled for February 27 - March 2, in San Antonio, Texas, will be another stellar event.

One of the departures from tradition this year is the location. "We kind of got stuck in that Orlando, Vegas, Arizona rotation," Jim said, "so this will be a new venue and we're excited about San Antonio and all that it has to offer." The event will be held at the San Antonio Marriott Rivercenter. "You literally step outside the hotel, and you are on River Walk, with its renowned specialty bars, restaurants, and unique shops," he noted.

The next thing the Committee tackled was who to have as a guest speaker. After reviewing many options, the group picked pro football's legendary Joe Theismann. Mr. Theismann is an entrepreneur and the former star quarterback for the Washington Redskins. He has spent the last two decades working on NFL broadcasts for ESPN and the NFL Network. His keynote talk is titled, "Game Plan for Success," and is sure to be a hit. "It's certainly a recognizable name," Jim explained," not only

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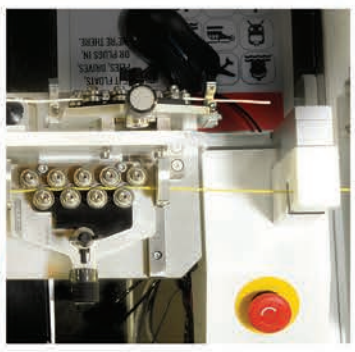
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January/February 2017

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LV 214-4 is an automotive standard that was developed by representatives of the German car manufacturers Audi AG, BMW AG, Daimler AG, Porsche AG and Volkswagen AG

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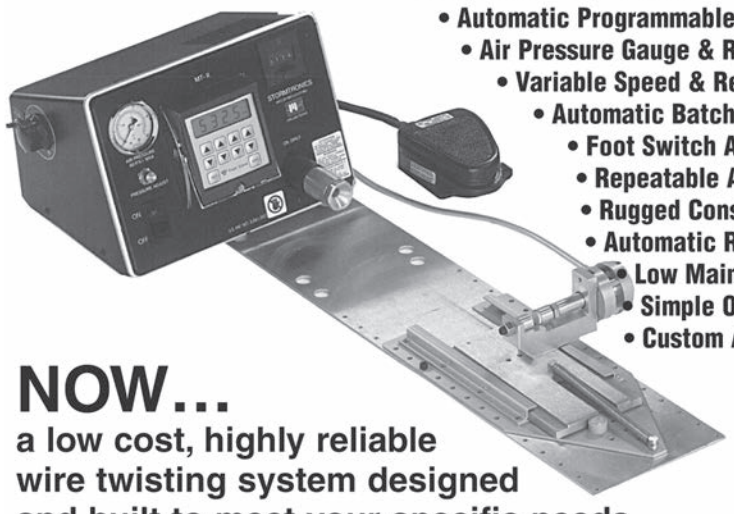

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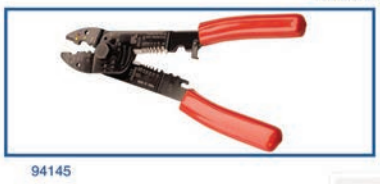

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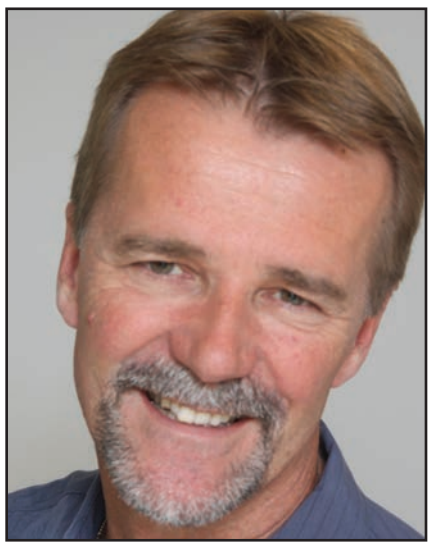
What's your company's DNA?

By Paul Hogendoorn



Paul Hogendoorn

The start of a new year is not just a great time to look ahead with some clarity to the next year and somewhat speculatively to the distant future, it is also a good time to look back at the past year and also further back to our companies' origins.

Businesses evolve over time because they have to - because times change. Economic situations change, as does the marketplace and the business environment. The rate of change has been accelerated by technology, and now also by the significant political and societal changes underway as well. These changes may cause us to alter our visions and re-evaluate our values frequently, but what they don't alter is our DNA. Our DNA is what our companies were born with, and unless they are sold or die, it's what they take with them into the future.

I was recently asked to describe my company's DNA by a respected colleague. The company is only 4 years old and competing in the new IIoT space, so it wasn't too difficult to talk about its vision, the opportunity and value proposition. He then asked me two thought provoking questions: why are you, and, who are you? And this made me think about our DNA, and how we can't really describe it, but how it should be evident in everything we do (just like it is in our real DNA – it dictates how we walk, how we talk, how we think, and how we grow).

The best way to answer his question then, was to describe what I believe (and hope!) are four key characteristics that are evident in our company every day.

#1. "We give credit and take blame".

In many other corporations (both large and small), people feel the need to take credit and give blame. This happens when 'internal competition' becomes the only way that people move up in the organization, or when they need the need to protect their position as they see others seeking to advance up the ladder. In our company, credit is earned and given, and shared genuinely.

#2. "A rising tide raises all the ships in the harbour".

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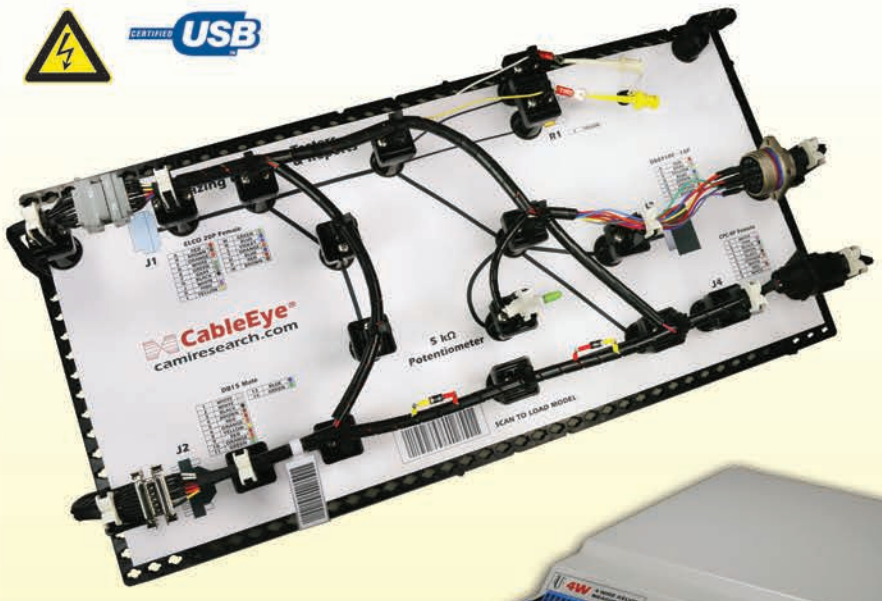

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What's your company's DNA?

Continued from page 4

This is a quote one of my customers customer often uses to describe businesses working together, but it also applies to our organization, where we aim for other people's success rather than our individual success. As we help our coworkers get better, our ability to compete with other companies improves dramatically. To quote my cofounder (Randy Hess, and a pretty good musician), "I'd rather be the weakest player in a rock band than the best player". If you are the best player in that band, it may not be such a great band!

#3. "Aim for our customer's success first, and they will help us achieve ours."

We ultimately succeed only when our customers succeed with our product. This phrase places the onus is on us to first, choose our customers well; second, make sure we deliver a well-designed and well developed product; and third, stay involved and committed until they achieve their success.

#4. "Think. Plan. Do." (Because tactile outcomes speak for themselves.)

Because we are still a small company, no one has a role that is limited to just "thinking", or just "planning", or even just "doing". At this stage in our history, we realize that we all must be "doing" and everyone has a responsibility to get tactile things done themselves. Thinking is required before planning, and planning before doing, but what we get done is what we measure. Our preferred measurement for progress is "outcomes" – the things that we've gotten done. Tactile outcomes need few words because they speak for themselves. In our current organization, everyone "thinks", everyone "plans", and everyone "does". As we get bigger and more 'mature', I hope this characteristic remains true.

A company's initial DNA comes from its founders. As it takes on shareholders, appoints new leaders and grows more key stakeholders, the DNA gets altered with each generation, but a significant part of it is passed on and carried forward. The characteristic a company exhibits strongly and consistently is what attracts certain kinds of people to apply for its key positions and naturally disqualifies others; it attracts certain kinds of customers and even investors as well. If you consistently exhibit and live out your positive DNA characteristics, you will likely end up with a great group of people and a great roster of customers.

If you want a snapshot to gage what your DNA is really like, take a look at your people and how they treat each other, your customers, and even your suppliers. It can be argued that it's the people that make the company, but at the same time, it's the company's DNA that attracts and even shapes its people.

So, here's a question for you at the start of the new year: what is in your company DNA, and, what 3 or 4 characteristics make it clearly evident?

Paul Hogendoorn is co-founder of FreePoint Technologies. "Measure. Analyze. Share." (Don't forget to share!) He can be reached at paulh@getfreepoint.com or www.getfreepoint.com

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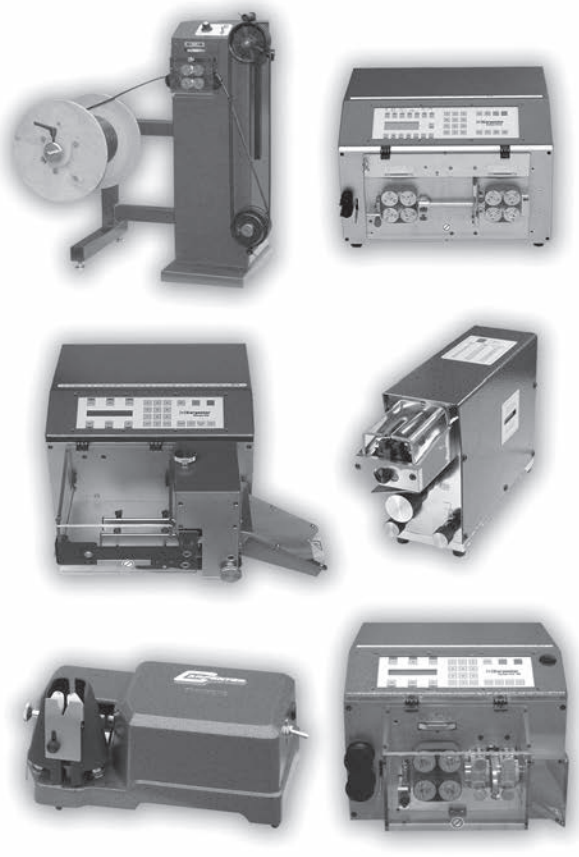

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Timing the Sale: A Case Study

By Loren Smith

Loren Smith CEO
Blue Valley Capital

"Next year should be a bonanza. I think I'll put my decision to sell on hold because I should be able to get a better price next year."

I've heard this, or something like it, many times, and I agree that when an entrepreneur decides to delay selling in the face of an encouraging development, such as a new customer or significant piece of business, applying the brakes can seem to make plenty of sense. But this change of heart is not without risk. Obviously, a delay can turn out to be a brilliant move or a source of regret.

A cautionary tale

I recently was involved in selling a company for a retirement-age entrepreneur who then decided to put the sale process on hold because he felt next year's revenues would be higher, increasing the valuation of the company he had founded many years ago.

Unfortunately, this gentleman suffered a debilitating stroke shortly after halting the process. Because the stroke eliminated his ability to manage the operations of his company, his wife had to step in and handle his affairs. Shortly thereafter, she elected to proceed with the sale--as soon as possible.

I was able to sell the company for her, and the fact that the company was on a growth trajectory boosted its value. But there was a hitch. Even though the owner had a strong management team, prospective buyers could not be sure how much of the company's success was a function of effective overall management versus the founder's personality and relationships. (This relative unknown is why, even with companies that do have a strong management team, buyers so often insist that an owner stay involved for at least a 12-month transition.)

In this instance, the inability of the founder to be involved in the transition increased risk, and the company sold at a discounted price.

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Timing the Sale: A Case Study

Continued from page 8

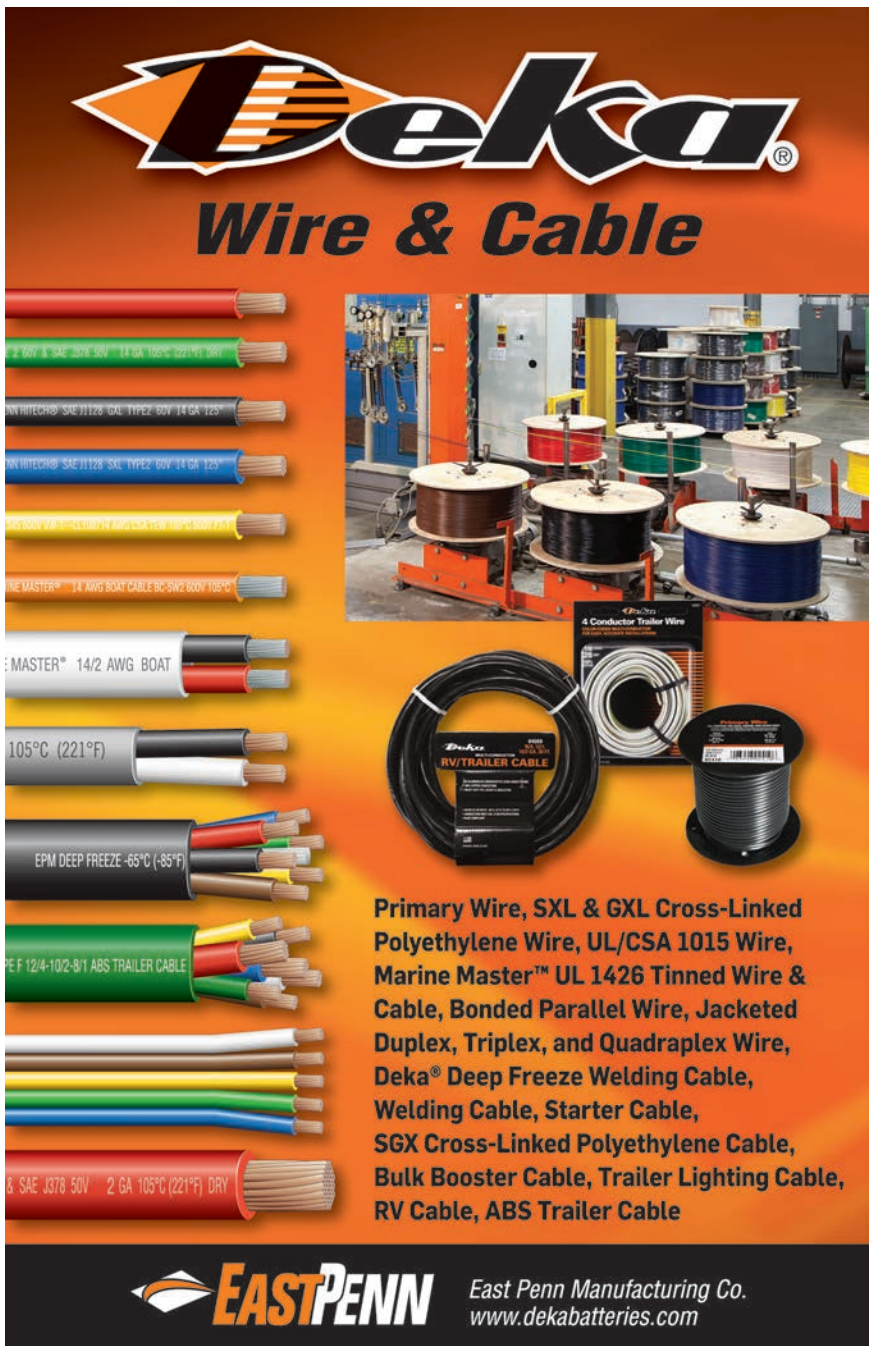
Risk on both sides

Every buyer of a company, in every industry, is concerned with risk. How could anyone not pore over all the pros and cons of buying a business at a particular price? But the element of risk for the seller is not nearly as apparent. And yet, prospective sellers really need to ask themselves what could go wrong? The wild card in our cautionary tale was health, but we can come up with all sorts of other factors undermining the potential sale price: the departure of a key manager, the loss of a steadfast customer or a vital outside resource, an unexpected new competitor, even a lawsuit.

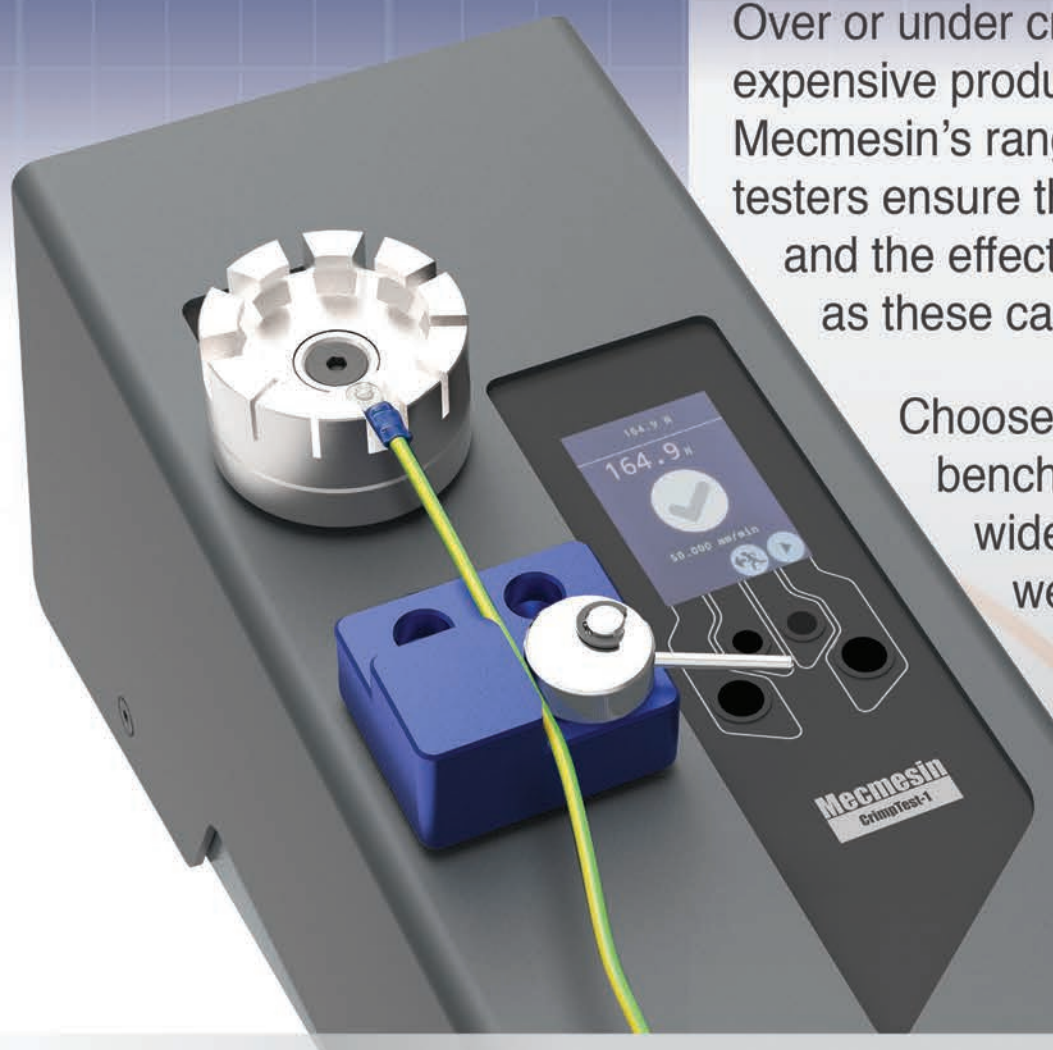
So what is an owner to do? Quite obviously, there is no magic monetary formula for determining the ideal time to sell a company. That is why I counsel anyone considering a delay in selling a company to think hard about the risks of waiting and the original motivations to sell. Do you feel ready to retire? Do you want to make a lifestyle change? Do you want to continue working but you no longer want the stress of ownership? Is it time to pursue a particular estate planning strategy? Whatever the motivations, a close examination of them can often help clear up the question of when to sell better than an extreme focus on dollar and cents.

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

2017 WHMA Conference will be held at the Marriott River Center, San Antonio, Texas Feburary 27 - March 2. Visit www.whma.org for more information.



Wire Terminal Pull Testing



Over or under crimping often results in expensive product failure, re-call or re-work. Mecmesin's range of wire terminal strength testers ensure the integrity of the final product and the effectiveness of crimping tools, as these can be calibrated to test results.

Choose from a selection of motorised benchtop or vertical testers to test a wide range of crimped, soldered or welded terminals to ASTM, ISO, SAE, NASA standards up to AWG 0000.

Visit *www.wireterminalstrength.com* for a range of useful information including videos and full technical specifications.

Please contact us to request a quote

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NEWS PLUGS

The Epson LABELWORKS PX LW-PX700 Thermal Transfer Label Printer

K-Sun Corp., a leader in professional identification and labeling solutions, introduces the Epson LABELWORKS PX LW-PX700 industrial label maker for creating durable, custom and compliant labels, wire markers and more up to 1" wide. Exclusive features of the LW-PX700 save time, effort and money by creating a lower total cost of ownership:

Auto Tape Rewind reduces lead margins to 4 mm by retracting material into the cartridge before the first label prints, which translates to more cost savings per print and less waste.

Epson LABELWORKS PX LW-PX700 Thermal Transfer Label Printer

The Mixed-Length hot key lets users create multiple uniform and variable-length labels on the same strip with a half-cut between each label for easy removal and application, eliminating multiple lead margins to significantly save tape.

The Pick-and-Print function conveniently prints, cuts and holds a single label until it is removed. The function resumes for the next label in the series, saving time by eliminating the need to continuously type and print labels.

The rugged LW-PX700 label printer, engineered to meet MIL-STD 810 "drop" test specifications for the toughest environments, can be used to organize tool cribs, identify storage bins, label inventory racks, make safety labels, mark cables and wires, tag assets and create nine resident barcodes or 15 using Label Editor Professional software plus import images and label files to print on the go.

With applications-specific hot keys such as Punch Block, Patch Panel, Block 66, Self-Lam Overwrap and more, the LW-PX700 label printer offers extraordinary flexibility. Powerful, easy-to-use Label Editor Professional software allows users to import and print large batch files from Excel® or other software with an available API, as well as import custom images and logos. Software functions also include alphanumeric sequencing and auto-repeat. Plus, users have automatic access to new label templates as they are added through the

Continued on page 14

We'll prove it with *free sample welds.*

***Only* Sonobond delivers these ultrasonic welding advantages...**

- ***Exclusive tin-coated wire splicing***, as well as welding aluminum, copper, nickel alloys, precious metals and dissimilar metals.

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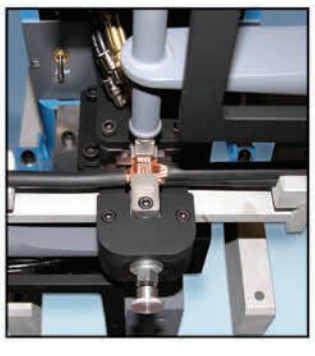
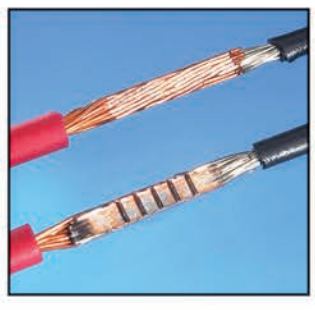


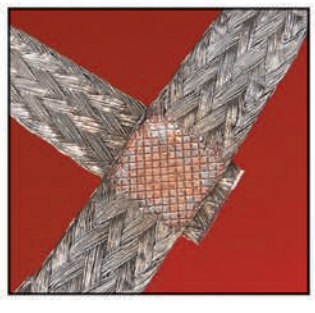
- One-pulse wire splicing up to ***100mm²*** and ***tinned wire to 60mm²***.
- Spot welds and wire-to-terminal welds also delivered ***in a single hit***. Welding by time, energy, or distance.

- Durable Taper Lock tips that last up to ***100,000 welds***.
- Fast, easy tooling changes with ***no re-calibration*** required.

We've been using our patented Wedge-Reed System since 1960 to provide the most durable, precise welds of any ultrasonic metal welder manufacturer.

Tests prove that ultrasonic welding is less expensive and more reliable than resistance welding or soldering. And Sonobond's technology helps you be RoHS-compliant, unlike conventional soldering.





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NEWS PLUGS continued

Continued from page 12

software's cloud-based label catalog.

The LW-PX700 has a unique a built-in handle, making it easy to use anywhere. Magnet attachments allow hands-free operation to keep the printer within reach to free up hands and get the job done. A built-in memory lets users create, import and store up to 100 label designs. High speed, 180-dpi printing results in highly visible and detailed auto-cut individual and half-cut continuous labels. The printer is RoHS compliant and Energy Star certified, and cartridges can be recycled through K-Sun. There is a Lifetime Warranty on the Epson LABELWORKS PX.

The LW-PX700 uses LABELWORKS PX supplies -- more than 118 supplies include heat shrink tube, magnetic tape, glow-in-the-dark, self-lamination wire/cable wrap, strong adhesive, reflective tapes and more. LABELWORKS PX supplies have more material per cartridge and are designed to diversify and simplify supply selection for industrial applications in the facility or field. For more information contact K-Sun at 800-622-6312, info@ksun.com, or www.ksun.com.

Weidmuller Purchases Bosch Rexroth Monitoring Systems GmbH

The Weidmuller Group is pleased to announce the purchase of Bosch Rexroth Monitoring Systems GmbH from Bosch Rexroth AG. The acquisition was completed on November 1, 2016, following review and approval of the Competition Authorities. With this acquisition, Weidmuller strengthens its presence in the wind power industry and expands its solution portfolio for condition-monitoring technologies.

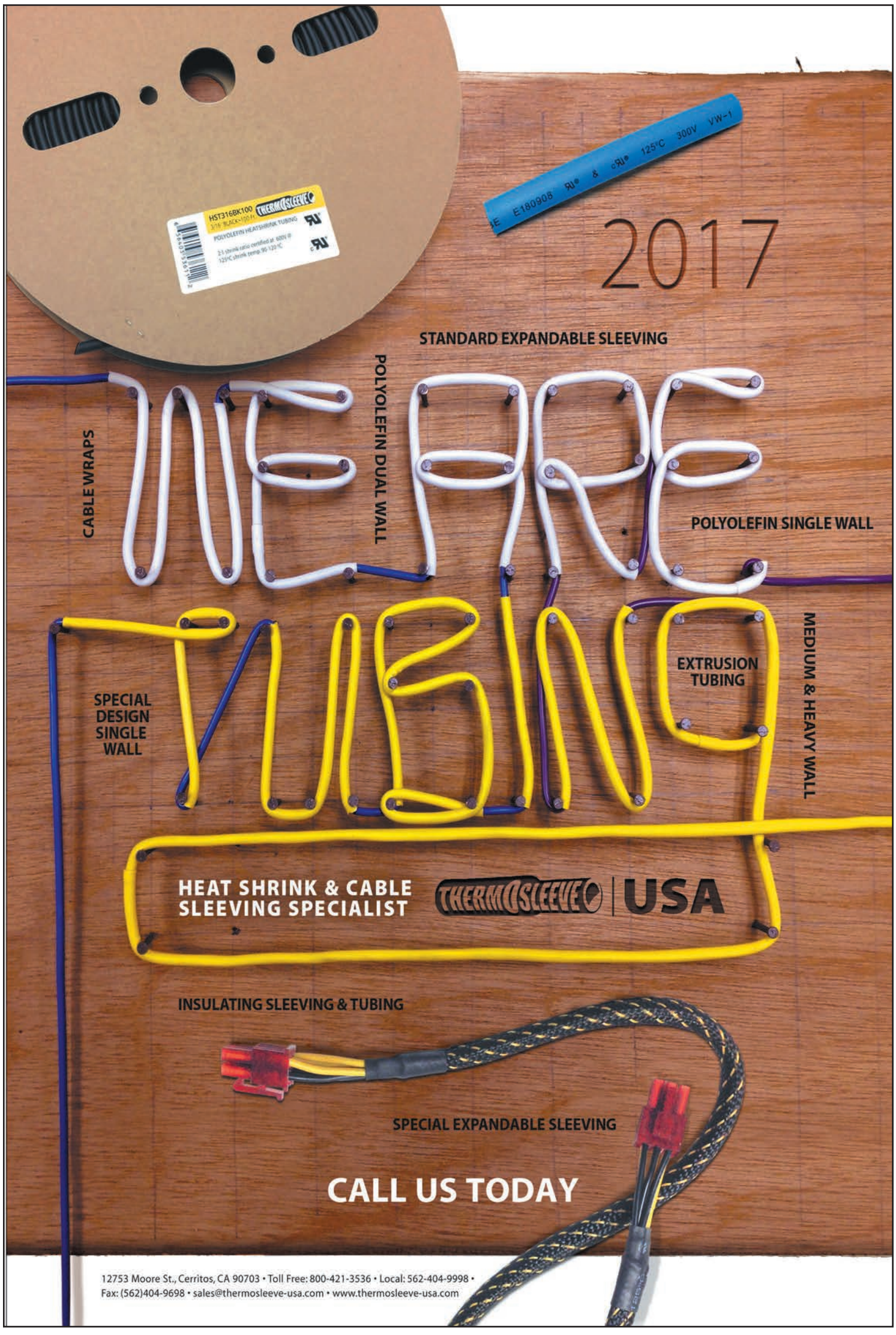
The new subsidiary, located in Dresden, Germany, employs 25 people and effective immediately, will operate under the name of "Weidmuller Monitoring Systems". As part of the acquisition, the Weidmuller Group purchased the former facility of Bosch Rexroth Monitoring Systems in Dresden, where the condition-monitoring systems for wind power installations are developed, manufactured and distributed. These systems, marketed under the brand name BLADEcontrol®, monitor the condition of wind turbine rotor blades and provide the ability to detect ice build-up.

"Weidmuller Monitoring Systems breathes new life into our existing solution portfolio for the wind energy sector," said Dr. Peter Köhler, Chief Executive of the Weidmuller Group. "Thanks to our new subsidiary and its excellence in the area of rotor blade-based damage detection for wind turbines, our portfolio for wind turbine condition monitoring has become considerably more appealing in Germany and worldwide. We are delighted to be able to work together with our new employees in designing customized automation solutions for the wind energy systems of the future."

The Weidmuller Group and Bosch Rexroth AG agreed not to disclose the purchase price of Bosch Rexroth Monitoring Systems GmbH, which has experienced rapid growth, and is expected to post significantly higher revenue this year, compared to 2015.

Weidmuller supports customers and partners

Continued on page 16



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NEWS PLUGS continued

Continued from page 14

around the world with products, solutions and services in the industrial environment of power, signal and data. The company develops innovative, sustainable and useful solutions that set standards in Industrial Connectivity today and continually work toward providing solutions for the technology challenges of tomorrow. The Weidmuller Group owns manufacturing plants, sales companies and representatives in more than 80 countries.

TE Connectivity Launches First Cable Identification Marker - Low Fire Hazard and Diesel-resistance

TE Connectivity (TE) (NYSE: TEL), a world leader in connectivity, has launched ZHD, a new, versatile cable identification product. Until now, heat shrink cable identification systems were either low fire hazard or diesel resistant – but not both. TE's new ZHD identification products combines these two features into a single product. With this combined advantage, train manufacturers can standardize and simplify cable identification – and remain compliant with the latest industry regulations.

ZHD is the first low fire hazard and diesel-resistant heat shrink cable identification solution available in the marketplace. It meets EN 45545-2 and NFPA130 standards for fire safety in rail vehicles and complies with rail fluid resistance regulations and rail fire and smoke regulations, as well as meeting the UNIFE environmental standards – a unique product in the rail industry meeting all of these standards.

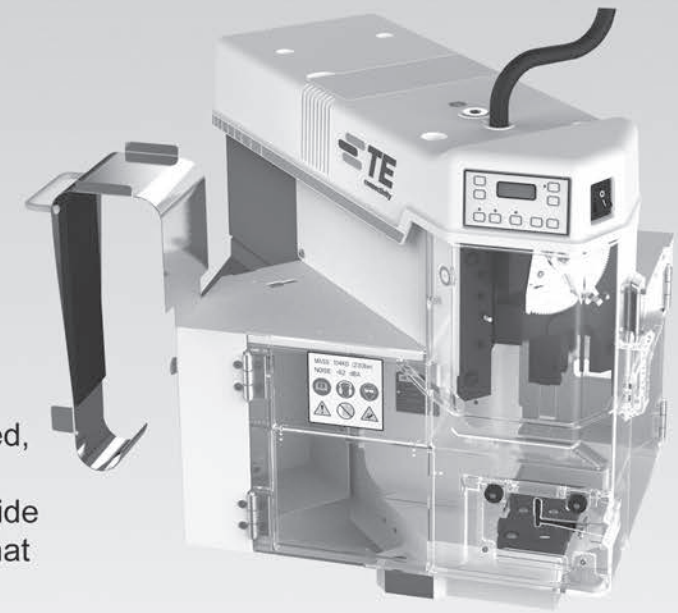
"ZHD offers train manufacturers a single product which enables inventory reduction, decreases set-up and change-over frequency, reduces training requirementsand improves standardization," said Stephen Earley, product manager, TE. "We believe that it will be the new rail industry benchmark for heat shrink identification."

With a temperature range of minus 55 degrees Celsius to 125 degrees Celsius (-67°F to 257°F), ZHD has a shrink ratio of 2:1 and is available in sleeve diameters from 2.4mm (3/32") to 38.1mm (1½"). It is part of the complete TE Identification Solutions portfolio.

ZHD is suitable for pre-termination cable identification across multiple applications in the rail, mass transit, aerospace, marine and heavy industrial sectors that face harsh environments and conditions such as being able to resist fluids (diesel) and fire & smoke hazards. It is ideal for locations where there is fire risk to people or equipment, and suitable for installations that require outstanding fluid resistance, especially from diesel fuel. For more information on the ZHD, visit the te.com\zhd.

AMP-O-LECTRIC MODEL G II TERMINATOR

TE Connectivity's (TE) Model G II is the latest and most advanced design in the long-standing series of their AMP-O-LECTRIC machines for terminating wire using reeled terminals and contacts. This unit is designed and built to continue the tradition of work-horse terminators from TE.



The new terminator improves key performance areas for operators. For operator convenience, TE improved access to, and significantly updated, lighting in the under cabinet and target area. A variable speed option was also added to provide more flexibility for those complex applications that benefit from slower ram and feed speeds.

The Model G II terminator is one of the quietest machines available and the improved guarding meets applicable CE and domestic safety requirements. The improved guarding also creates open access for quick and smooth installation of both end-feed and side-feed applicator styles.

User Friendly

At the push of a button, you can power the motor on or off, jog forward or reverse, switch to split-cycle operation, turn the work light off or on, power the air feed on or off, or reset the batch counter. And, it's all reported on an LCD display. The controls will also detect and report errors in the machine, and stop cycling when a bad crimp is detected by the CQM II. The operator must then push the reset button to continue. The Model "G II" will accept all existing TE miniature applicators.

Product Features

- Quiet operation
- Improved guarding and lighting
- Tool-less changeover of applicators
- Precision manual adjust for crimp height
- Total and batch counter
- Accepts all existing TE applicators, with minor modifications
- Reduced maintenance requirements
- Split-cycle operation
- Standardized 1 5/8 [41.3] stroke
- Operates on either 120 or 220 VAC, 50 or 60 Hz

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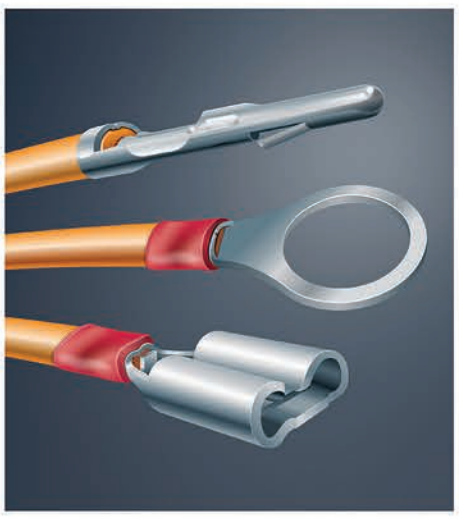

Ramp up efficiency with a full line of equipment designed to enhance productivity and satisfy your budgetary needs. From our highly affordable AT-300 electric benchtop terminator and reliable, semi-automatic model G II terminator, to the versatile, fully-automated UNIQA-PRO single crimp wire processor, we have the right equipment for every stage of your business.

As **the industry's only single ended wire processor**, the UNIQA-PRO saves on labor costs by measuring, cutting, stripping both ends, and crimping one end of a wire lead—all in a single machine. With a 20% smaller footprint compared to typical double-ended lead makers, the UNIQA-PRO ramps up throughput approximately 4X more than standard wire prep and benchtop machines. Plus, a user-friendly PC control allows operators to easily monitor system performance.

To learn more about the right TE tooling for your needs, contact us at 717-810-2082 or ToolingSales@te.com

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INSPIRING INNOVATIONS

The 2017 WHMA Conference Poised to be Another Winner

Continued from page 1

as a football player, but now as a TV commentator."

Other timely topics to be discussed at the conference include:

Art Thomas of the Purdue Manufacturing Extension Partnership, will lead a three hour interactive session on the "Total Cost of Ownership".

Dave Pheteplace of Bishop Research returns with his always popular "Industry Trends Update".

Paul Evans, Director of the Production and Simulation Technologies Department, Southwest Research Institute® (SwRI®) will make a provocative presentation entitled, "Future Trends in Robotics for Manufacturing Applications". This presentation takes a look to the near-future, as robots transition to operate in high-mix low-volume production.

The Committee has also changed the event flow for the 2017 conference. "Typically we would start on a Wednesday with a golf outing, have a reception that evening, then go all day Thursday and half of Friday. This year, we moved it up so folks will arrive on Monday, we will have a reception that night, then two full days of programming Tuesday and Wednesday," Jim explained. The golf outing at La Cantera will be Thursday.

Joe Theismann

Part of the feedback from last year's event was the extent to which members truly value the peer to peer discussions, so the decision was made to bump the round tables up from two to three hours. "One of the other things we heard," Jim revealed, "and more so from the attendees rather than from the exhibitors, is that they felt rushed and didn't get the time they needed for in-depth discussions with suppliers; so we beefed up the exhibit hours too."

Continued on page 23

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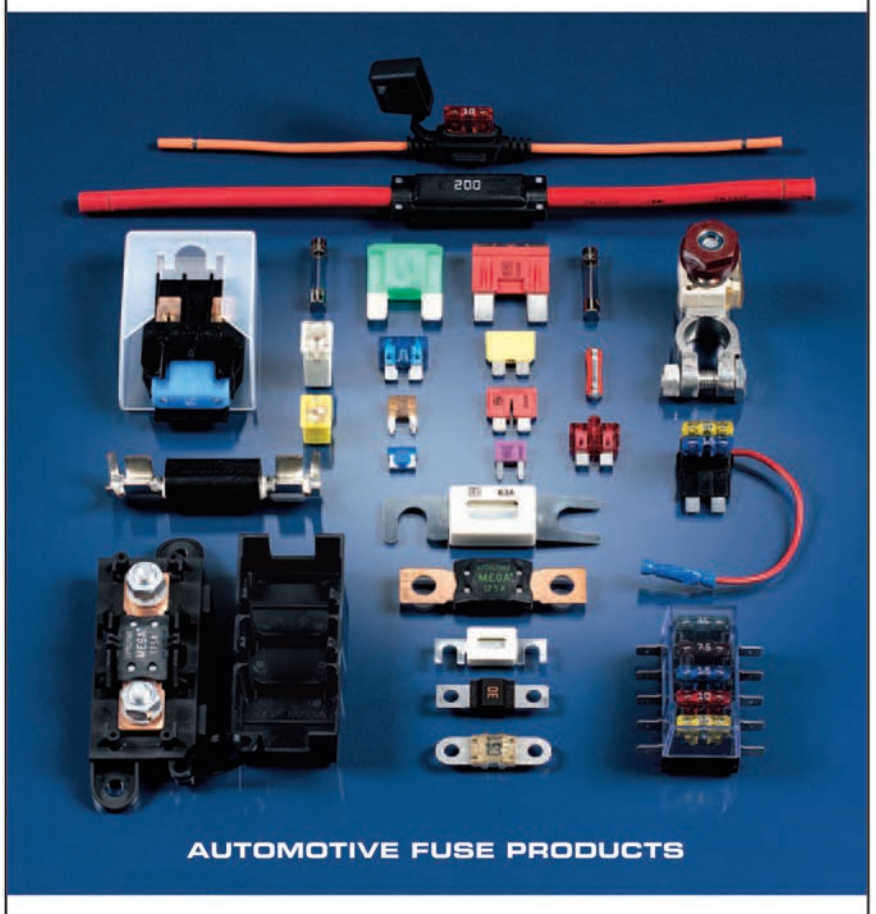

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NEWS PLUGS continued

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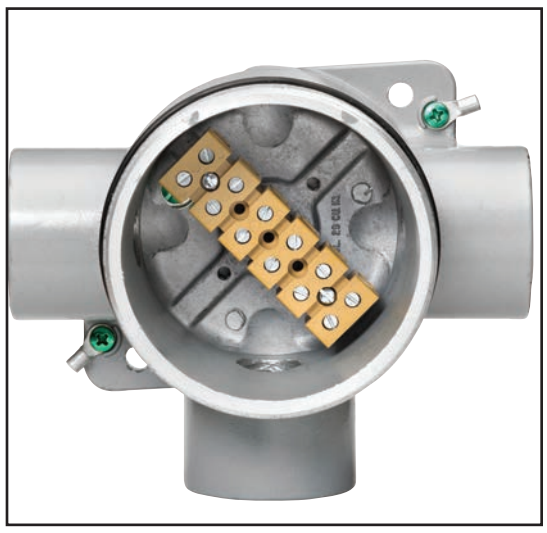
Killark® Announces the GEB Series Terminal Box Line

Killark Electric is announcing a new addition to their global market lines of Harsh and Hazardous Terminal Boxes built and tested to the latest IEC / UL / CSA / ATEX / IECEx Certifications and Directives for Class I Groups BCD & Ex d IIC hazardous areas, with IP66 and Type 4X Ingress Protection in a ambient temperature range of -40°C to +163°C.

The GEB terminal box line is supplied standard in copper free aluminum that has a grey electrostatically applied powder coating, along with utilizing a Nitrile gasket to hold up in the harshest environments.



GEB Series Terminal Box Line

The GEB terminal box line is available in four configurations, C, L, T & X. The hubs are available in ½" NPT through 1-1/2" NPT and M20 through M50. Available with ABB and Weidmuller terminal blocks, choice of DIN rail mounted or panel mounted. And a choice of either screw clamp or cage clamp styles. Available as an empty instrument enclosure also.

For further information contact Hubbell Killark, 3940 Dr. Martin Luther King Dr., St. Louis, MO 63113. Phone (314) 531-0460 or Fax (314) 531-7164. Visit www.hubbell-killark.com.

Toyota Motor Corporation Approves Mentor Graphics Volcano™ VSTAR AUTOSAR Stack for Deployment in Toyota Vehicles

Mentor Graphics Corporation announced that TOYOTA MOTOR CORPORATION has approved its Volcano™ VSTAR AUTOSAR basic software stack for use in all Toyota vehicles. With this approval, global Tier 1 automotive suppliers can now leverage Mentor's fast, resource-efficient AUTOSAR stack for the design and development of advanced Electronic Control Units (ECUs) in next-generation Toyota models.

Supported by Volcano VSx™ design tools across the development cycle, Mentor's Volcano VSTAR software stack provides scalable AUTOSAR 4 middleware which abstracts the application from the hardware-dependent layer for the rapid development of highly differentiated end-products.

"Toyota's approval of our advanced Volcano™ VSTAR AUTOSAR software reinforces Mentor's broad acceptance and expanding adoption among the world's most prestigious and demanding automotive OEMs and Tier 1 suppliers," said Rainer Oder, General Manager for Mentor Graphics' Automotive Business Unit. "Fueled by innovative technologies and proven systems engineering expertise, Mentor's footprint in global automotive markets continues to expand at a rapid pace."

A longtime premium partner of the AUTOSAR development partnership, Mentor has a well-established track record of promoting AUTOSAR as the premier open standard for automotive electronics engineering. Designed to optimize re-use and transferability of ECU design assets, AUTOSAR allows automotive engineers and suppliers of ECUs to achieve modularity and scalability of software with standardized interfaces, improving the ability to handle high-complexity designs.

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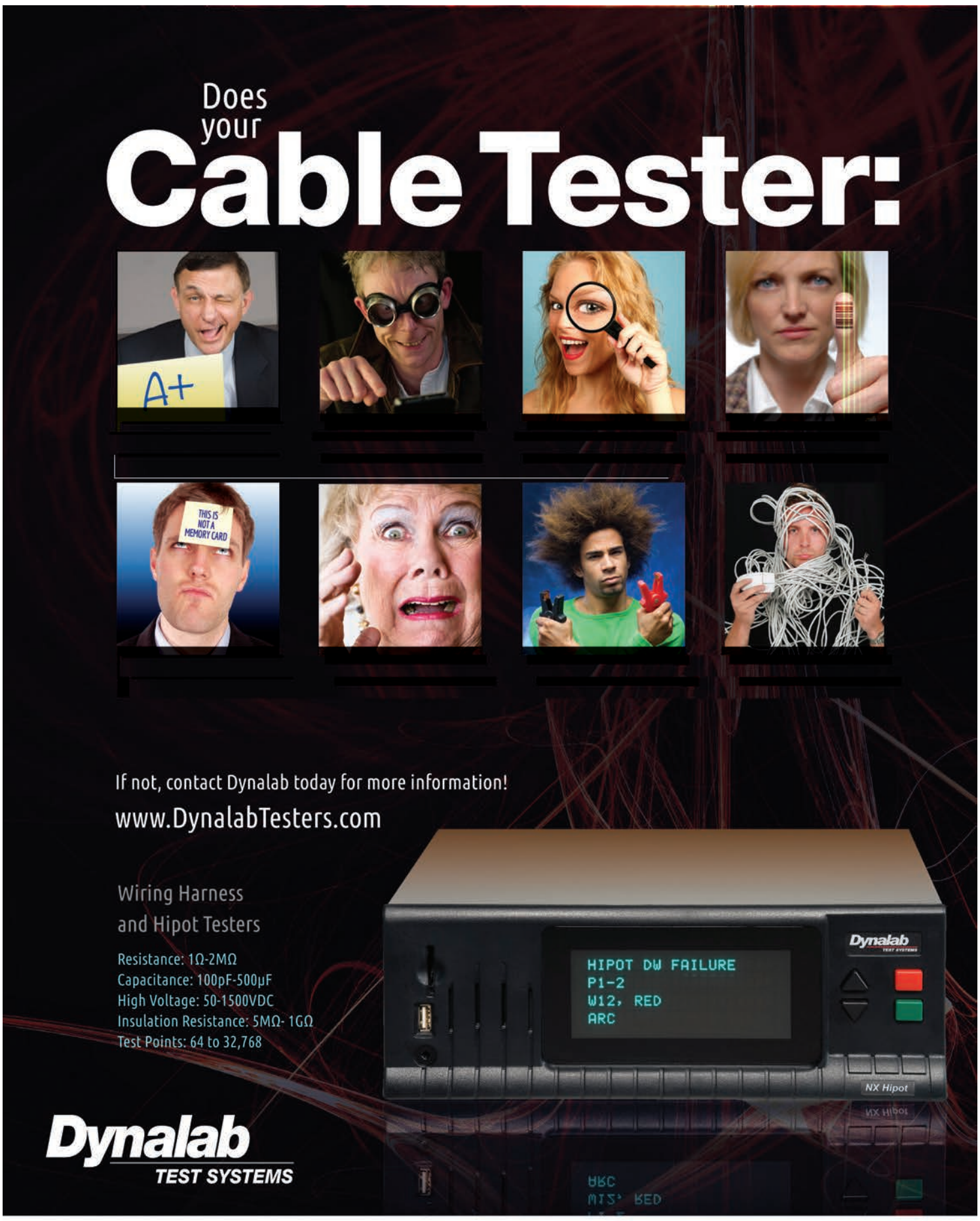
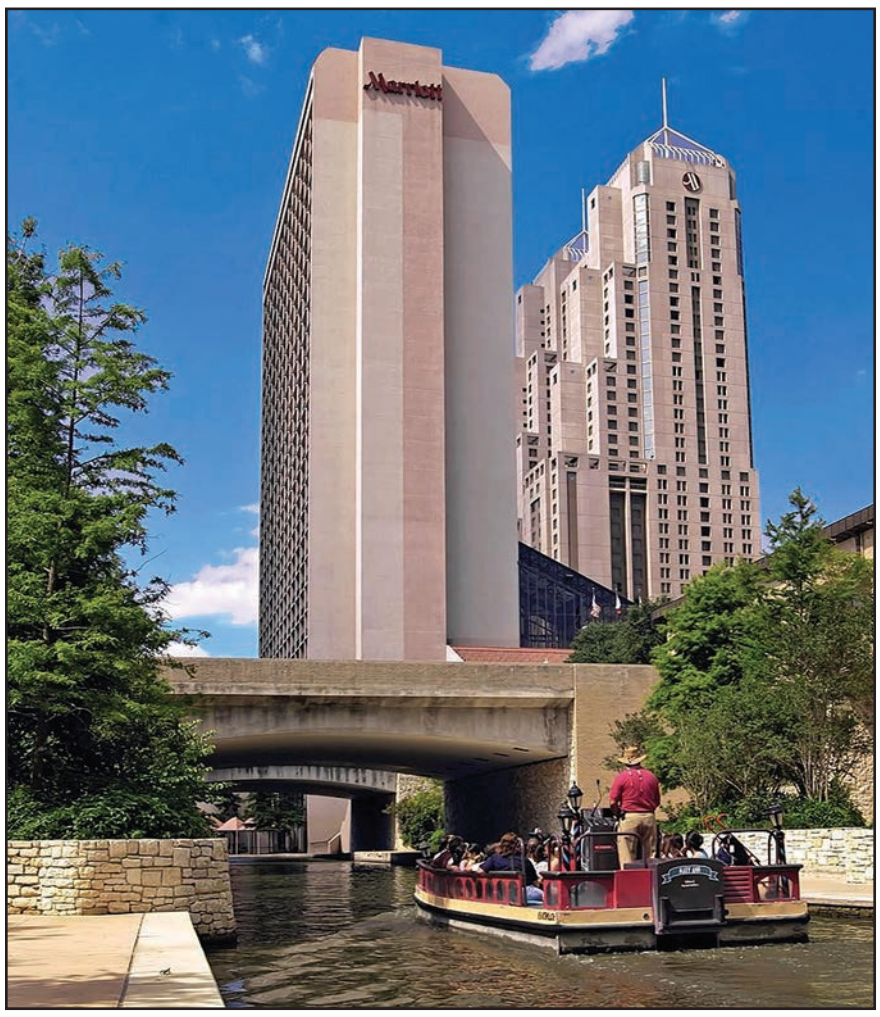


The 2017 WHMA Conference Poised to be Another Winner

Continued from page 19

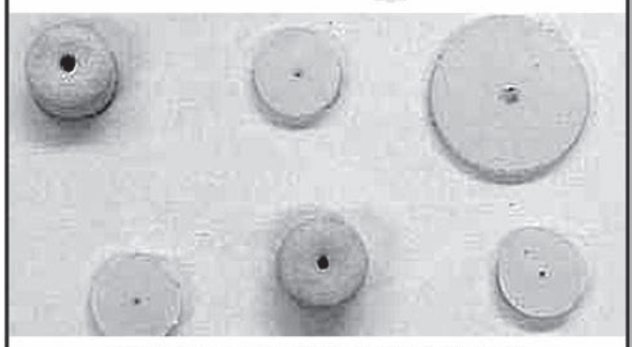
There will be a Riverwalk Boat Cruise reception to capstone the second day of programming. This part of the conference is always a great opportunity to relax and enjoy the fellowship of industry peers. This is truly an event not to be missed for those looking to reinvigorate their professional efforts in the industry.

For full program details, and to register for the event, please visit WHMA.org



Riverwalk boat cruise, San Antionio, TX

EIC Wipers



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NEWS PLUGS continued

Continued from page 20

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- Connectivity - connecting car, driver & the external world
- Autonomous - autonomous driving & driver assist systems
- Electrification - electric vehicles & supporting technology
- Architecture - EE architecture & system implementation

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TE Connectivity Snap-On Pre-Printed Wire Markers

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You can be sure your dies will fit your long-term needs, because they are completely compatible with all tools in the SDE system. They move with you as your needs grow.

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TE Connectivity Provides Snap-On Pre-Printed Wire Markers

Convenient and easy to use, designed to stand the test of time, preventing costly rework before the life of the equipment ends.

TE Connectivity (TE), a world leader in connectivity and sensors, has highlighted its market-leading STD and STB snap-on pre-printed markers for wire and cable identification.

The markers are ideally suited for projects in energy, such as power stations, oil refineries and offshore platforms, where maintenance technicians will need to identify individual wires and cables quickly and efficiently over the operating life of assets.

STD and STB markers are individual snap on markers that can be applied after termination or installation to identify wires and small cables permanently. STD markers are white and yellow with a black legend, whereas STB markers are color coded and a UV stabilized version is available in black with a white legend. Both are available in a range of ten sizes that expand to accommodate a full range of wire and small cables from 1.0 mm to 19 mm in diameter (0.04 to 0.75 inches).

They are applied using a dedicated applicator wand, which enables easy installation and prevents over-expansion of the markers. Once installed, the markers have a secure grip and feature chevron

Continued on page 27

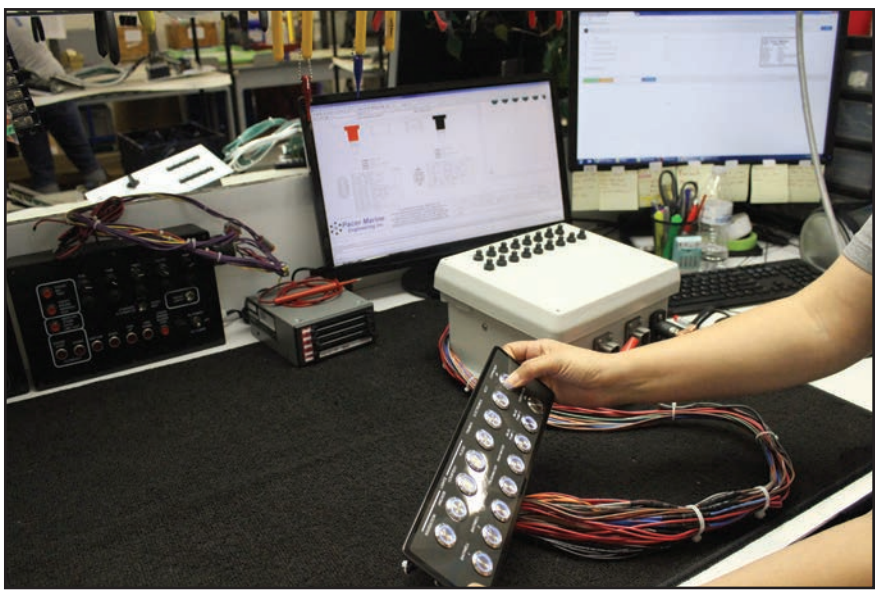
37 Years of Marine Wiring Proficiency at Pacer

Continued from page 1

of volumes. "We say production house with quotations around it," John described, "because a boat platform that has 500 plus units sold is a pretty good boat." Average platforms are around 150 units per year, so operations at Pacer still have the characteristics of small-lot/high-changeover manufacturing. "Ninety percent of our products are well under 500 units per year."

Going back to the American Boat and Yacht Council, I asked John to explain more about guidelines and industry manufacturing specifications. "The council will specify the types of materials that should be used, and how they should be properly wired--where breakers and fuses should be to avoid shorts--but they don't really get involved in how a harness assembly should be made," he said. "They might say the wire needs to meet a certain UL or SAE specification, and we'll take our A-620 principles and apply the class that best fits the particular application, and produce assemblies to those standards." Pacer has several people certified to IPC/WHMA-A-620.

Continued on page 24



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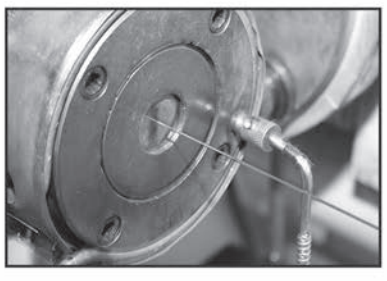

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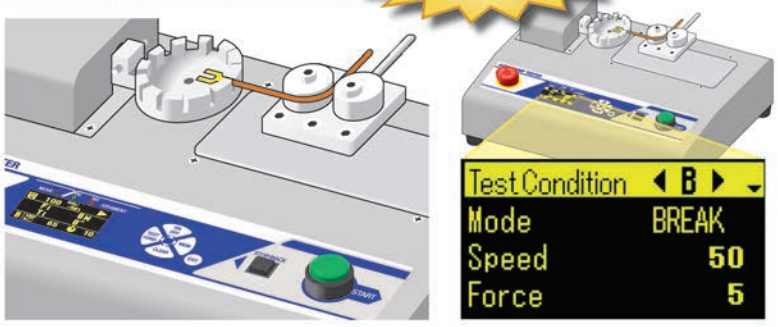

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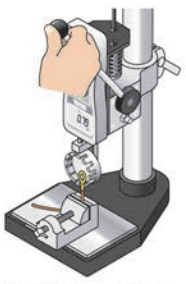

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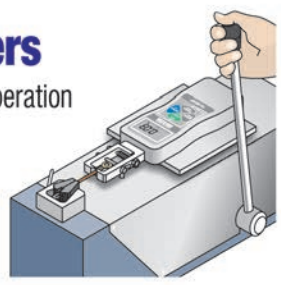

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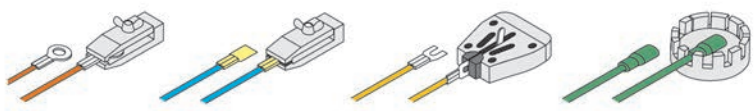

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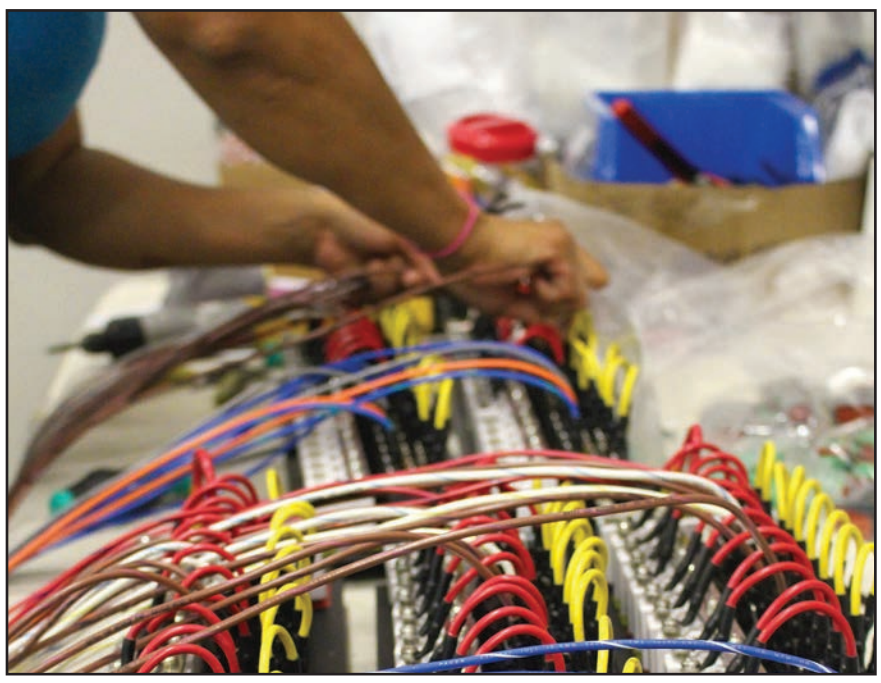
37 Years of Marine Wiring Proficiency at Pacer

Continued from page 23

I asked John what he feels is unmistakable about Pacer. "What truly makes us unique is that we control the quality of the product from basic wire and cable, through the finished assembly; and this is generally how we are known in the industry," he replied. Pacer's wire is made with the industry in mind, and factors like corrosion resistance and flexibility are absolutely critical. "For example, No. SAE is typically 19 strand bare copper, but our product is manufactured using tin plated 30 AWG stranding for ease of use and corrosion resistance," he detailed.

Copper content measured via CMIL area is another characteristic Pacer tightly controls. "Our 30 AWG stranding is .010 OD, and we don't manufacture with stranding made less than ASTM Class K." The proprietary insulation makes the wire flexible, easy to



Panel Assembly at Pacer.

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4 - **ARTOS** CS26, CS26A Cut and Strip Machines
1 - **ATS** Crimp Press, Series T3000, with Applicator
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1 - **BRADY** Wraptor Label Machine
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2 - **KOMAX** Alpha 411 Automatic Crimping Machines
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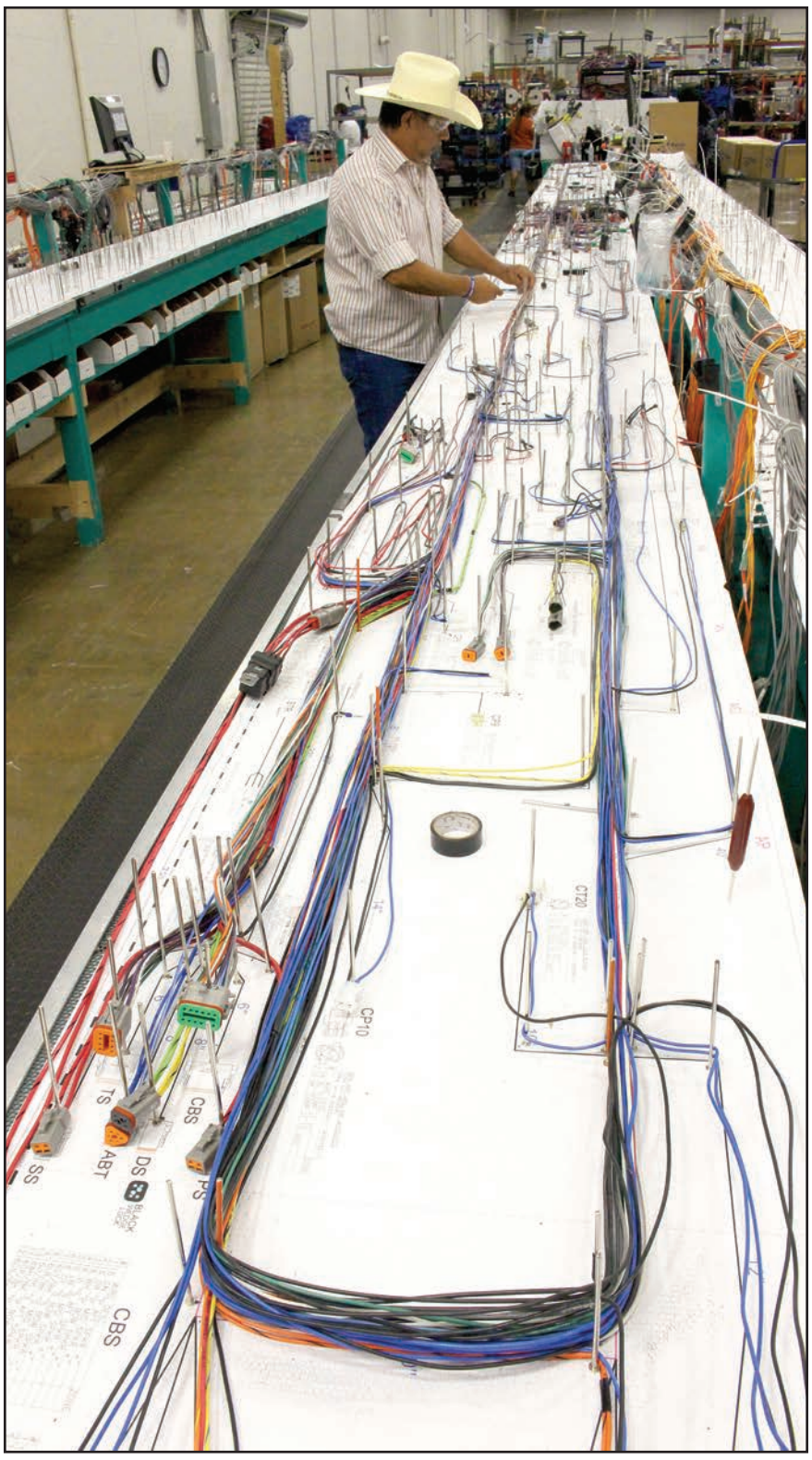
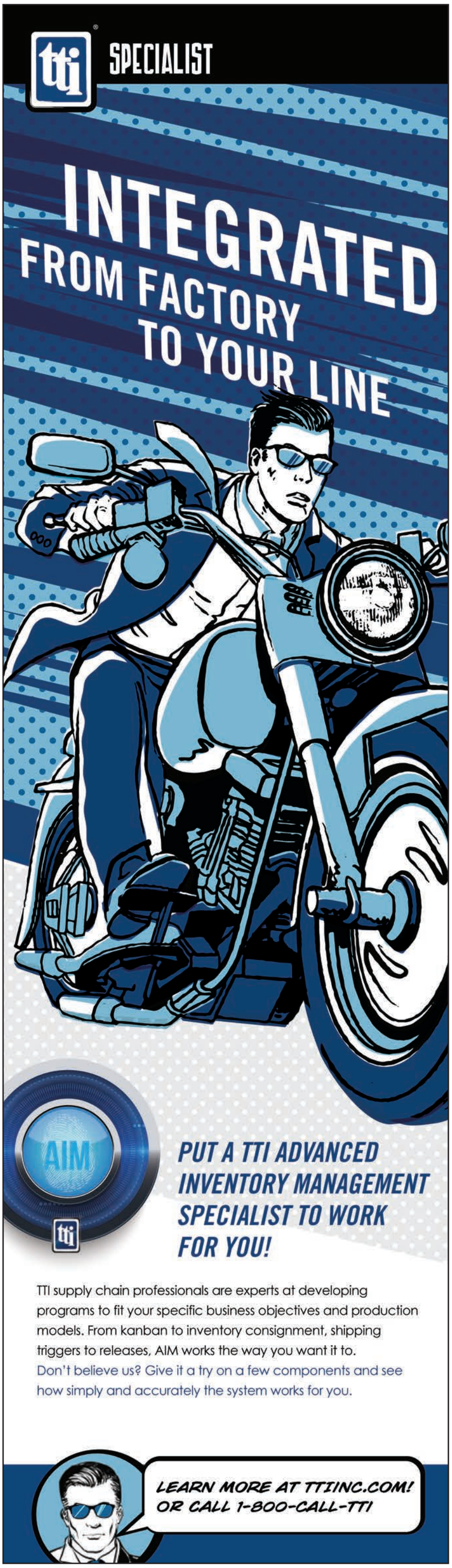
use, and resistant to the harsh marine environment.

Pacer's flexibility in wire production extends to the ability to provide custom color schemes for OEMs. They use many things like ink jetting, and various striping and color schemes that are not typically found in the industry. "With boats that range from 20 to 65 feet, the ability to identify circuits is important, so we are able to offer multiple systems to identify the wire's function," John highlighted.

In short, John points to Pacers self-sufficiency as the biggest part of their success. "We've dabbled in other industries and we do get into a few automotive harnesses that use a cross-linked polyethylene, but the important thing for our company is we really focus on staying in our lane."



Harness build for one of Pacer's larger boat platforms.



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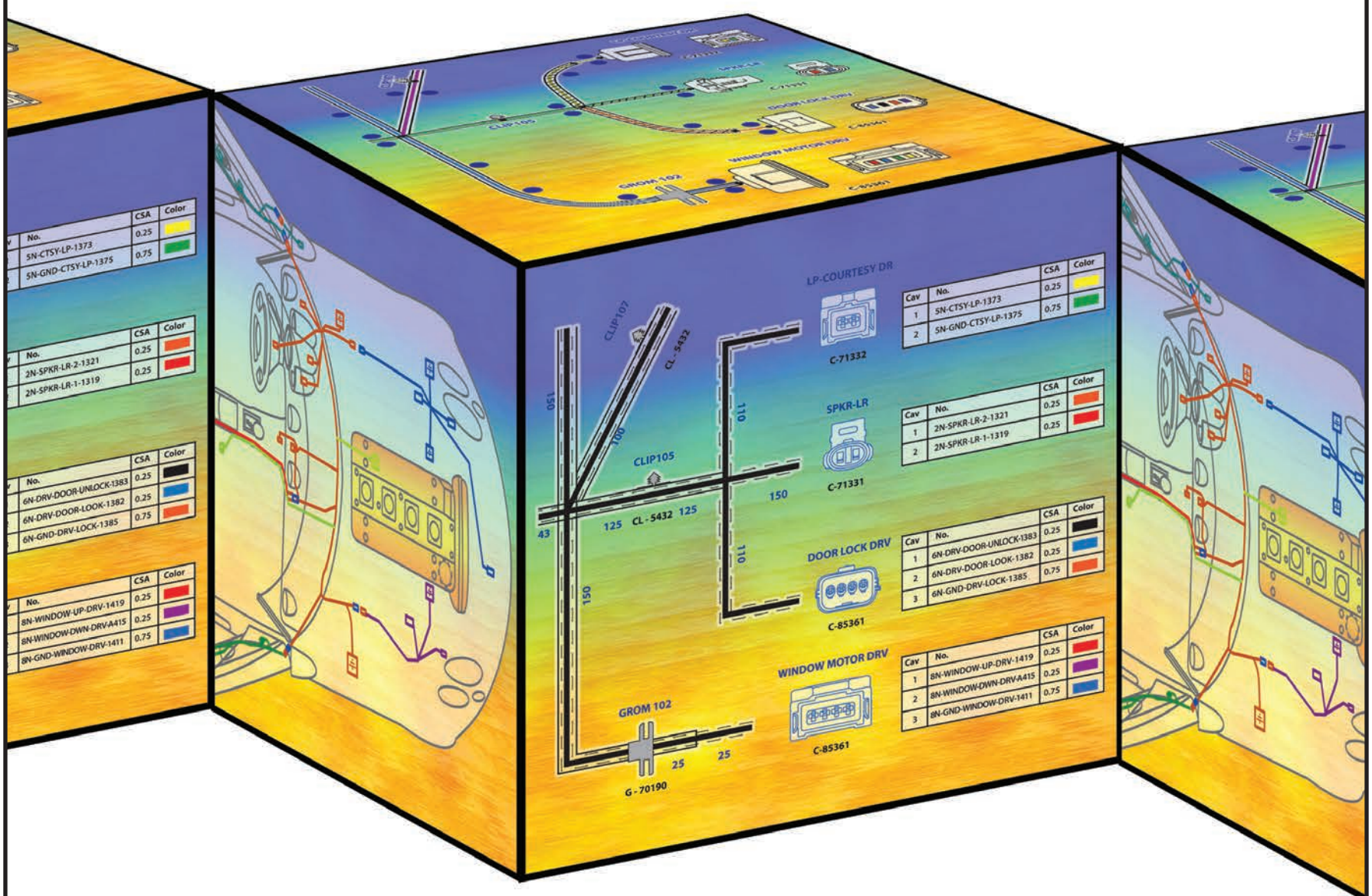

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NEWS PLUGS continued

Continued from page 22

cut-outs on the sides to ensure the legend remains aligned and easy to read.

Both STD and STB markers are manufactured using a zero halogen polyoxymethylene (POM) compound, which is highly elastic to avoid damage to wire and cable insulation. POM guarantees strength, stability and low moisture absorption. It also has good resistance to chemicals, including key fluids found in energy, oil and gas, aviation and military installations. In terms of their flammability performance, STD and STB markers meet the US standard UL94 HB for plastic materials. Together these characteristics make them suitable to installations where a permanent cable identification solution is required.

For more information visit the TE website.

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Schleuniger, Inc. to Demonstrate New Wire Processing Equipment at WHMA Wire Harness Conference 2017

Schleuniger, Inc., a leading international manufacturer of high-precision wire processing machines and member of the Wire Harness Manufacturer's Association (WHMA), will exhibit at the 24th Annual WHMA Wire Harness Conference.

Thanks to Schleuniger's worldwide cooperation with Laser Wire Solutions, Schleuniger will be demonstrating the new Mercury-4 laser wire stripping machine, designed by Laser Wire Solutions. The machine strips wires and cables ranging in size from 50 – 6 AWG. This innovative machine does not require any mechanical adjustments to process different wire sizes. Using the color touchscreen, the operator selects the desired stripping parameters from the programmed library and all parameters (strip lengths, laser power and speed, etc.) are automatically set. Once the operator selects the required program, the machine is ready for operation. The Mercury-4 can strip cables inserted into the supplied fixture aperture to an end stop, or via a custom fixture plate. A camera allows the whole process to be monitored.

Mercury-4 Laser Wire Stripping Machine

Schleuniger will also demonstrate the EcoStrip 9380 cut and strip machine. The EcoStrip 9380 offers the most complete feature set at an economical price point. This flexible machine provides expanded capabilities due to its quick change transport unit for belts, rollers and shortmode and is compatible with a wide range of accessories, including prefeeding, marking, stacking and coiling. The intuitive color touchscreen user interface minimizes training and set-up times and with optional Schleuniger software, the EcoStrip 9380 can easily be integrated into various networks.

The ShieldCut 8100 will also be highlighted. The ShieldCut 8100 can safely and quickly cut and remove the braided shield layer from most shielded cables, eliminating countless hours of manual labor. As the only machine of its kind, the ShieldCut 8100 fills a current market need for efficient processing of shielded cables.

EchoStrip 9380 Cut & Strip Machine

Continued on page 30

APX Labs Brings Augmented Reality to Harness Assembly at Boeing

Joe Tito
Wiring Harness News

Augmented Reality (AR) is best defined as a technology that superimposes a computer-generated image on a user's view of the real world, thus providing a composite view. We are hearing more about AR with respect to how it is being used in wire harness manufacturing. This is especially true in the high reliability realm, where automation is comparatively low, and hands-on interaction is commonplace. The advent of wearable technology, in particular smart glasses, provides a new solution to the age old challenges presented by these intense manual processes.

APX Labs, in Herndon VA, began building software solutions using smart glasses in 2010. Today, their Skylight platform has positioned them as a leader in wearable AR technology for manufacturing. Having proved the viability of Skylight in other arenas across complex manufacturing, APX set their sights on harness assembly. In a recent conversation, Christine Bohle Boyd, VP of Marketing, and Aaron Tate, VP of Customer Solutions, explained Skylight and the company's first foray into harness assembly at Boeing.

At its heart, Skylight provides in-view routing and assembly instructions to the operator in real-time (see fig. 1). It is a hardware agnostic

Continued on page 40

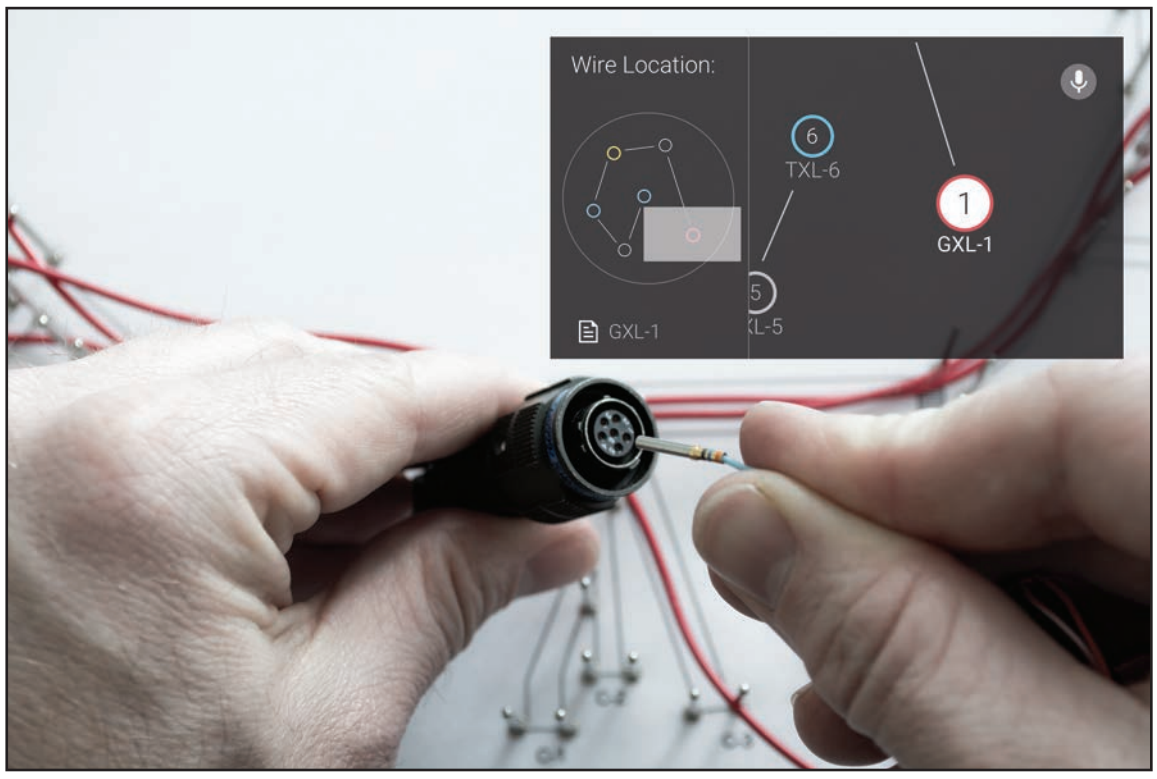

Fig. 1. In-view Assembly Instructions

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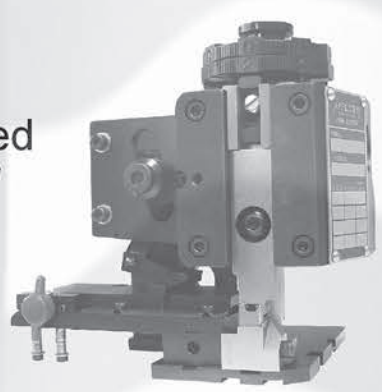
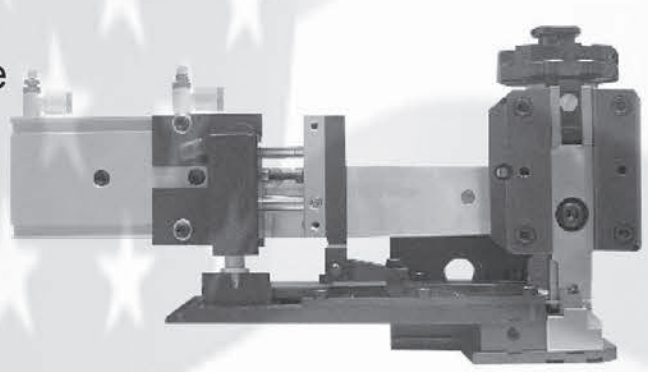
Mini style applicators with mechanical feed mechanisms are supplied in a variety of feed configurations. Adaptable to most crimping presses.



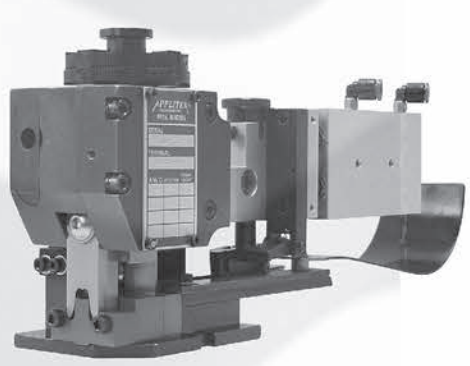
Model 1700

Model 2000

Pneumatic feed mini-style applicators can accommodate terminals with center to center distances up to 2 inches.

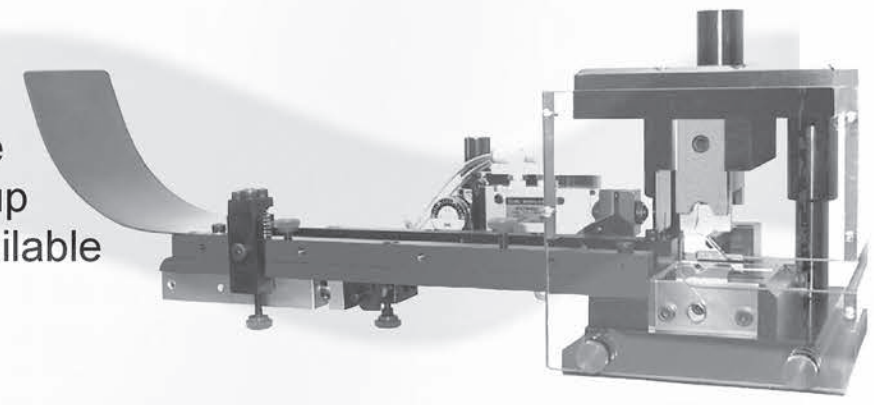


Model 1500



Model 2100

DSA applicators are designed for large terminals manufactured from heavy gage material with center to center distances up to 3 inches and widths to 3.5 inches. Available in left to right, right to left and rear feed configurations.



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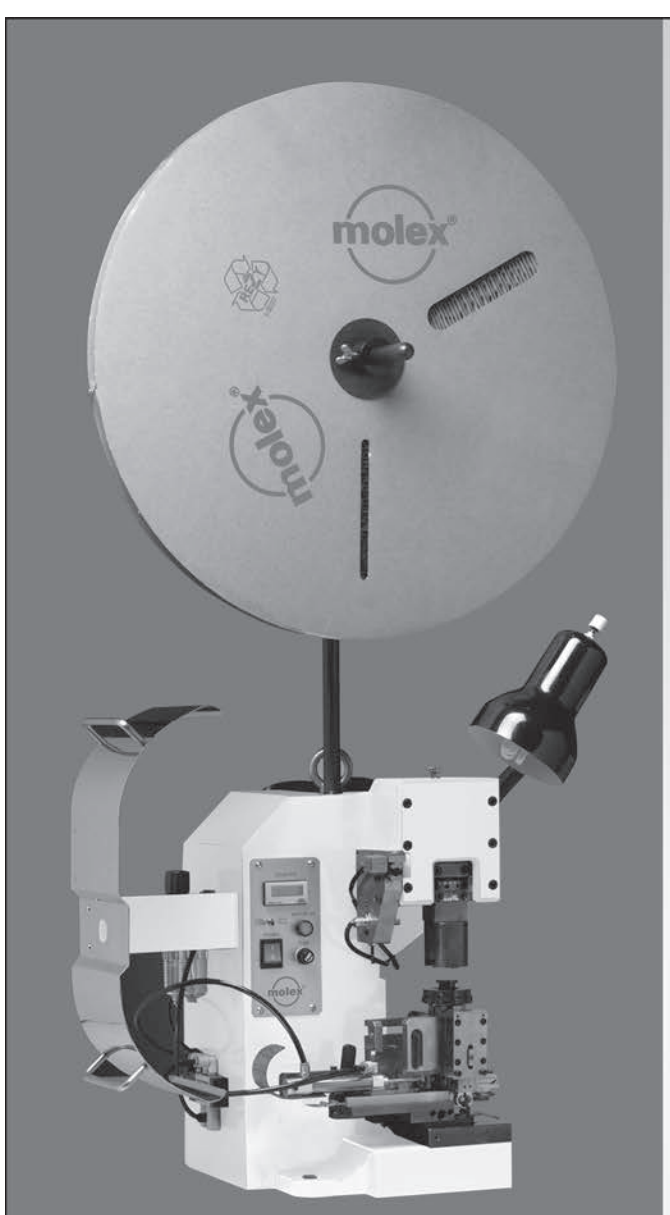
NEWS PLUGS continued

Continued from page 27

Finally, attendees will have the opportunity to experience hands-on demonstrations of two of Schleuniger's bench-top cable stripping machines, the CoaxStrip 5200 and UniStrip 2300. The CoaxStrip 5200 is a multi-step stripping machine for coaxial, multi-conductor cable and single conductor wire. Thanks to the universally designed blades, centralizers, and clamping jaws, the machine can process a full range of cables without the need for mechanical adjustments, saving the user valuable time and increasing output when switching between applications.

Schleuniger has participated in the WHMA Annual Conference for several years now and is proud to be part of an organization dedicated to addressing the specific needs of the wire harness and cable industry.

Schleuniger's ShieldCut 8100



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The **Taped Terminal Crimp Module** efficiently crimps terminals to wires from 4 to 30 AWG with minimal setup adjustments and achieves optimal cycle rates for mid-to-high volume, semi-automatic operations.

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- Used in Molex TM-3000™ and TM-4000™ presses, which accept Molex applicators and most industry standard applicators
- Independent adjustment of insulation crimp height provides flexibility for various wire insulation thicknesses
- Quick tool changeover from die set to die set for increased productivity

The **TM-4000™ Universal Crimp Press** is an industry-standard, bench-top press that terminates large lug products on Mylar tape up to 4 AWG insulated and some 2 AWG uninsulated, resulting in lower overall applied costs. The TM-4000™ has electrical requirements of 240 AC 50/60Hz.

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Cirris Introduces New Software Package, Power User

Cirris Systems presents an all-inclusive software package called Power User. Built for owners of the Cirris CH2, this package combines all extra features of easy-wire into a one-time purchase.

Through Cirris easy-wire Software, users define connectors, wires, cables, and other information necessary for testing. For more complicated testing, some users require extra features such as custom instructions, LUA scripting, and other add-ons. Rather than purchase each feature one at a time, customers can now acquire all easy-wire features at once.

Customers with Power User have access to all areas of easy-wire. Every feature is made available for the customer to utilize. Need custom scripts for specific tests? Want to automate the test process through Digital I/O? The features obtained through Power User give companies the ability to test with far greater efficiency and accuracy.

Customers who choose to purchase Power User also have access to certain future releases, such as custom scripts (Normally each script would have to be purchased individually). Customers with Power User can be sent the scripts without extra charge or hassle.

CH2 users who would like to learn more about Power User can visit cirrris.com/power-user.

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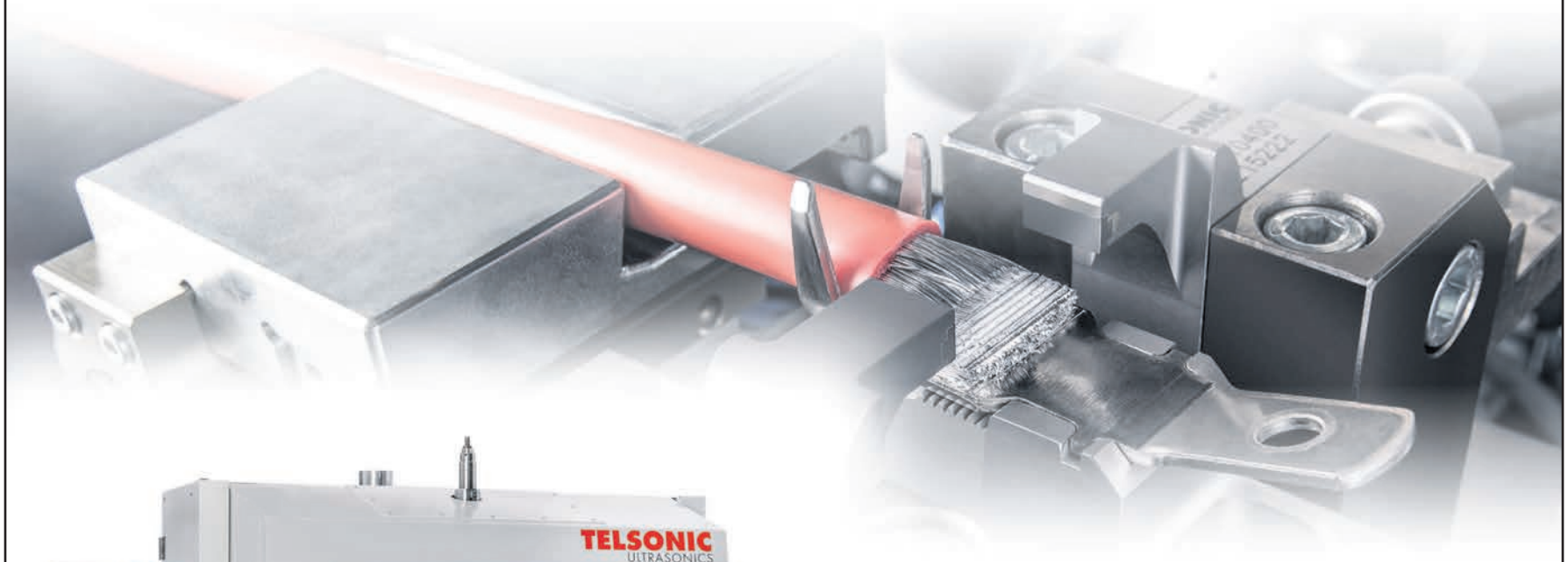

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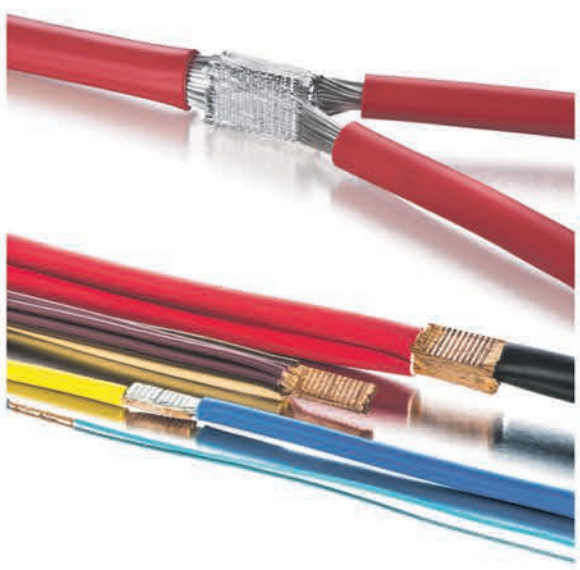

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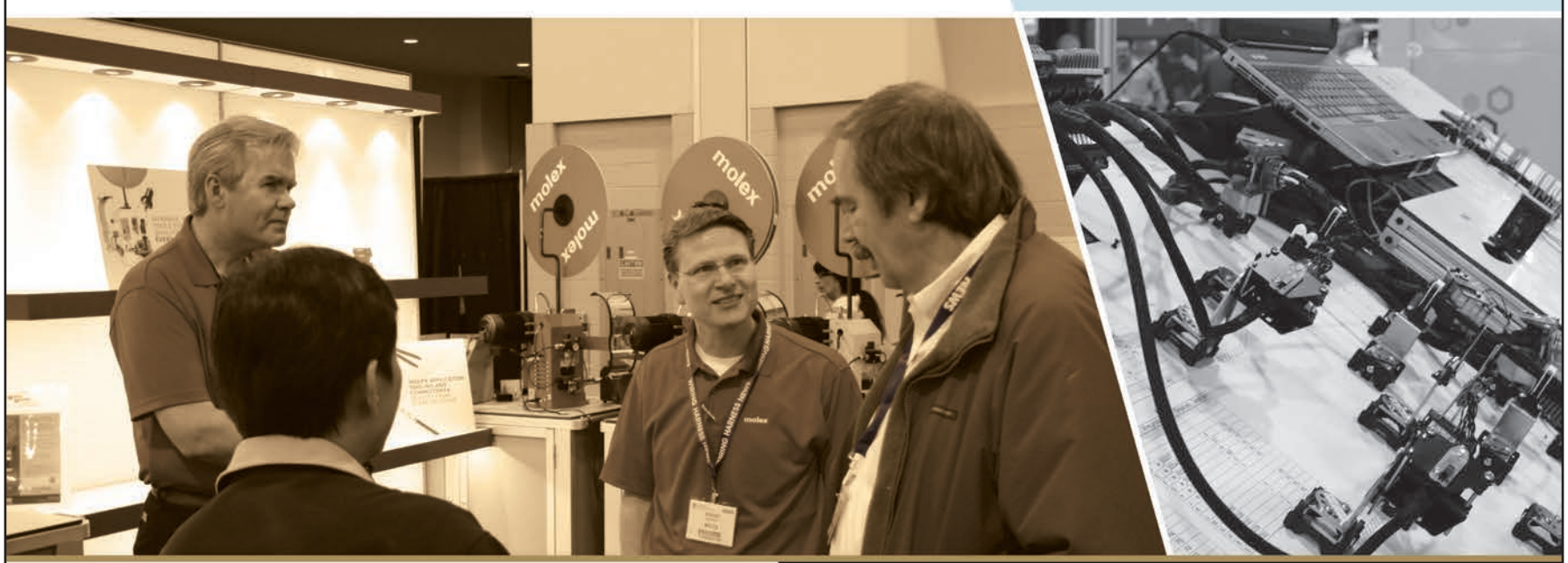

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NEWS PLUGS continued

Laselec Celebrates 15 Year Anniversary with Electrical Harness Automation at NBAA 2016

Founded in 2001, LASELEC designs and manufactures cutting-edge electrical wire processing equipment like UV laser wire markers, laser wire strippers, interactive harness assembly boards, and harness braiding machines. This wide range of products demonstrates the company's willingness for continuous innovation and leadership in the latest trends in aircraft electrical harness manufacturing, and to truly embrace automation.

LASELEC presented its automatic solutions in a special presentation at the NBAA 2016 show.

Prior to RapidShare being launched, the first step in the manufacturing process of an aerospace electrical harness started with the marking and cutting of wires. Next the operator had to manually group the batch of wires. Then the operator would label and sort those batches for production processing before sending them to the shop floor for assembly on a form board.

Laselec has initiated the new trend in the harness manufacturing with GE Aviation being the first customer to experience an unprecedented level of automation. RapidShare is a solution designed to automate wire processing production. The RapidShare robot arm, attached to the ULYS Modena laser wire marker, is able to perform automatic tasks such as: labelling, stripping, crimping, bundling and kitting processes. The operator is now free to handle multiple tasks/machines instead of operating a single marking machine for an entire shift. RapidShare's compatibility with the ULYS Modena line of laser wire markers has allowed companies, such as Airbus Group which owns several Laselec's markers, to upgrade to the automated production system that has increased their competitiveness. For more information, contact Frederick Viaut, Sales Manager, at frederick.viaut@laselec.com, 814-460-7830. www.laselec.com.

RapidShare is a solution designed to automate wire processing production.

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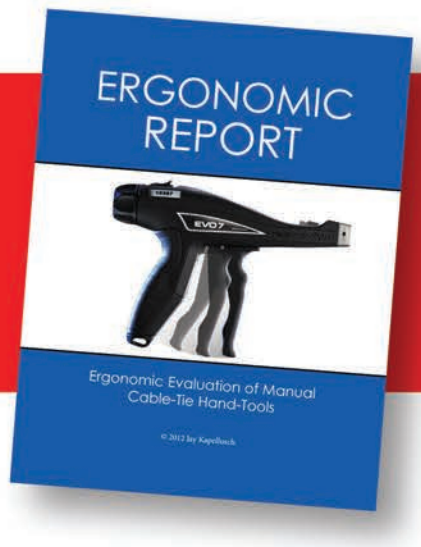

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APX Labs Brings Augmented Reality to Harness Assembly at Boeing

Continued from page 28

software product—meaning it can run on hardware provided by multiple vendors, and on next generation hardware as it releases into the market. Through Skylight, workers are provided access a wide range of existing instruction data and information systems directly from within the wearables (see fig. 2). Aaron described it as an enterprise solution, in that it can satisfy the needs of an entire organization, versus individual or departmental users. For manufacturers, this means integrating wearables across shop floor operations with installation, compliance, training, field service repair, and a host of other functions.

The Challenge at Boeing

Wire harnesses represent a complicated build at any level. This is especially true with aerospace manufactures, like Boeing, where assembly and routing instructions traditionally reside in phone book sized volumes. Integrated computer systems provide some relief and make instructions easier to access, but scanning back and forth from a screen to the actual build point can cause eye strain and fatigue. Stepping away to manipulate a keyboard takes hands off the product and disrupts thought processes. When dealing with up to 100 wires hand inserted into a connector, this can prove problematic.

Aaron described Boeing's innovation effort to tackle the problem through the Research & Technology team at their Mesa facility. "They did internal development work using Google Glass test some improvements in assembly productivity, particularly on the second end insertion, and realized they needed a company with an existing wearables software platform to help them create a scalable implementation based on what they had learned," he said. Boeing put out a competitive bid which APX won in 2014. "We worked with their R&T team to understand the processes and the data types users needed to see through the smart glasses while they were doing the work," he described.

The resulting system was a huge success. "We look for the big changers," said Randall MacPherson, Senior Manager, Electrical Strategic Fabrication Center. "Wearables, as an example, are what we call a 'step function change'—meaning that rather than picking up seconds or minutes, wearables conceivably gives us an opportunity to cut the build time by possibly 25 percent." And it doesn't end there. Boeing has also reported significant reduction in defects and rework to virtually zero, and an improvement in safety metrics.

With both hands on the product, users can use voice command to call up specific line-of-sight instructions that prompt them through detailed operations. Complicated activities can be simplified by showing in-view diagrams or videos. When a problem arises, there's immediate access to help. Assembly workers can see

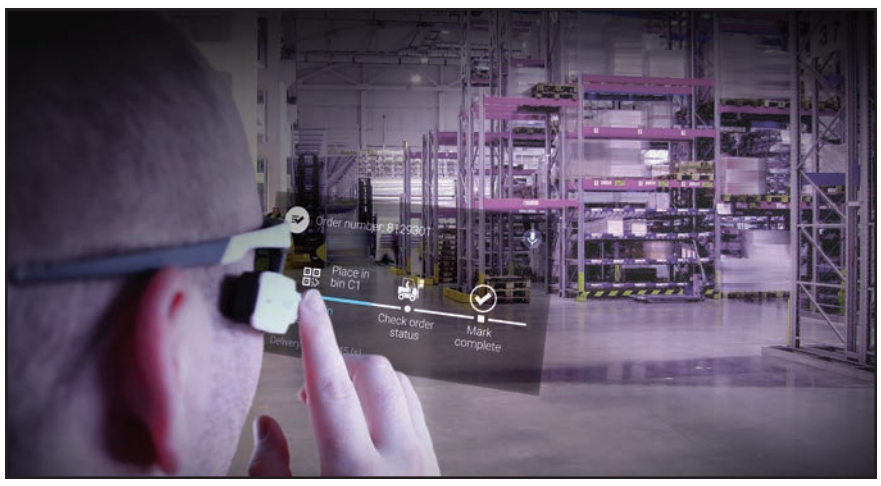

Fig. 2. View within the wearable

instructional videos (see fig. 3), and when technical issues arise, they can collaborate with others who can see what they are seeing. Aaron added, "Having the capability to take a picture or video allows the harness technicians to capture the work they completed and establish documentation for root cause analysis, management review, or for QC analysis. That's incredibly important to Boeing."

And beyond actual assembly operations, material handlers will be able to kit work orders from in-view instructions and deliver them in just-in-time fashion. "The workers are alerted to new pick requests in their queue with exactly what needs to be delivered and when it's due, rather than reading a list of instructions printed early in the shift," Aaron informed. Many aspects of manufacturing lend themselves to automation. For those that don't, "the humans in the loop have to be empowered with data rather than having to look at laptops or instruction sheets."

In addition to Google Glass, APX currently offers their solution on three other optical head mounted displays to interface with Skylight; those are Recon Jet Pro by Intel, and Vuzix M100 and M300 models. Christine explained the selection of these saying, "These hardware offerings are of the desired size and weight, they can be bought in the hundreds to thousands particularly important for companies with a large hands-on workforce, and are ready to connect to a variety of security systems and standard IT platforms." She added, "We have relationships with vendors across the entire hardware ecosystem, get early access to any new devices, and can make the judgement call and integrate Skylight to new hardware once the devices are generally available."The company is also reviewing Microsoft HoloLens 3D along with Epson's Moverio headsets for possible mixed reality solutions at some point in the future. For now, however, the company's focus is on assisted reality solutions that can be implemented today to demonstrate immediate ROI.

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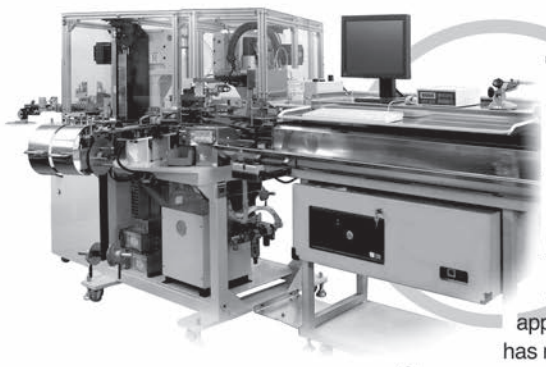

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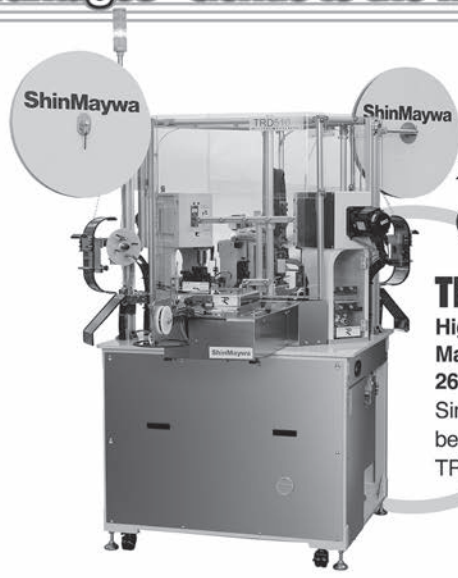

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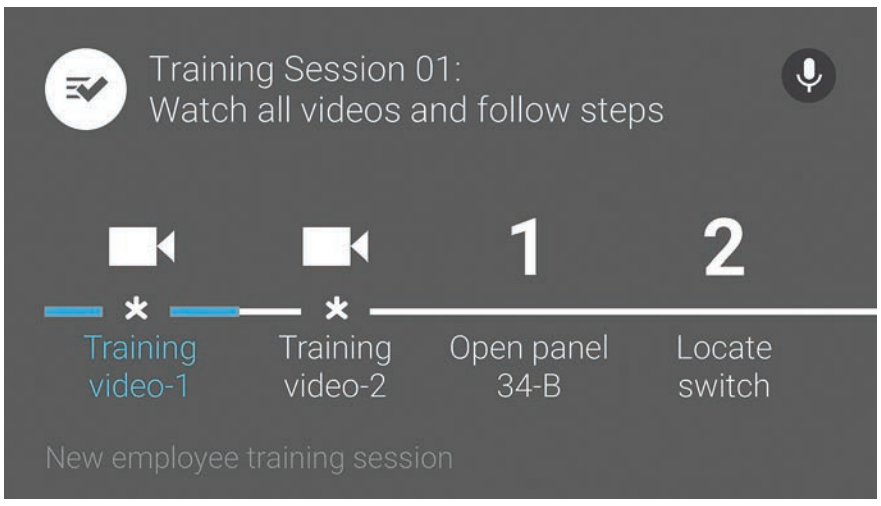

Fig. 3. In-view Training Videos

How it Started

Like many new technologies, Skylight is the commercial manifestation of a Department of Defense contract. "We were helping soldiers deployed at forward operating bases to recognize faces and provide soldiers with information about people trying to enter the base," Aaron mentioned, "and the interesting thing about using smart glasses, is they could keep their hands on their weapon." They also developed hands-free telecommunications for Army Telemedicine & Advanced Technology Research Center (TATRC) who wanted to fill a major gap: remote video streaming from an incident in the field back to the next level of care. This use case was funded through an SBIR grant which paved the way to commercialization. "So we took all the lessons learned, all of the background in securely connecting into high security systems and networks with our experience in "See What I See" video streaming, and decided to bring this expertise to the global commercial market."

The Future of Skylight

Aaron sees many other applications in wire harness assembly where there is currently a great deal of hands-on interaction. For now, APX will be concentrating on Global 2000 companies where they can deploy Skylight on a truly enterprise basis. "What makes us unique is our understanding of enterprise environments and the deploying of a widely applicable software platform rather than a single use-case application," Aaron explained. "Our signature is being able to apply to a broad number of employee types across an organization. Enterprises have already invested significantly in many digital work support systems, we just help expose that data to the users that need it the most, the hands-on workforce."

For more on APX and Skylight, check them out at apx-labs.com

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UL FOLLOW-UP SERVICES MAINTAIN PRODUCT INTEGRITY

Most products destined for commercial, consumer and industrial applications require some sort of certification. Underwriters Laboratory and its UL Mark are highly recognized in North America and the rest of the world. The UL Mark and its variations are often the subject of questions relating to wire and cable products. In this Wire Wisdom, we will look at what it takes to be able to use the UL Marks and more specifically, the value that UL's Follow-Up Services brings to users.

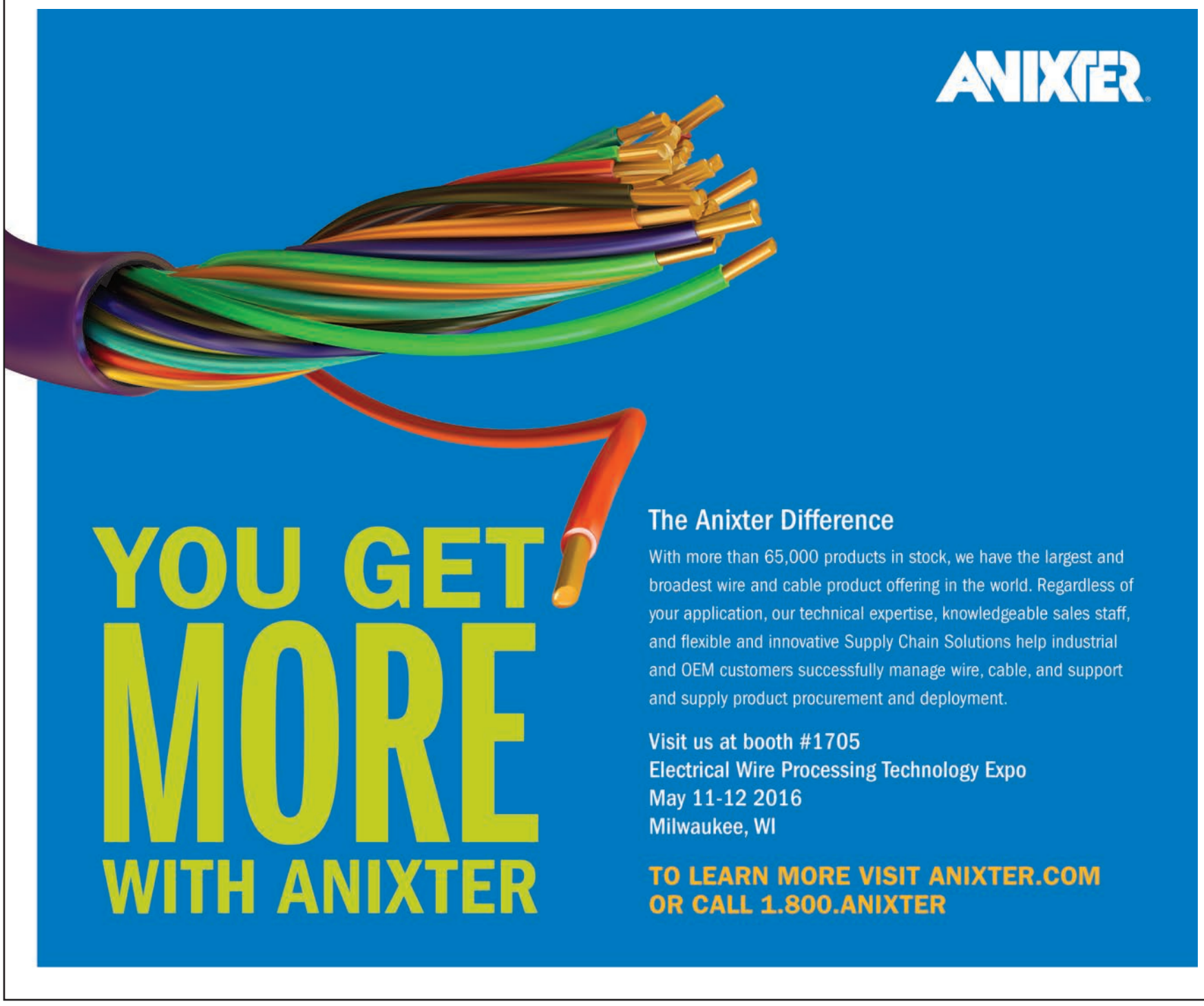
CERTIFICATION PROVIDERS SERVE IMPORTANT ROLES

Certification service providers typically offer a broad array of services including, but not limited to, engineering evaluation, testing, and inspections of products and systems that are sold into nearly all industries and applications globally. Without certified products, it would be difficult to standardize on electrical and electronic systems. Lack of standardization could result in serious issues with compatibility, safety, reliability and efficiency. The services and corresponding certification marks, often called "listings" and offered by certification providers, are part of a complex supply chain. The goal of the supply chain is to supply products that are safe when used as intended.

HOW CERTIFICATION PROGRAMS WORK

Many certification providers offer product certification and listings through testing, factory inspections and engineering design reviews. Typically, a product manufacturer determines that a particular product certification is needed in order to fulfill regulatory or customer requirements. The manufacturer then searches for a certification provider that can evaluate the product and provide a certification or listing mark that can be applied to the product(s). Once the certification provider completes the evaluation phase, it will then grant use of the appropriate marking to be applied to the product(s) and the manufacturer can then begin to sell the product with the new certification.

Here's an example: the NEC (National Electrical Code) requires cords to be listed by a NRTL (Nationally Recognized Testing Labo-



ratory) if they are to be used in certain applications. It's important to note that certification providers are also often identified as NRTLs. In this case, one of the most common standards to which portable cords are listed is UL Standard 62 (i.e., UL 62).

Sometimes, the certification provider is also the author of the standard that the product will be certified to, as is the case when someone has UL certify a portable cord to the UL 62 standard. In this example, UL not only authors or contributes to the development of the standard, it also tests and inspects manufacturers' product to ensure they meet the standard.

There are certification providers and NRTLs other than UL, and their certification programs may be slightly different. Most providers use product evaluation, testing and inspection as part of their certification program. Providers often include inspections of the manufacturing, testing and shipping facilities as part of their certification programs. However, ongoing inspections are something that not all certification providers offer.

WHY FOLLOW-UP SERVICES IS IMPORTANT

Ongoing inspections are a way for the certification provider to audit the manufacturer to make sure the certified product is still made according the original design for which it was certified. If the certification provider identifies that the products are being produced outside the limits allowed by the original certification, there are a number things that can be done to protect the user/consumer of the product.

There are other systems of quality that can accomplish goals similar to UL's Follow-Up Services program using different methods. Such quality systems are often employed in industries such as automotive and military supply. Even though nothing is foolproof, ongoing inspections and audits of processes and systems is a time-tested method of improving product quality. The advantage to users of products bearing the UL Mark is that the auditing process used in UL's Follow-Up Services will help to increase the consistency, quality and the safety of the product they are buying.

For more information, contact your local Anixter sales representative at 1.800.ANIXTER.

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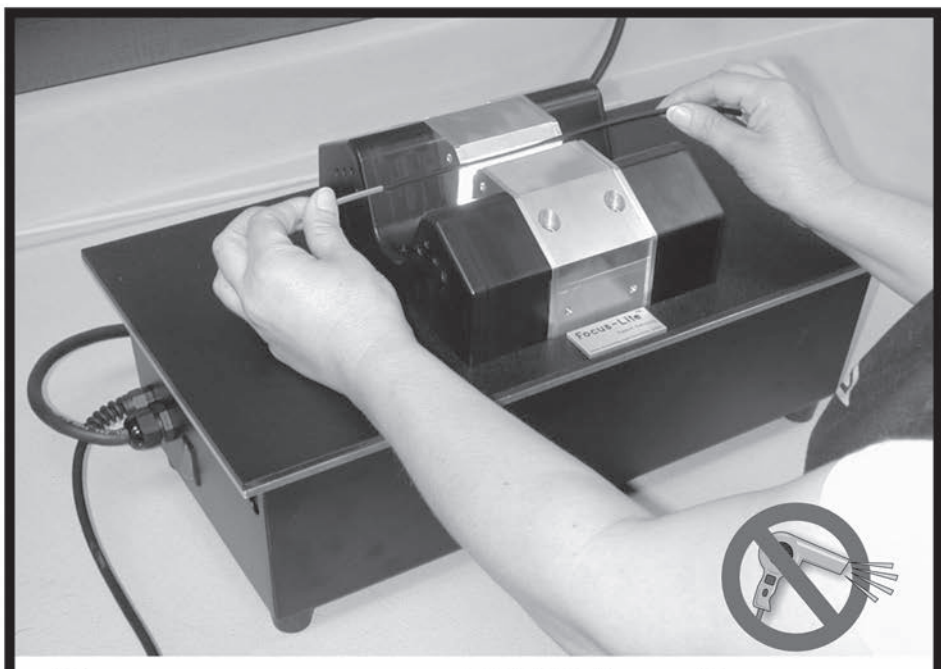

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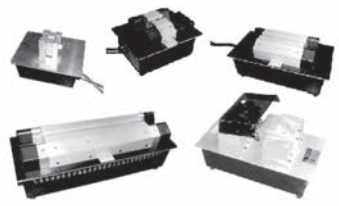

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OEMs Consider Cross-Border Move in Face of Uncertainty

Border towns, such as El Paso, Texas, could service as "middle ground" if OEMs with operations in Mexico decide to relocate stateside

For OEMs that rely on the Maquiladora industry in Mexico, such as the automotive, electronics and medical device industries, the threat of increased tariffs on imports as high as 35% has created considerable uncertainty. Factor in the possibility that such a move could spark a trade war and OEMS are rightfully concerned, with many considering their options to keep prices on finished products at a competitive level.

Much remains to be learned, of course, as to exactly what trade restrictions will be enacted by the new administration. What is sure, is that any significant increase in the cost of goods from Mexico will leave US companies that rely on lower-cost labor to keep prices competitive with a tough decision.

Among the options, maintaining existing operations in Mexico and likely raising the price of the finished product, or relocating stateside. For the latter, this could mean a full move back, or a small cross-border move to cities already in tight working relationship with Mexican counterparts and the supply chain infrastructure.

"Companies will have to consider their options and bridge the gap between what their cost will be to remain [in Mexico] and the cost to relocate back to the U.S.," says Hector Macias, director of Northpoint Technologies, a US-based company that manufactures silicon and membrane switches, flexible PCBs and assemblies, touchscreens and wire harnesses for the medical, automotive, defense, telecommunications, industrial and consumer markets.

Macias estimates that the fully-burdened labor costs, which include taxes, benefits and supplies, in Mexico is approximately $3.25-$3.50, compared to $10.25-$10.50 in the U.S. This does not account for valuable incentive packages provided by the Mexican government in the form of tax breaks, land and infrastructure.

"There is already quite a gap in cost, so companies may not even move," says Macias. "Instead, they may opt to increase the costs of the finished product to absorb some of the additional costs."

If this occurs, it will inevitably become a case of "the consumer always pays" as the cost of consumer products such as cars, flat-screen TVs and home appliances rise.

"To me the biggest hurdle of any restructuring of NAFTA is going to be to convince consumers to pay 25% more for the same model of microwave that is now made in the U.S. instead of Mexico," adds Macias.

In many ways, Macias is literally at the virtual epicenter of this issue. In the past 35 years, he has been involved in over 300 transfers of either production lines or plants into Mexico from US based companies.

He now operates El Paso, Texas-based Northpoint Technologies, a third-party supplier of turnkey electronic subassemblies, many of which involve labor-intensive assembly.

According to Macias, his company has been able to offer competitive pricing on these subassemblies, in part because of its geographic location and ability to price from different low labor cost regions. This includes light and high volume assembly in Mexico and in Asia.

Cross border relocation

Even if manufacturers decide to relocate operations back to the United States, a full move back to a location

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thousands of miles from Mexico may not be viable.

Another option could be relocating a plant just north of the border. This would allow OEMs to take advantage of the existing supply chain, expertise and even labor force with little disruption.

As it stands, industrial border towns such as El Paso already work in a symbiotic relationship with the Maquiladora industry.

El Paso stands across the border from Ciudad Juárez, Chihuahua, Mexico. With more than 1,100 manufacturing operations in the region, it boasts one of the largest bilingual, binational work forces in the western hemisphere.

The city already serves as the coordination point for logistics and receipt of raw materials into Mexico. Key personnel and much of the workforce live in El Paso and travel back and forth over the border daily.

"Being in El Paso, we are strategically located to help relocate manufacturing on this side of the border if needed," says Macias. "Everything that is going into Mexico right now is kept in staging warehouses here in El Paso, so it's already there. The raw material does not have to enter into Mexico, it can stop here for assembly."

El Paso also has some of the lowest wage requirements in the United States, operating at the nationwide minimum $7.25 per hour. While higher than labor in Mexico, 29 other states, including California, already mandate wages above the federal minimum.

As a case in point, wire, cable and wire harnesses are labor-intensive, with much of the work requiring manual assembly using fixtures and jigs. Little, if any, of the process beyond can be automated.

For high volumes, wire harnesses are typically assembled in Mexico or other low-wage countries. Macias has prior experience in the wire harness industry in Mexico for a company that produced $300 million per year in product.

For lower volume, custom work, much of the wire harness work remains in the U.S. at facilities like Northpoint Technologies. These wire harnesses are typically aftermarket products used in industrial equipment, such as forklifts.

Given the existing infrastructure and supply chain, ramping up operations to deliver larger volumes in El Paso could be achieved with minimal increase in costs.

Move to Asia?

In recent decades, the other alternative to Mexico was to move operations or source products from Asia. However, with the new administration stance toward China, the prospect of tariffs or a trade war seems even more likely.

At the same time, labor rates continue to increase at the rate of 15-20% a year, removing some of the allure of turning to Asia. Mexican wages, on the other hand, have been more stable.

In Asia it can also be very difficult to manage operations. For example, many OEMs that contract directly with offshore suppliers experience communication difficulties that can lead to errors with subassembly materials or dimensions, avoidable logistical difficulties, or even cost miscalculations.

Uncertain Future

Although the extent of new trade regulations or tariffs is not yet known, proactive OEMs would be wise to consider the options.

Failure to do so could leave US companies at a competitive disadvantage both at home, due to escalating prices on goods, and in competition with other global manufacturers that also manufacture or source products from Mexico.

For information contact: Northpoint Technologies, Inc.; 13321 Tobacco Rd., El Paso, TX 79938; Phone: (915) 591-6300; Sales Office: (800) 553-5087; Email: sales@northpoint.com; Visit the web site northpointtech.com

Going Green in a Manufacturing Environment Increases Profits

Going Green in a manufacturing environment can be one of the most important things you can do to stay ahead of the US manufacturing decline. Here are 3 Reasons as to why?

Tremendous focus on waste reduction and being energy-efficient automatically makes your company leaner and meaner. These cost reduction strategies go straight to the bottom line. This can help manufacturers in an already price sensitive market compete even more. By implementing GREEN lean principles, such as waste reduction, especially towards non-green office supplies such as paper and ink, manufacturers reduce cost by as much as 75%. This has been a main focus for price competitive manufacturers such as Z-Tronix Inc., a Los Angeles, Ca based wire harness and cable assembly manufacturer. "We have made it a focus to eliminate paper as much as possible from all of our departments, both in the office and in the warehouse and we have saved over $50,000/year" says Azim Mahboob founder and VP of Operations at Z-Tronix Inc.

Going Green has saved Z-Tronix Inc. thousands each year just on postage and ink! "We send out a lot of invoices every day and by auto emailing our invoices, we have saved $10,200/year on postage and ink on these documents alone. This simple improvement eliminated printing invoices, purchasing envelopes and mailing them to customers, plus all the labor savings this takes," added Mahboob.

"I have been manufacturing wire harnesses since 1986 and there is a lot of paperwork involved with record keeping, first articles, manufacturing instructions, testing records, etc. And by digitizing these documents we can get our information at lightning speed from anywhere in the warehouse" continues Azim Mahboob, "We used to have a lot of file cabinets and we now use that space for more areas to manufacture."

Additionally, manufacturers can attract new customers and increase sales by marketing their company as green. By implementing green strategies, companies like Z-Tronix Inc. become more personable and liked in the market. Sometimes your business needs to be less like a company and more like a team of people that can work together to get the job done. "By marketing ourselves as green, we become a company with a green heart for our environmental impact. We show we care about the future, because we really do," added Kamran Jahangard, Global Sales Director of Z-Tronix Inc.

In conclusion, going green is just plain good for the environment too and can increase employee morale by knowing they work at a company that cares.

NEWS PLUGS continued

Schleuniger, Inc. to Demonstrate New Laser Wire Stripping Machine at IPC APEX Expo 2017

Schleuniger, Inc., a leading international manufacturer of high-precision wire processing machines, will demonstrate select equipment from its comprehensive line of wire processing products at the 2017 IPC APEX EXPO, the largest electronics assembly exhibition in North America. The exhibition will be held at the San Diego Convention Center in San Diego, CA on February 14 -16, 2017 and will include over 400 exhibitors showing advanced and emerging technologies in printed board design and manufacturing, printed electronics and electronics assembly, test and inspection. Schleuniger will be at booth #2607 providing hands-on demonstrations of innovative wire processing solutions.

Schleuniger will have the new UniStrip 2050 wire stripping machine will be on display. The UniStrip 2050 is a great solution for customers looking for a simple, low-cost pneumatic stripping unit for medium sized cables and wires. The fully pneumatic machine is extremely simple to set up and operate and excels with its compact design and ample stripping power.

Schleuniger's MultiStrip 9480 cut and strip machine will also be shown. The machine's high resolution indexing cutter head and programmable rotary incision capability set the benchmark for high precision processing of coaxial and other shielded cables. The MultiStrip 9480 family offers six machine versions to meet your specific production needs. With many additional options and accessories, the MultiStrip 9480 can handle a nearly endless range of applications.

Schleuniger will also showcase the economical UniCrimp 100 crimping press. The UniCrimp 100 is a bench-top crimping machine that delivers up to two tons of force along with simple, fast changeovers, adjustment and set-up times. The UniCrimp100 accepts most applicators on the market and provides quality crimping for wires up to 6 mm2 (10 AWG).

Other popular machines that will be part of the exhibition include the UniStrip 2300, UniStrip 2550, UniStrip 2600 and RotaryStrip 2400 programmable wire stripping machines and the CoaxStrip 5200 coaxial cable stripping machine. As always Schleuniger's wire processing experts will be on hand to review your wire samples and help you find the right equipment for your specific applications.

More information can be found at www.schleuniger-na.com/apex or e-mail sales@schleuniger.com or call (603) 668-8117.

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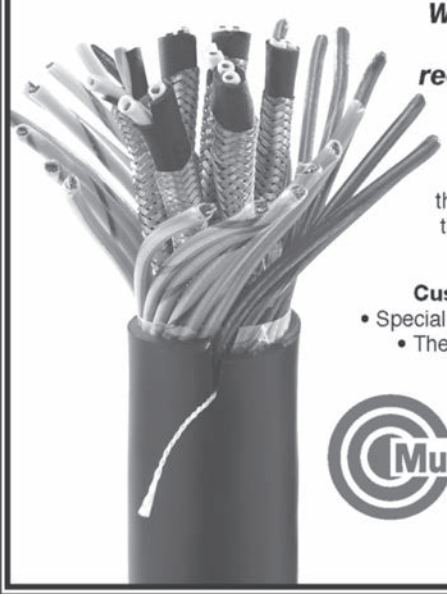

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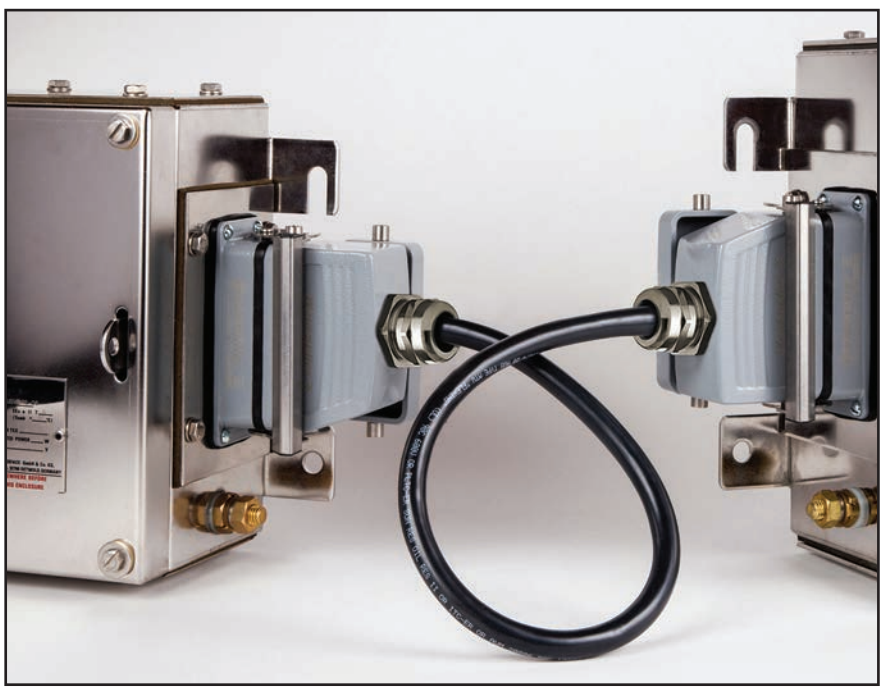
NEWS PLUGS continued

New HDC Cable Configurator Revolutionizes Heavy Duty Connector Cable Harness Design

Weidmuller introduces the "HDC Cable Configurator", an industry-first online tool created to simplify the task of designing and building custom cable harness and mating assemblies for Weidmuller's Rockstar® Heavy Duty Connectors. This unique tool does more than just simplify the design and assembly of the end-to-end HDC connection– it can help users save time and reduce errors. Using this "design-to-order" tool, a single part number is assigned to the completed cable harness, and a single part number is created for each mating assembly required for a user's application. No more than three part numbers are needed for a complete and protected pluggable connection for use between panels, machinery, equipment and more.

The HDC Cable Configurator interface provides users the ability to designate project names so they can save their designs for future access. The configurator guides the user through available options for each side of the harness and mating assemblies. Each step narrows down the choices based on options already selected to ensure a compatible system. Choices include Weidmuller's "HE Series" inserts in screw clamp or push-in clamp technology, hood or coupler housings for the harness, and bulkhead, coupler or base housings for the mating assemblies. Users are also able to select additional options if they require a customized solution for an application.



HDC Cable Configurator

The benefits of using the HDC Cable Configurator extend beyond designing the cable to ordering and quality assurance. Once a project is created and saved, the data resides in the tool so the user can select the design and print a pdf quote at any time. Quotes include project details, list pricing, a simple rendering, and custom part numbers that can be used to order and obtain data sheets by request. To ensure product quality, Weidmuller has teamed with an UL Approved cable assembly shop to provide cables that meet with UL and CSA requirements, including continuity and short testing on every harness. All product options provided in the configurator use UL and CSA Listed components.

Access the HDC Cable Configurator landing page directly from Weidmuller's home page or from the HDC Services page at www.weidmuller.com for more information.

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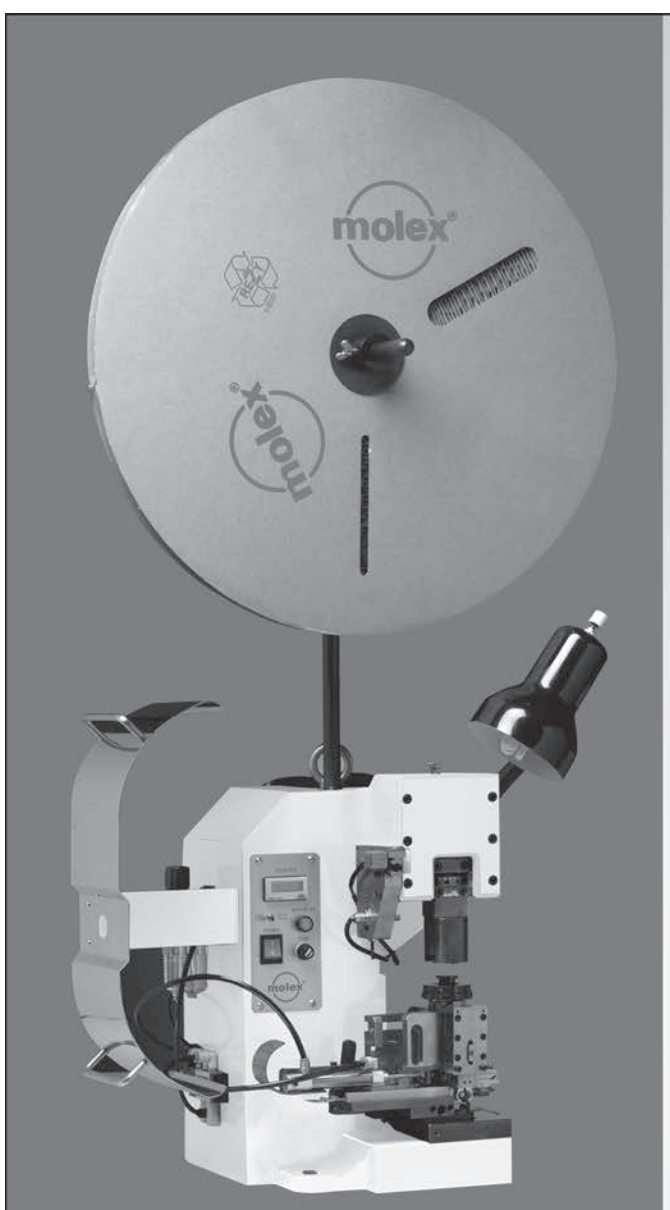

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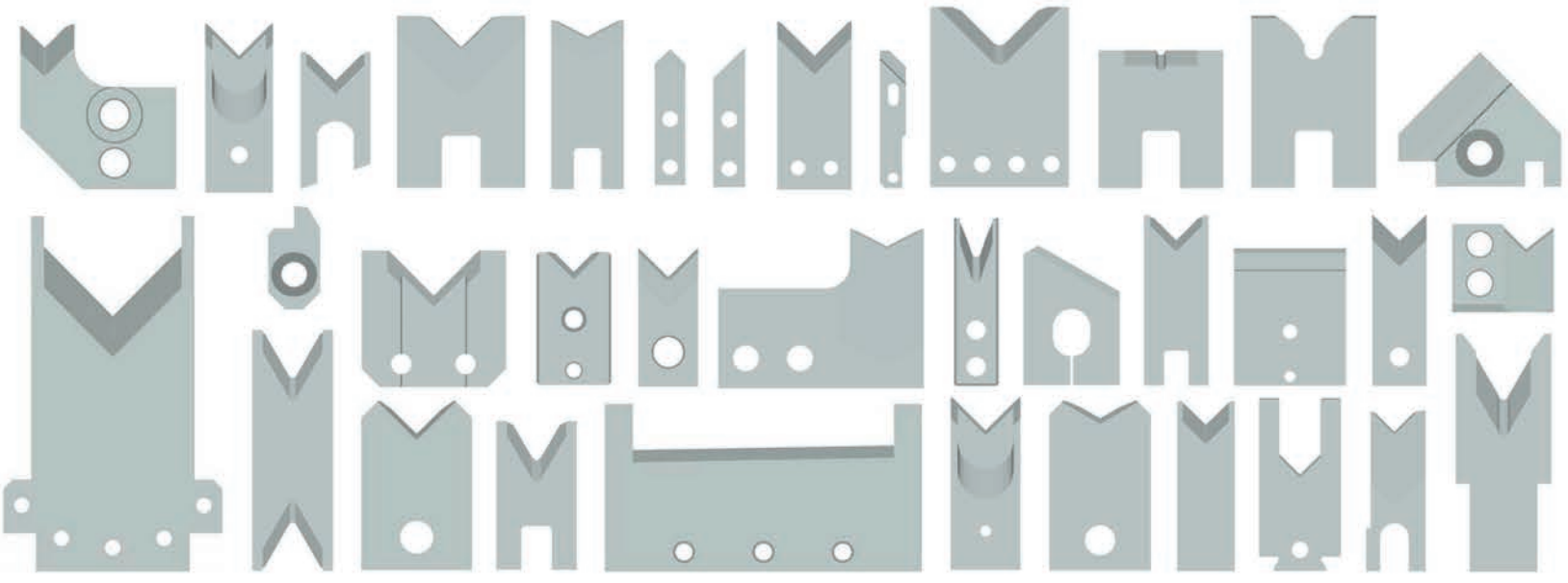

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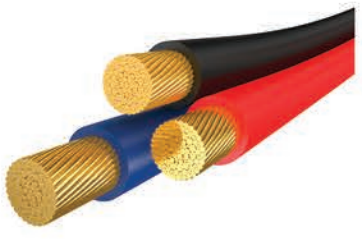

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The Impact of LV 214-4 – The German Automotive OEM Connector Test Specification

By Rob Boyd, Senior Product Manager, Schleuniger, Inc.

It goes without saying that every manufacturer wants to ensure they are producing a quality product. Standards and specifications from various organizations provide a guideline from which manufacturers can measure different areas of quality, while also providing the end user with the reassurance that they are purchasing a trustworthy, long-lasting product. Within the wire processing industry there are many standards that manufacturers may choose or be required to adhere to. These standards and specifications are constantly evolving and increasing in detail, especially as monitoring technology improves.

What is LV 214-4?

LV 214-4 is an automotive standard that was developed by representatives of the German car manufacturers Audi AG, BMW AG, Daimler AG, Porsche AG and Volkswagen AG. The standard outlines terminal requirements specifically for the automotive industry. The standard addresses the ability of terminals to be effectively evaluated by crimp force monitors. To be used in an automotive wire harness, terminal must exhibit certain crimp force characteristics so that typical crimp force monitors can effectively detect critical error modes. Though it is currently in draft form and many points are still largely theoretical, the standard has been in progress for many years.

Concepts: Old and New

The standard focuses on relative deviation of force curves and headroom, both common concepts with regard to crimp force monitoring. Relative deviation is the variation of peak force expressed as a percentage. Headroom is the difference between the peak forces of the average good crimp and empty crimp curves, also expressed as a percentage (see fig. 1).

LV 214-4 defines what an empty crimp is; something that is not clear to all. In a good crimp the conductor crimp is filled with all conductor strands and the insolation crimp with all undamaged insulation material. Crimp parameters are at the nominal values as specified by the manufacturer. An empty crimp

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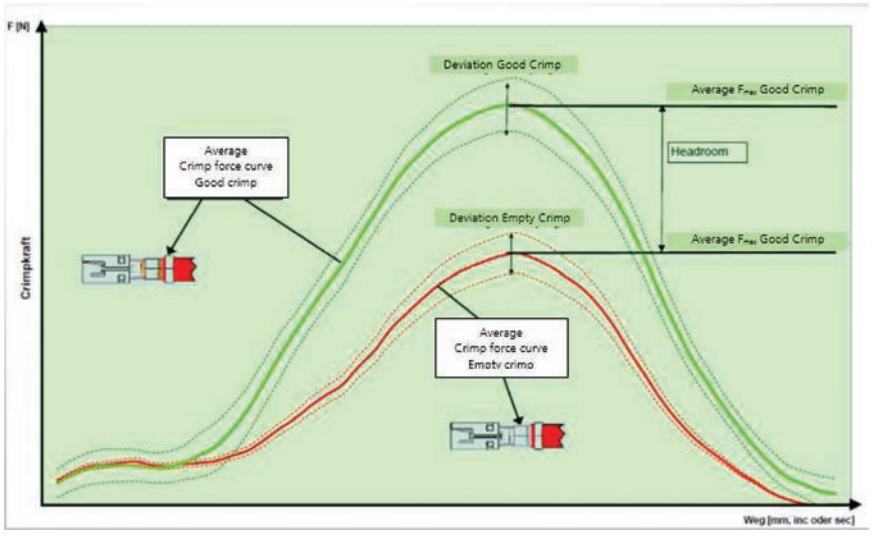

Fig. 1. Crimp Force Curves and Headroom definition.

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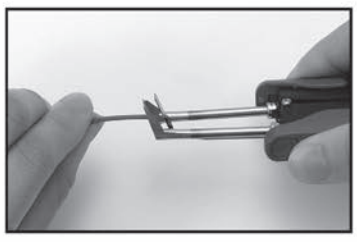

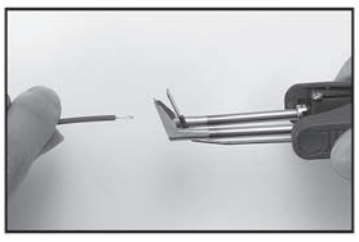

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"Once I helped round up a cow that got loose in a customer's plant.

"Another time, while driving to a customer's site, our rep's car caught fire. We eventually arrived there that night and finished the job in time for the morning shift," Mando reports.

Customers report something unusual too: Mando's "can-do" attitude.

George Price, vice president of J&M Products, for example, writes how Mando takes time to answer questions, explain machine operation and even gave "tips on stripping some shielded cable that others said could not be done."

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The Impact of LV 214-4

Continued from page 50

has a full insulation crimp, but the conductor crimp is empty (see fig. 2).

For many years, crimp force monitors have analyzed the total area under the crimp curve. However, LV 214-4 defines four area segments; one for good crimps and one for each error mode, specifically, empty crimp, missing strands and insulation-in-the-crimp (see fig. 3). The good crimp area is the area between the good crimp curve and the empty crimp curve. Similarly, the missing strand area is the area between the missing strand curve and the empty crimp curve. Alternatively, the area for insulation-in-the-crimp is the area between the insulation-in-the-crimp and the good crimp curves. Differences in each of these areas must be detectable for the corresponding error mode.

The LV looks closely at the "roll-in" portion of the crimp. The roll-in area is the beginning of a crimp force curve where the terminal wings begin to roll in and close around the wire. Most monitors ignore this portion because forces are usually inconsistent and this part of the crimp process is not very important. However, LV 214-4 analyzes relative deviation and defines the positions X_0 and X_1.

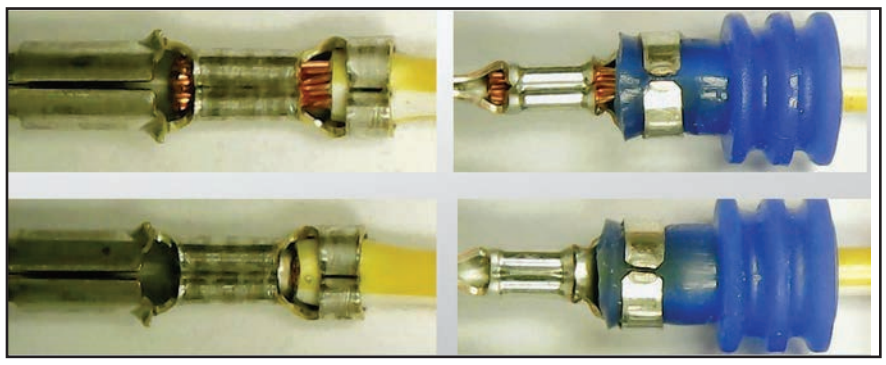

Fig. 2. View of Good Crimp (top) and Empty Crimp (bottom).

X_0 is generally where the good crimp and the insulation-in-the-crimp curves begin to diverge. X_1 is generally where the good crimp and empty crimp curves begin to diverge. The LV provides a formula to determine specific locations for X_0 and X_1.

At this time, however, no crimp force monitor analyzes the area under the crimp curve as described in the LV. Similarly, the force curve data in the roll-in area is typically ignored during monitoring with filters. Therefore, the different area regions, X_0 and X_1 are theoretical and will only be considered during initial validation of the terminal.

Today's crimp force monitors detect area differences as a result of crimp defects but analysis does not go to this detail. But the LV is not a specification on crimp monitors; it is a specification on terminal characteristics. Regardless of how the area results are calculated, when crimped, the LV mandates that a terminal must exhibit significant differences in these areas so that a crimp force monitor can accurately detect all scenarios. If not, it will not be approved for use in an automotive harness. Furthermore, typical crimp monitors are used on the production floor. Therefore, if the terminal is already on the production floor, it has already been approved so this level of detail in the analysis is not required.

Feasibility Study

The feasibility study is the testing methodology for terminals as defined under LV 214-4. It is to verify that defect modes can be detected for a terminal/wire combination. The output identifies the separation between good crimps and defect crimps. Tests must be performed using the smallest wire allowed for that terminal. For example, if the terminal is rated for 18 -22 AWG wire, 22 AWG wire should be used for

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testing. Although the procedure is written for initial validation of terminals, this process can be used on the production floor to determine the feasibility of any application.

After the application is set up, crimp parameters have been verified, and the teach crimps are completed, 300 good crimps and five empty crimps are processed. The relative deviation of the good crimp peak forces is calculated. The LV specifies a maximum relative deviation of 1%. If the relative deviation is greater than 1%, the terminal fails for this criteria and the testing stops. If the relative deviation is less than 1%, the terminal passes and the test continues.

The next step is to test crimps with strands missing. The LV states that 9% missing strands must be detectable. Examples are given for calculating the 9% and rounding up for various wire sizes. For example, in a 7 strand wire, 9% missing strands equals 0.63, which round up to one missing strand that must be detected. For a 32 strand wire, a defect must be detected with three strands missing. 9% of 32 equals 2.88, which rounds up to three.

Ten crimp samples are processed with the required number of missing strands and all must be detected as defects. If not all are detected as defects, the terminal fails and the test stops. If all ten are detected as defects, the test proceeds.

The next step is to detect insulation in the crimp. Like with missing strand detection, 10 wires must be processed with insulation in the crimp area and all must be detect as defects. LV 214-4 mandates 30% insulation inside the crimp for these tests and provides a clear method of measurement. If all are not detected as defects, the terminal fails and the test stops. If all are detected successfully, the test continues.

At this point, the operator considers the headroom. LV 214-4 states that headroom should be greater than 35%. Headroom can actually be determined much earlier on in the feasibility test, however, it is best left for last. If the terminal fails any test up until this point, the terminal does not meet the criteria of the specification and thus cannot be used in an automotive wire harness. However, if all defects are successfully detected but the headroom value is less than 35%, then perhaps special parameters are required.

Documentation

The final area discussed in LV 214-4 is documentation. In order to meet LV 214-4 criteria, proper documentation must be kept of all assembly data, machine data and the results of all testing. This includes: terminal ID, crimp data, wire cross section, wire type, machine, applicator and crimp force monitor used, relative deviations, headroom, and feasibility study results. This data is used not only for internal purposes, but can also be shared with customers or manufacturers to help them understand why a specific terminal is or is not appropriate for their application.

Conclusion

It is important to remember that LV 214-4 is intended for terminal validation in automotive harnesses. This means that when an OEM receives a terminal that has been approved for automotive manufacturing, all of this testing has already been completed. However, the LV 214-4 is a culmination of knowledge from top automotive manufacturers and provides consistency among expectations and processes in terminal requirements for automotive use. Thus, it is important for OEM manufacturers to have at least a basic knowledge of what the LV 214-4 is and how it may impact their manufacturing.

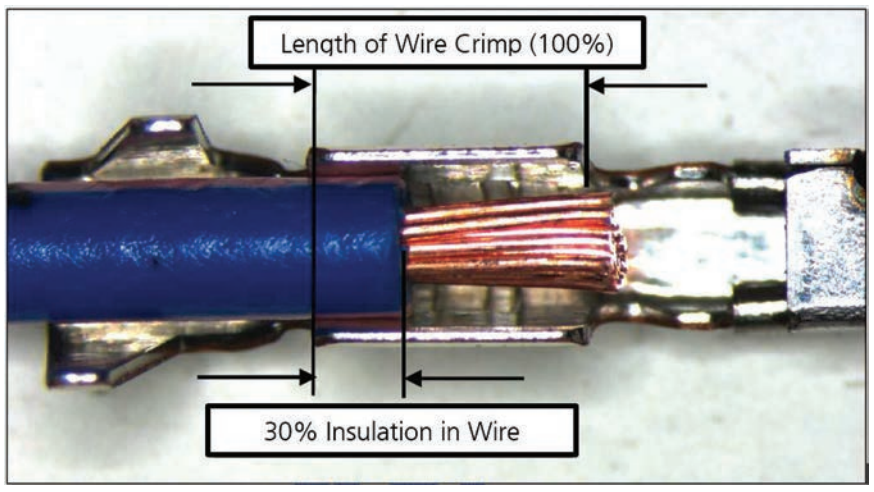
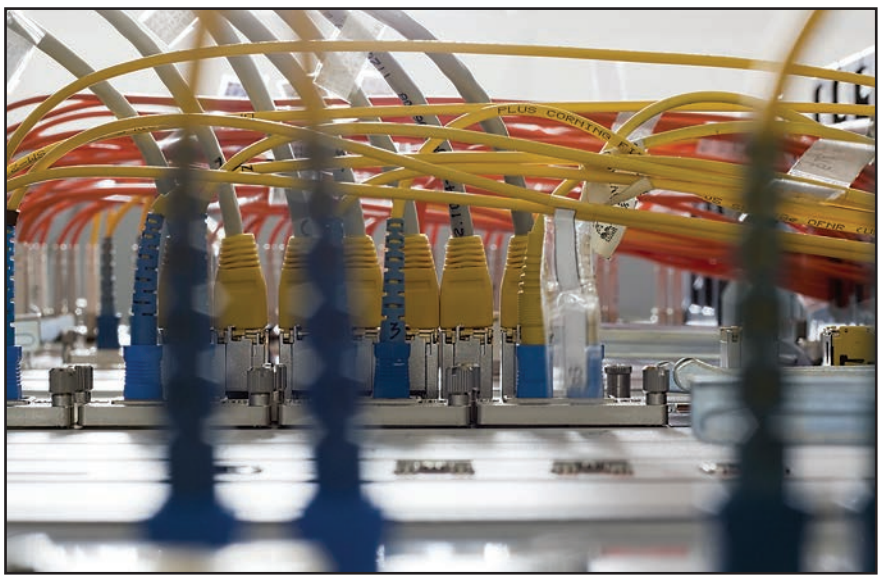


Fig. 3. View of 30% Insulation in Wire.

FreePoint Shiftworx Supports Ethernet/IP and OPC Server Data Acquisition

FreePoint's "Smart Devices" have proven to be an effective means for capturing operational and performance data from legacy manufacturing machines in the wire harness industry, such as cut and strip machines, sonic welders, injection molding machines, and even wire harness assembly stations. With this information, organizations have been able to Measure, Share and Analyze their production processes to gain efficiencies that drive productivity gains through our ShiftWorx platform.

FreePoint has recently launched their FPT Xi family of "Smart Devices", helping manufacturers better manage their entire production operation by capturing operational and performance data sets from their modern automation equipment and adjunct processors they may use in their SCADA, MES and MOM systems as well.



Two of the key technologies incorporated and supported in the new products are Ethernet/IP and OPC Servers – both of which can be used to provide data to the Shiftworx platform.

Ethernet/IP is actually a combination of two networking technologies that has become the de facto standard in modern manufacturing facilities. Created in 2001 by combining the ubiquitous networking capabilities of TCP/IP over Ethernet with the robust services provided by the Common Industrial Protocol (CIP), Ethernet/IP is an open standard managed by ODVA Inc., a global trade and standards development organization that also owns 3 other CIP integrated network protocols – DeviceNet, ControlNet and CompoNet. The impetus behind the creation Ethernet/IP was to take the well-defined Service and Device object model framework elements defined by CIP and use TCP/IP and Ethernet for networking and messaging as defined under the standard OSI stack model. Put another way, it combines the best of both worlds to create a total solution far greater than just the sum of its parts!

OPC Server is based on OLE for Process Control, a series of standards and specifications for industrial telecommunications to allow for communication of real-time manufacturing data between control devices independent of vendor. OLE, or Object Linking and Embedding, originally developed by Microsoft for communications with database servers was chosen due to its ease of adoption and simple programming interface.

Today OPC has changed its name to Open Platform Communication as the dependence on OLE has evolved to include other transportation technologies that are Microsoft platform agnostic. The modern standard for OPC that reflects this platform neutral capability is referred to as OPC UA, or Unified Architecture. UA allows for modern tech-

nologies to be used such as XML and Web Services that provide a much richer data set and allows for higher level support for MES, MOM and ERP systems.

OPC Servers provide the methods for many different software packages to access process control data from PLC's (Programmable Logic Controller) and DCS's (Distributed Control Systems). It is a true Client/Server model where the Client is written specifically to support a device to allow for control, performance and operational data exchange. There are many vendor specific instances of OPC Server, most notably Kepware, however the OPC standard is maintained by the OPC Foundation who ensure it is open and available to anyone to use.

With the Industrial Internet of Things (IIoT) evolution fully underway and impacting our existing and new customers in as yet unknown but profitable ways, FreePoint's engineers and technology experts are keenly focused on all new developments in this space and are actively future-proofing our products to ensure long term value for their customers. The ability to acquire data via Ethernet/IP and/or OPC Server reflects that commitment.

For more information on these new products, or their capabilities, contact paulh@getfreepoint.com

The 17th Annual Electrical Wire Processing Technology Expo, will be held on Wednesday, May 10 and Thursday, May 11, 2017 at the Wisconsin Center in Milwaukee, Wisconsin.

The CT4 Coastelmatic Pneumatic Tool Holder

The CT4 Coastelmatic hand tool holder is a device that uses air to activate spring retracted hand tools. The CT4 Coastelmatic is a great low cost alternative to automatic crimping, stripping, and cutting machines. The CT4 Coastelmatic can be set up to work crimpers, strippers and cutters. The patent pending tool holder in the applicator securely holds all tools in place, allowing the operator to use his hands freely. This new and improved cylinder delivers 10% more power through dual activation for tough jobs. Each unit is pre-assembled, tested and ready for use.

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NEWS PLUGS continued

The New Alphatron MPT-250C Digital Wire Crimp Pull Tester from DMC

The all new MPT250C Motorized Wire Crimp Pull Tester is the latest addition to the Alphatron™ Product Line from DMC. This series of Motorized and Manual Wire Pull Testers represents the most reliable, portable, affordable, and wire specific test systems in the Wire Harness Industry. The MPT250C takes its position as the top of the line Tensile (Pull) Tester for the verification of wire terminations.

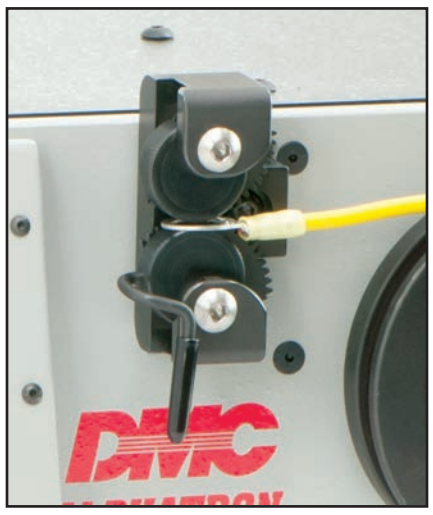
A motorized pull tester (as opposed to a manual tester) is required for High Reliability wiring (Transportation Systems, Aerospace, and Class 3 Wiring) to meet the specified pull rate (head speed) of the tester where hand operated, manual testers can't be used. It is a well-known fact that motorized testers with a stable speed and pull rate will provide more consistent and reliable test data.

The MPT-250C has been designed to be rugged and portable (20 Pounds) and it measures only 13.3" wide, X 6" high, and 11" deep.

This Tester is equipped with State-of–the–art Touch-Screen Controls, and PC Ready interface. This provides the latest upload capabilities for Statistical Process Control, and other Data Capture applications.

Other Standard Features:

- Two Test Options: Pull to Fail, and Force Hold



A variety of standard and custom grips are available and easy to install.

- Easy Setup operation and Grip Change
- Accurate (± 0.3% Full Scale)
- Test Results in Pounds Force, Newtons, or Kilograms Force
- Overload Protection (150% of Full Scale
- Pull Rate Speeds from 1 to 10 inches per minute
- RS232 and USB Communications Ports
- Rugged Machined Aluminum Construction
- Retractable Carry Handles

Optional Accessories and Grips:

- Many standard options to choose from.
- DMC will provide customized grips for your specific application.
- DMC provides Technical Support, Accessories, and Factory Calibration for all Pull Testers

For further information contact Daniels Manufacturing Corp, at www.dmctools.com or e-mail: dmc@dmctools.com

UNIQA-PRO SINGLE CRIMP WIRE PROCESSOR

This lead making machine combines a proven platform, with a cost-effective, multiple station design and a wide range of customer options.

TE Connectivity's UNIQA-PRO Single Crimp Wire Processor is an ideal cost-effective solution for companies looking to ramp up production from multiple bench top machines without making the large capital investment of a double ended lead maker. With this single ended-lead maker, you will be able to save labor costs by measuring, cutting, stripping both ends, and crimping one end of a wire lead all with a single machine.

Features:

- 20% smaller footprint than a typical double ended lead maker.
- The UNIQA-PRO can ramp up your throughput by approximately 4X over a standard wire prep. and benchtop applicator.
- User-friendly PC control.
- Available in three different models to fit your needs: Basic machine with a passive wire collection system, basic machine with a passive wire collection system, crimp force monitor, and terminal scrap chopper, and a high force machine with an active wire collection system, crimp force monitor, and terminal scrap chopper.

Applications:

- Appliance industry
- Medical equipment
- Wire sizes ranging from 12 AWG – 26 AWG
- Anywhere manufacturers want to keep labor costs down without a large capital investment

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LASELEC Celebrates 15 Year Anniversary with Electrical Harness Automation at NBAA 2016

Founded in 2001, LASELEC designs and manufactures cutting-edge electrical wire processing equipment like UV laser wire markers, laser wire strippers, interactive harness assembly boards, and harness braiding machines. This wide range of products demonstrates the company's willingness for continuous innovation and leadership in the latest trends in aircraft electrical harness manufacturing, and to truly embrace automation.

LASELEC presented its automatic solutions in a special presentation at the NBAA 2016 show.

Prior to RapidShare being launched, the first step in the manufacturing process of an aerospace electrical harness started with the marking and cutting of wires. Next the operator had to manually group the batch of wires. Then the operator would label and sort those batches for production processing before sending them to the shop floor for assembly on a form board.

Laselec has initiated the new trend in the harness manufacturing with GE Aviation being the first customer to experience an unprecedented level of automation. RapidShare is a solution designed to automate wire processing production. The RapidShare robot arm, attached to

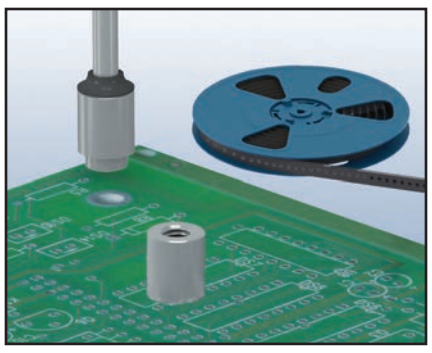
the ULYS Modena laser wire marker, is able to perform automatic tasks such as: labelling, stripping, crimping, bundling and kitting processes. The operator is now free to handle multiple tasks/machines instead of operating a single marking machine for an entire shift. RapidShare's compatibility with the ULYS Modena line of laser wire markers has allowed companies, such as Airbus Group which owns several Laselec's markers, to upgrade to the automated production system that has increased their competitiveness. For more information, contact Frederick Viaut, Sales Manager, at frederick.viaut@laselec.com, 814-460-7830. www.laselec.com.

New Surface Mount Threaded Standoffs for PC Boards

Keystone Electronics has introduced a new series of threaded standoffs specifically designed and packaged for use on PC Boards in the same manner as other surface mount components.

Manufactured from steel with a tin plate, these standoffs can be added to the board using the same SMT equipment used to populate the board, reducing scrap and handling time while minimizing damage to a PCB that may occur while using traditional mounting products ensuring easy reflow soldering for reliable solder joints.

Threaded SMT standoffs are available in 2-56, 4-40 and 6-32 threads in lengths from 1/16" up to 3/8" and are



Surface Mount Threaded Standoffs for PC Boards.

supplied on tape and reel with Kapton tape on top surface for easy pickup. They are ideal for use with most vacuum and mechanical pick-and-place assembly systems. Availability is from stock through Keystone's global distribution network. Online ordering is accommodated.

A major manufacturer of interconnect components and electronic hardware, Keystone's capabilities include stamping, machining and assembly services. Application engineering assistance for product modifications and special designs are also available. ISO-9001 certified and RoHS compliant, company headquarters are in the USA with offices in Canada, Europe, Australia and Asia.

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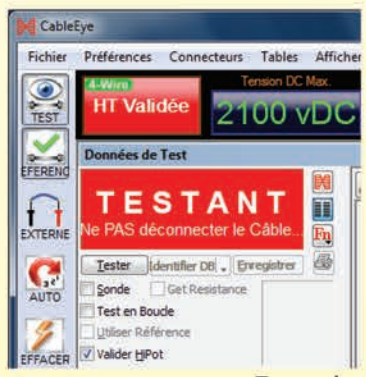

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NEWS PLUGS continued

The New Twist-Strip™ TSK8000 Outer Jacket Stripping Tool from DMC

There has been exponential growth in the amount of Shielded Twisted Pair Cable being processed for wire harness manufacturing. This type of cable is needed to handle high-speed data circuits. There are many specifications, part numbers, and application options for High Speed Data Cable which adds to the complexity of processing these cables.

Removing the outer jacket for termination of the shield and inner wires presents a problem for people working with this type of cable, due its irregular (not-round) cross-sectional shape. The original Twist-Strip™ tool was invented by a maintenance engineer who was working with aerospace wiring. DMC Licensed and introduced the innovative Twist-Strip™ Tool and Die System into the wire harness industry, and the first generation of Twist-Strip™ Tooling was well received by users and maintainers who process High Speed Data cable.

By applying what was learned from the first generation Twist-Strip™ tools and dies, the DMC Engineering Team has enhanced the user friendly features and added blade depth adjustability to compensate for the variations commonly seen between cable lots and multiple manufacturers. These additions further the user's ability to consistently remove the outer jacket with no damage to the shielding or inner conductors. DMC is proud to introduce the TSK8000 as the next-generation Twist-Strip™ Tool.

Historically, the most common tool for removing the outer jacket of shielded twisted pair cable has been a razor blade. This is a dangerous and difficult way to remove the jacket from any type of electrical cable. A razor blade offers significant unreliability in depth of cut which often results in a poor quality strip, cuts or scrapes on the shielding, and increases the probability of injury to the operator.

Other methods for removal of the jacket from multi-wire shielded cable are laser strippers, but they are costly, and not portable. Laser stripping of multi wire cable can penetrate the insulation on the inner conductors, and create a shorting path for solder and humidity which can cause failures on sensitive digital circuits.

The Twist-Strip™ Solution:

The DMC TSK8000 Twist-Strip™ product line gives the user a system with the maximum capabilities, while keeping the system portable, self-contained, affordable, and operator-friendly. The precise blade adjustment, zero friction ball bearing design, articulating/locking arms, and changeable dies makes the Twist-Strip™ a very easy, understandable, and repeatable system for cable prep.

caption needed

Micrometer Adjustable Blades are an important new feature of the TSK8000.

This allows the tool to accommodate variances in the cable, whereas previous models of the Twist-Strip™ had fixed blades, which were non-adjustable.

A cable track is precisely machined into each die set. This feature creates a controlled rotation of the dies/blades as the cable is moved along the track. This produces a longitudinal score in the cable jacket, which is deep enough to allow cracking and peeling the outer insulation from the cable, but not deep enough to damage the shield or inner wires.

Once the correct dies are installed in the tool, and the adjustments are made, the Twist-Strip™ performance is consistent and repeatable through thousands of strip cycles on a particular cable. When it is time to change to a different cable application, a simple set-up process is followed, and the TSK8000 Twist-Strip™ Tool is ready for the next application/use.

This system is robust enough for high production line operations, yet portable and versatile enough for maintenance, and second end terminations (wire prep operations) on wire harness form boards.

DMC provides an upgrade incentive in the pricing for users who elect to upgrade from the original Twist-Strip™ fixed blade system to the new TSK8000 Adjustable Blade tool and die package.

For further information contact Daniels Manufacturing Corp, at www.dmctools.com or e-mail: dmc@dmctools.com

Wardwell Harness Braiding Machine

The Wardwell Harness Braider is the ideal machine for over braiding on harnesses. It works equally well with wire materials or with textile and synthetic threads. The improvements to this type of standard machine include: a motor driven capstan take-up for accurate coverage of the harness, a new tubular frame, a self lubricating horn gear, a new operator station and sound reduction, among many others.

Technical Features

- *Carriers for both textile and wire*
- *Infinitely variable motorized take-off system (18" capstan)*
- *Variable speed drive with foot potentiometer*
- *Self lubrication horn gears*

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Cablescan's Series 90 TestRite programs run under the most popular Windows operating systems, and can import wire lists, net lists, and CAD data. TestRite's browser window allows you to provide setup and work instructions using HTML, image, and audio files. With a simple click, everything is displayed, stored, and can be printed in seconds. High voltage and high current models are also available. Put simply, you reduce test and assembly cost dramatically. Visit our website or call us at (909) 483-2436 for more details. Cablescan, Inc., 3022 Inland Empire Blvd., Ontario, CA 91764

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FEBRUARY 14-16

MEETINGS & COURSE S
FEBRUARY 11-16

TURN INSPIRATION
INTO ELECTRONICS
INDUSTRY INNOVATION

www.IPCAPEXEXPO.org

Tuesday, February 14, 2017 | 8:30am-9:30am
Mayim Bialik, Actress & Neuroscientist
"The Big Bang Theory - Making Science Cool (and Funny)"

Wednesday, February 15, 2017 | 8:00am-9:00am
Mary (Missy) Cummings, Naval Officer, Military Pilot & Professor, Duke University
"The Future of Drones"

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A. _____

Q. What's your track record (closing percentage)?
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A. _____

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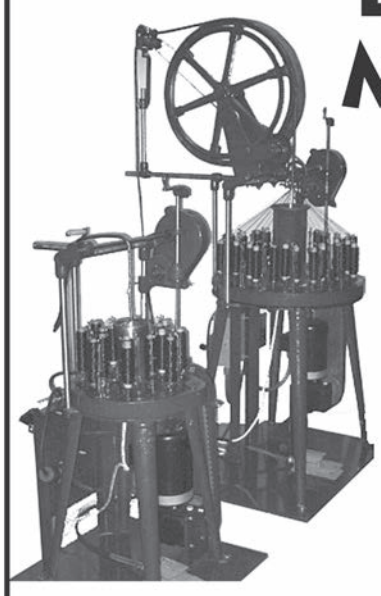

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