

## This Issue Features:

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- Best Practices in Crimp Applicator Maintenance
- Manufacturers Who Are Meeting Production and Market Challenges Head-on



## RPC Engineering: An Unlikely Beginning Becomes a Strategy for Success for this Colorado Manufacturer

By Joe Tito  
Wiring Harness News

**R**PC Manufacturing Solutions, LLC was founded by Larry Rohs in 2003 in what many would consider to be unlikely circumstances. It has everything to

do with Larry's steadfast nature and abilities as a well-rounded executive. He and his son Brian Rohs told the compelling story to WHN in a recent chat.

Larry's background was entrepreneurial from the start. His family owned a small metal finishing busi-



Brian, Larry, and Rob Rohs

## Electrical Wire Processing Technology Expo Announces Seminar Lineup

**I**ndustry experts will lead educational seminars, workshops, and trainings both days of the Expo.

The 18th Annual Electrical Wire Processing Technology Expo (EW-PTE) will be held on Wednesday, May 9 and Thursday, May 10 at the Wisconsin Center in Milwaukee, Wisconsin. Free informative seminars are held both days and provide attendees with the latest information to take back to their company for increased productivity.

### SEMINAR SCHEDULE

**WEDNESDAY, MAY 9**  
8:30am IPC/WHMA A-620: Rev C and Beyond Presented by Teresa Rowe, Sr. Director, Assembly & Standards Technology of IPC.

10:30am Laser Wire Stripping Master Class Presented by Dr. Paul Taylor, Found of Laser Wire Solutions, Schleuniger, Inc.

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RPC Production Team

ness in Milwaukee, WI called Barrel Plating Service. Larry's father was a big believer in Yellow Pages advertising, the internet advertising equivalent of that era. In fact, he did so much in Yellow Pages advertising, he was featured in an advertisement for Yellow Pages and declared the Yellow Pages Businessman of the Year. Larry's initial exposure to business was around the dinner table, where he was exposed to all facets of business while hearing the events of the day from his father.

He decided to major in accounting in college and obtained a degree and subsequent CPA license. He entered the business world working for a large accounting firm. His career then migrated from accounting and financial management, to general management, and ultimately to turnaround executive. In that role, Larry accomplished many successful turnarounds,

and it became clear that one day he should be running his own company.

In 2003, Larry was brought on board as president of a small Colorado computer company in need of his turnaround skills. "When I arrived," he recalled, "I looked at the core competencies to determine what we might come up with as a future strategy, and what is now RPC is what I basically came up with." The company had solid skills at finding suppliers for motherboards for the specialized computers they were putting together. His crew could solder, process wire, and had good electronic assembly skills. With the barriers of entry seemingly low, he set out creating a company that existed on three main pillars: printed circuit board assembly, harness manufacturing, and electronic box builds.

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## The Role of the Blade in a Calibrated Wire Process

By Ruben Lozano, B.I.E  
Lakes Precision

**P**icture yourself in the middle of a busy freeway. You're traveling at night, at a high rate of speed, and SUDDENLY, your vehicle just stops dead. Everything just turns off!

Churning out low quality, unreliable wire circuits or defective, complex harnesses is certainly not the expectation of a wire harness manufacturer. Any wire harness producer worth their salt relies on first rate, efficient processes. One of the principal contributors of efficiency and quality in any process is a calibrated piece of equipment. Within the scope of a wire processing machine, there are three major process blocks: pre-process, process and post-process. Pre-and post-processes, like their names implies, are ancillary and supplemental procedures performed

prior or after the main process. The actual process entails measuring a section of the bulk wire to length, cutting apart and stripping the ends of the wire and attaching connectors and/or other elements to those ends.

Since we are talking here about building electrical wire harnesses to be installed in vehicles, appliances, etc., then we can surmise that connectivity between the end points of each wire in the harness to its intended target is paramount. Thus, length accuracy in combination with proper electrical connections is an absolute must. These two key elements are contained within the main process of the machines and give us a clue on the mechanisms in the equipment that require calibration. In assessing these elements, we must analyze the feed traction mechanism, the cutting and stripping head and transport arms, and also the crimp presses and dies.

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Larry Rohs got an unpleasant phone call one day. Read how he turned it into a thriving business for he and his two sons.

**1 The Roll of the Blade in a Calibrated Wire Process**

Ruben Lozano of Lakes Precision tackles the subject of blade calibration versus recertification in this informative article on automated stripping equipment.

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It only makes sense that an unprepared seller can make a deal go sour. But seller's need to ascertain the buyer's level of preparedness to consummate the deal. Loren Smith's latest article explains.

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We spend a lot of time getting things done in the manufacturing arena. But are we spending enough time making good things happen? Paul Hogendoorn's latest installment may just change the way you look at your business.

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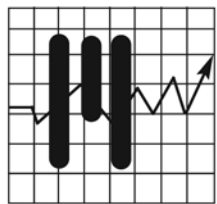
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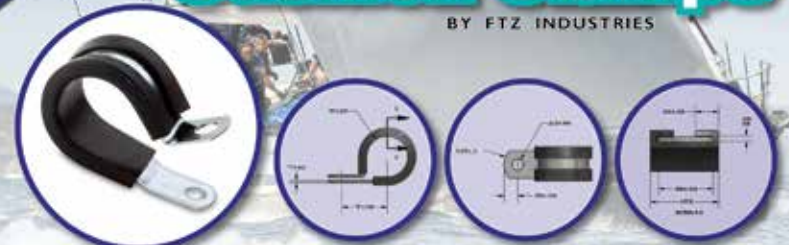


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SSC-375-EPDM	3/8"	0.040	0.500	#10	10
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SSC-562-EPDM	9/16"	0.040	0.500	#10	10
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SSC-875-EPDM	7/8"	0.040	0.500	#10	10
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SSC-2.00-EPDM	2"	0.051	0.500	#10	10
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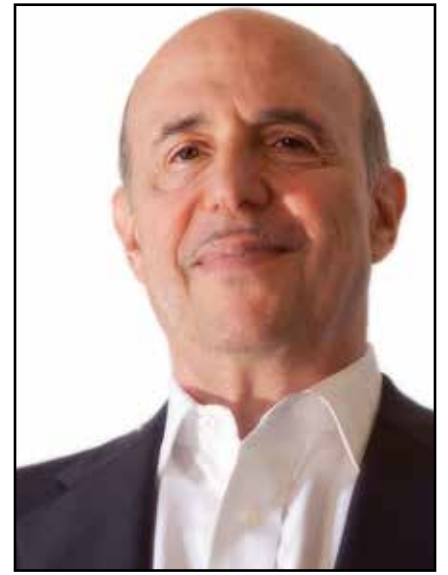
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# “Can a Buyer Kill a Deal”

By Loren Smith



**Loren Smith CEO  
Blue Valley Capital**

Among the various challenges and risks associated with the sale process, an underappreciated dynamic is the ways a seemingly promising buyer can, in the end, scuttle a deal. To guard against that 11th-hour turn of events, prospective sellers need to be aware that it takes more than financial wherewithal to get a deal done; it takes the time commitment and ability to develop a solid relationship with the seller.

A corollary is that sellers can protect themselves against the disintegration of a deal by looking beyond financial figures. Although the consideration of price and terms is central in the initial process of rank ordering prospective buyers, the seller also needs to heed any sixth sense about a particular buyer’s likelihood of killing the deal.

A couple of examples illustrate these points.

Some years ago, I was retained to sell a harness company in the Deep South. When we attracted one potential buyer whose price and terms were materially better than the others who had expressed an interest, our vetting of the buyer made it clear

that he had the resources and business skills to go forward with the acquisition. So we signed a letter of intent.

What we were unable to find out until the end of the process, however, was that this buyer was heavily occupied with his current business activities. Consequently, once he signed the letter of intent, he had precious little time to deal with the acquisition.

Because the founding entrepreneur was going to stay involved in the company post-closing, lack of contact with the buyer was critical, and the

*Continued on page 6*

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# “Can a Buyer Kill a Deal”

Continued from page 4

the seller wanted, but it did indicate an interest level that suggested perhaps there was a deal here.

seller eventually needed more time to try to reach a sufficient comfort level. Nevertheless, as we moved through due diligence, the seller's normal anxiety associated with departing a business was exacerbated by his concern about the buyer's ability to perform as the new owner.

The seller countered the offer, which resulted in the need to meet to try to come to mutually satisfactory terms. But before that even took place, the buyer sent the seller a revised letter of intent with a number of changes that were confusing and seemed to the seller to violate the spirit of the dialog thus far, creating a credibility issue.

Trying to bridge the gap, I recommended to the buyer that he get on a plane and expend the time required to better know the founder and the business, but he told me that wasn't possible due to his other priorities. With the closing approaching and the founder's stress rising, mere phone calls couldn't mitigate his concern, and he concluded that he could not go forward with this buyer. We then went to the number 2 buyer and did get the deal done, but at a substantially lower price.

Over time we engaged in a number of other communications to try to heal this breach of credibility, but, unfortunately, despite the fact that there were no other buyers for the company, the seller could not get over the credibility issue, and the sale did not take place. Once you lose credibility, you usually can't get it back.

A quite different situation was a company on the West Coast with a customer base and track record that made it extremely difficult to find prospective buyers. After a rigorous process of exploring prospective buyers, it was apparent there was almost no interest in this company.

These two failures to consummate a deal highlight the seller's need to ascertain the buyer's commitment to devoting the necessary time to get the deal done and desire to forge a constructive relationship with the seller. Either can be more important than the buyer's financial wherewithal.

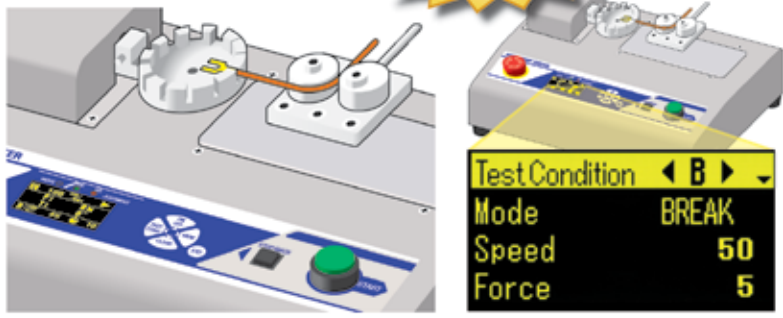
We did, however, find one buyer who for a variety of reasons was positively disposed and put a letter of intent on the table. It fell short of what

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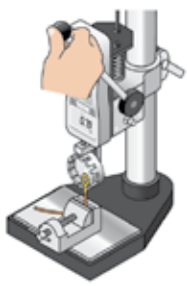
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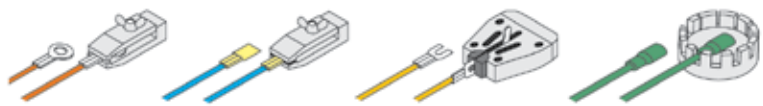
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# Making things happen, getting things done

By Paul Hogendoorn

Five years ago, I started a new company with a couple colleagues. We put a big white board in the office, and across the top of it we wrote “in a start-up company, everyone has to make things happen, or get things done”.

Five years later, the company is far beyond that stage, but the message is still on the whiteboard. It is still as true today as it was when it was first written. In fact, I think this message is valid today for every manufacturing company, big or small, well established or just getting started. Let me explain.

First of all, there is a subtle inference: everyone should make good things happen, and get the right things done. One thing I recognize in myself, and in many people and organizations, is the need to be busy, and the desire to be doing exciting things. It's not difficult keeping yourself busy doing things you want to do, or that make you feel important and useful, and not actually getting anything of real value done. A simple request to one service provider results in 6 emails bouncing back and forth over a week, and finally to a letter of engagement that needed to be signed before the initial question could be answered. The same ques-



Paul Hogendoorn

tion to an alternate service provider resulted in a short telephone conversation and an answer a day later. One got things done, the other did a lot of work and just got busy. When a candidate for employment makes it to the second interview stage, I often ask a simple thing of them post-interview: if they were offered the job, what are the first 2 or 3 things they think should get done. At this point, I'm not looking for elaborate plans or asking them to do a lot of work, I'm looking for an indication that they are good listeners, grasp the general nature of the role, and most importantly, can set their focus on getting things

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Phone: (847) 290-8686**Making things happen, getting things done***Continued from page 8*

done. Some folks will say that they have to plan or do more research, and some folks won't even respond. Planning and research is good, but certainly there must also be a few small things that are easy to identify and get done. "A journey of 1000 miles still starts with a first step". If someone is unable (or unwilling) to identify a first step or two, they likely aren't a fit for us.

The manufacturing world gets things done. Every day, there's product that has to be built and make it to the shipping door. The right amount has to be there, in the right quantity, in the right order, for the right price, and of the right quality. No exceptions, day in and day out, manufacturers have to get things done. But because of this intense and relentless focus on delivery, many manufacturers spend little, if any time at all, on trying to make good things hap-

pen. Many have Lean and continuous improvement activities ongoing, but I'd argue that this is primarily still a focus on getting things done, and not a focus on making good things happen. These activities have become a matter of making things and processes a little bit better; they seldom result in making something significantly better happen. As an example, many automotive manufacturing suppliers will aim for 2% or 3% productivity gains. When we suggest that 15% to 30% is possible on some processes, they ask for a proposal. Once they see our proposal however, they see that what we propose involves changes to the way they are measuring things, or report things, or communicate information. The cost is not the issue, it's the fact that "we don't do those things those ways", or, "that's not how we do it here". Even though the person or team is tasked to make "improvements", they really aren't commissioned to "make things happen".

Few manufacturers have any bandwidth for this kind of thinking because they are too occupied just trying to get things done. As a result, they continually settle for small incremental improvements, striving to keep up with their customer's current expectations, or slightly ahead of their competitors, completely missing the opportunity to make significant improvement. And sometimes it's even their customers that are the roadblock; they mandate small cost reductions over time, but any savings achieved has to be returned to them. This kind of arrangement forces the supplier to just aim to achieve the 2% or 3% target (just get it "done" and make them happy) without any motivation to really think outside of the box and try to make something far better begin to happen. The terms of their deals actually get in the way.

As I visit manufacturing plants all over North America, I remain convinced that our companies can remain competitive and our industry can be sustainable. The most successful companies I see are the ones that continually make good things happen, while getting the right things done.

Paul Hogendoorn co-founded FreePoint Technologies. "Measure. Analyze. Share. Don't forget to share". For ideas on how to "make good things happen" in your plant, he can be reached at paul.hogendoorn@getfreepoint.com or www.getfreepoint.com

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# Electrical Wire Processing Technology Expo Announces Seminar Lineup

Continued from page 1

**WEDNESDAY, MAY 9 (Continued)**

12:30pm Trends in the Interconnect Industry Presented by Lyle Fahning, Past Chairman of WHMA, Former CEO/Owner Technical Services for Electronics, and industry consultant

2:30pm Wire Harness Assembly Manufacturing Optimization Presented by Robert Rensa, Business Development Manager of Panduit

**THURSDAY, MAY 10**

8:30am PC A-630: Box Build Requirements Presented by Teresa Rowe, Sr. Director, Assembly & Standards of Technology IPC

**THURSDAY, MAY 10 (Continued)**

10:30am Portable Crimp Tool Selection—Balancing Ergonomics, Quality, Productivity and Cost Presented by Richard Dobson, Senior Product Engineer of TE Connectivity

12:30pm High Voltage Wire Harness Processing for Electric Vehicles Presented by Patrick Maroney, Product Marketing Manager of Komax Wire

In addition to the seminars, IPC will be holding Presentations May 8 through May 10 in connection with the show. The co-locating Electrical Manufacturing & Coil Winding Expo

will be hosting three short courses—separate registration is required to attend the courses.

For additional information on the seminars and presenters check the website. EWPTE is tailored specifically for those in the wire harness, wire/cable processing, tubing and other industry consumables, cable as-

semblies, cord sets, and related industries. Registration is now open for attendees—in addition to access to the show floor, registration also includes EWPTE seminars and presentations, networking opportunities, Coil Winding Expo admission, the VIP Party on Wednesday night, and more. To register, visit [ElectricalWireShow.com](http://ElectricalWireShow.com).



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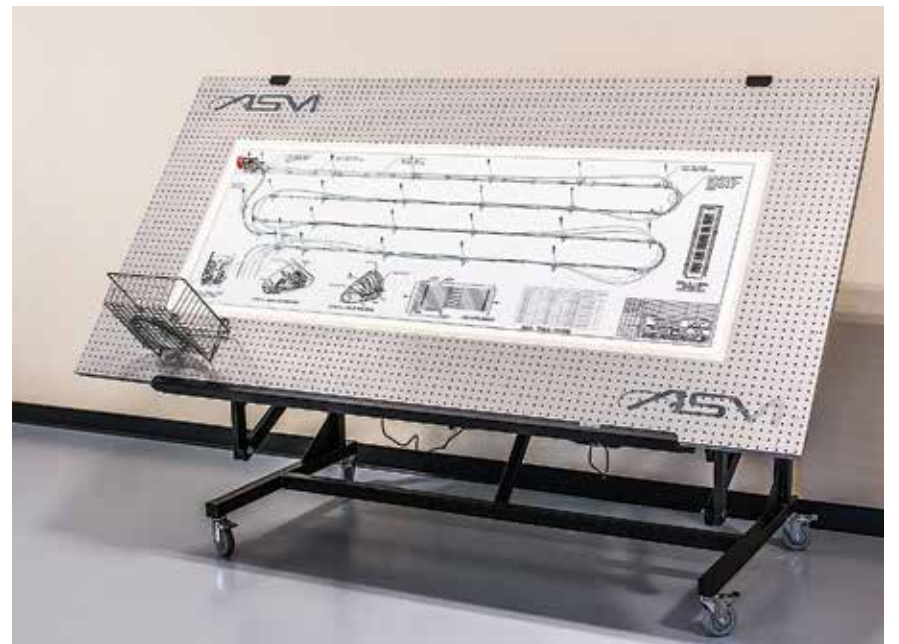
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Driven by increased demand ASM began looking for ways to increase their productivity with a focus on reducing unnecessary operator motion. Ken Schmidt, ASM Manufacturing Manager, explains, “We evaluated

how we were securing the layups for assembly and knew there was room for improvement.”

Schmidt’s team researched and installed wire harness board frame stations from BOSTONtec last year. Previous to implementing the new workstations, frames were built in-house utilizing peg boards and two-by-four lumber to mount on walls for working in the vertical position. Boards were placed on A-frame bases for working in the horizontal position. These options were difficult and time-consuming to adjust to for numerous size harnesses and operators.

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**CASE STUDY:****BOSTONtec Tackles Productivity with Harness Boards at Aircraft Systems and Manufacturing**

raise or lower boards by pressing a button to accommodate a wide range of operator heights. According to Schmidt, "This eliminated taller users having to stoop over boards set low and shorter users from reaching for boards set high. Each operator can easily adjust the frame to the height that is most comfortable for them."

The team viewed the change to the height adjustable workstations as an opportunity to reduce unnecessary movement and improve productivity while avoiding injuries and excess strain. Work-Related Mus-

culoskeletal Disorders (WMSDs) are injuries and disorders caused by lifting heavy items, bending, reaching overhead, pushing and pulling loads, working in awkward body postures and performing repetitive tasks. OSHA estimates WMSDs account for 34% of all lost workday injuries and illnesses annually. Each year employers report nearly 600,000 WMSDs requiring time away from work with a cost of over \$20 billion annually.

Prior to installing the stations, ASM technicians used door hinges mounted on the

top of the peg board frames to adjust the angle of the boards from about 5 to 15 degrees. The process was time-consuming and difficult so operators didn't always take the time to make the proper ergonomic adjustments. The new BOSTONtec stations tilt from 0° (horizontal) to 90° (vertical) utilizing either a manual pull-pin method or an electric option.

Tim McKenzie, ASM Manufacturing Technician adds, "Manipulating the boards is faster and easier now. We're working in much more comfortable positions and the stations hold our boards securely in place which has increased our wire processing accuracy."

The standard BOSTONtec workstation hold boards up to 48 inches deep by 96 inches wide. McKenzie also notes, "We wire harnesses ranging from 20 to 100 feet long. With multiple stations, we have the flexibility of setting two stations side-by-side for the longer jobs as needed."

"The decision to utilize the BOSTONtec stations as opposed to other options we explored was two-fold," explains Schmidt. "The units have the features that allow our operators to make adjustments quickly, and the design is simple so it was easy to make the change."

Scott Anderson is Marketing Manager for JANA Corporation, ASM's parent company. Anderson summarizes the investment as a positive one. "We improved productivity, increased wiring accuracy and just as importantly, improved the quality of work life for our operators."

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BOSTONtec is a member of the Wire Harness Manufacturer's Association (WHMA).

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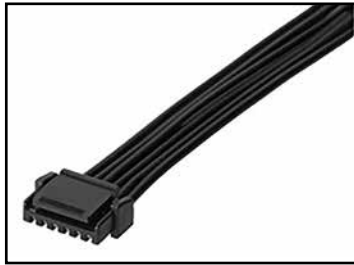
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## NEWS PLUGS



### Heilind Electronics Now Stocking Molex's Micro-Lock Plus Off-the-Shelf Discrete Wire Cable Assemblies

Micro-Lock Plus Off-the-Shelf Discrete Cable Assemblies are available in a variety of cable lengths and offer ready-to-use plug-and-play connections.



**Micro-Lock Plus**

Heilind Electronics, a leading global distributor of electronic components and authorized distributor for Molex, has expanded its selection of interconnect solutions with the company's Micro-Lock Plus off-the-shelf discrete wire cable assemblies. Featuring up to a 1.5 A current rating, these assemblies come in a variety of cable lengths and use a compact connector to support both prototyping and global production.

Prototyping cable assemblies requires tooling to crimp terminals, resulting in increased costs for compliance testing. Molex off-the-shelf standard cable as-

semblies help to reduce tooling start-up costs by providing a completed assembly that meets IPC (Institute for Printed Circuits) specification designs. The Micro-Lock Plus also provides a one-source solution that not only eliminates the need for customer drawings, but also the process of locating a supplier to build the assemblies.

A unique advantage of the Micro-Lock Plus is the pin-to-pin mapping from receptacle to PCB header; this facilitates ready-to-use plug-and-play connections. In addition, the 1.25 mm pitch form factor secures mating retention without sacrificing compactness. The Micro-Lock Plus family is a versatile connection option ideal for automotive and industrial settings, particularly in tight spaces and high temperatures.

Visit Heilind's website for more information about Molex Micro-Lock Plus Off-the-Shelf Discrete Cable Assemblies [www.heilind.com](http://www.heilind.com).

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### Cirris Releases New Software Updates

Cirris Systems is pleased to announce updates to three of our software programs including Cirris easy-wire Software, Cirris Server Software, and CTLWin. To download the newest versions of these software programs, contact your account manager and go to [cirris.com/products/software](http://cirris.com/products/software).

Cirris easy-wire software version 2018.1.0 comes after months of dedicated work from Cirris engineers. With over one hundred bug repairs and improved speeds, easy-wire is more productive and capable than ever. Users familiar with easy-wire will notice that database access times have been dramatically reduced. Other features in the software have been altered or removed to avoid confusion and improve user experience.

Improvements have been made to Cirris Server Software and CTLWin Software. Cirris Server Software enables users to share one database with many different test stations. CTLWin helps users manage test programs and script files on the 1100 series testers. Several bugs were repaired in both software programs. The newest versions have been released along with the latest version of easy-wire.



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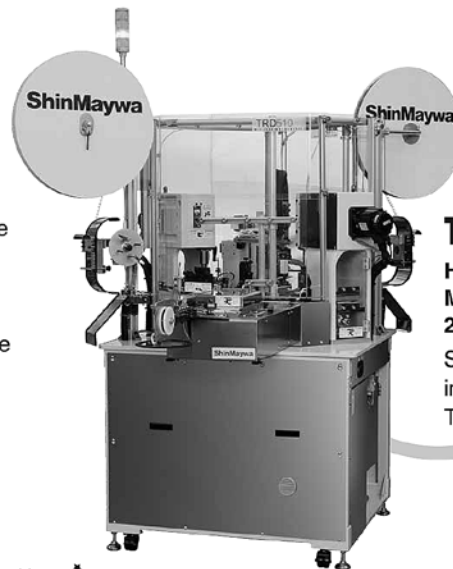
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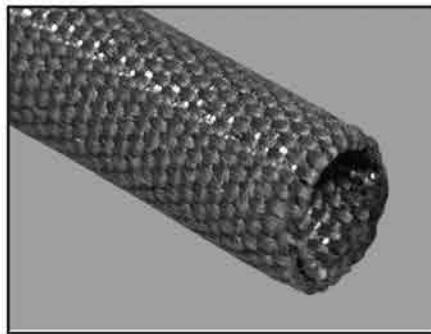
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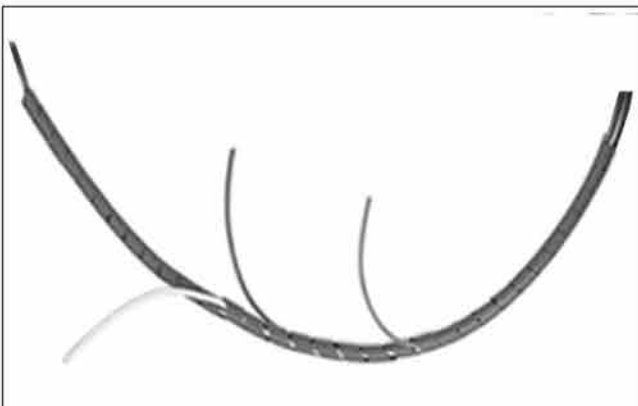
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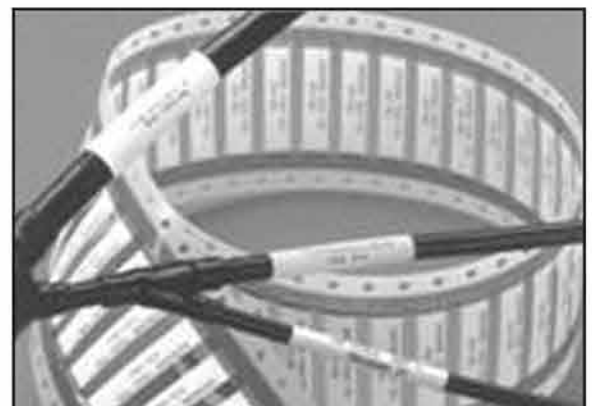
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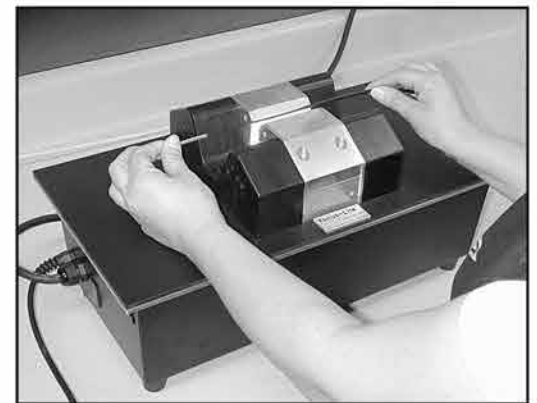
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# The Power Women of the Wire Harness Industry

*Spotlight on Monica Urena*

This edition of 'Power Women' features Monica Urena, an Industrial Engineer from Guaymas, Sonora, Mexico who is employed by St. Clair Technologies as a Sales Account Manager. Since completing her collegiate education at ITSON, Instituto Tecnológico de Guaymas, Monica has worked in one particular area of the wire harness business—the VIN-sequenced school bus segment. Within this segment, she originally started in Quality as a student, later hired as a permanent process engineer designing workstations, building first-piece samples, developing visual aids and work methods, and training operators.

After her term as a manufacturing engineer, she was moved to Program Management, where she was responsible for coordinating new launches and maintaining smoothly running operations for her bus customers. Her subsequent position was in Customer Service, where she was responsible for customer communication and ensuring accurate receipt of unique school bus order sets with a 4-week lead time from receipt of order to delivery on the customer's dock. She was also challenged to incorporate late customer drop-in requests in to an already-compressed build schedule. She and her team were additionally confronted with managing seasonal business, ensuring proficient operations during peak order months of Spring and Summer while minimizing employee inefficiencies during slower periods to ultimately maintain a competitive cost structure and exceed customer expectations.



Monica Urena

After a maternity leave, she returned to Program Management prior to being promoted to Commercial Account Management in 2017. In her 9 years with St. Clair Technologies, Monica is a power force who knows the custom school bus market from the commercial aspect through the manufacturing and engineering realms. During her tenure at St. Clair, her team was challenged to and responded by reducing customer lead times on harnesses that vary significantly with every sequenced download and are seldom the same configuration from one order to the next. For this reason, Monica is undoubtedly a "Power Woman" of the wire harness industry.

When I asked Monica about her



Melissa Femia

choice to pursue engineering in college, she advised that she first considered being a teacher while in high school. Through discussions with her grandfather and parents and because she liked and scored well in math, she decided to study engineering. As her grandfather was an agricultural engineer, she was exposed early to the field. Because her parents did not have a post-secondary education though, they strongly encouraged Monica to become an engineer and excel beyond their aspirations. Her parents were also aware of the increased industry in Guaymas and noted that many jobs would result from that growth.

In terms of her experiences as a female engineering student and engineer, Monica recalls that her classes at ITSON were comprised of approximately 70% males. However, she did not feel unwelcomed as a female. She had a similar experience in industry noting that she was regarded as highly as her male counterparts at St. Clair Technologies and also noted that there are several other female engineers with whom she works. She encourages other females to pursue engineering as she believes that there are many opportunities in the workplace, especially in Mexico. In terms of the wire harness industry specifically, she likes the industry because technologies continue to advance and each customer has its unique designs and processes, thus keeping her inspired. Thank you, Monica and St. Clair Technologies, for supporting the 'Power Women' WHN series.

Spotlight story written by Melissa A. Femia, President of Jana Diversity Solutions (J-Di). J-Di is a female-owned small business that manufactures wire harnesses and supplies warehousing & logistics as well as engineering services. If you would like to be spotlighted in a future edition of WHN or if you would like to recommend someone to be highlighted for the benefit of advancing females in engineering, please send the contact information to [melissa.femia@janadiversity.com](mailto:melissa.femia@janadiversity.com). Inspiring individuals working in or around the wire harness industry are encouraged to participate, but the requirement is that the female must possess an undergraduate degree in an engineering discipline since the premise of the series is to encourage females to pursue and persist in engineering along with work in a wire-harness related industry.


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# RPC Engineering

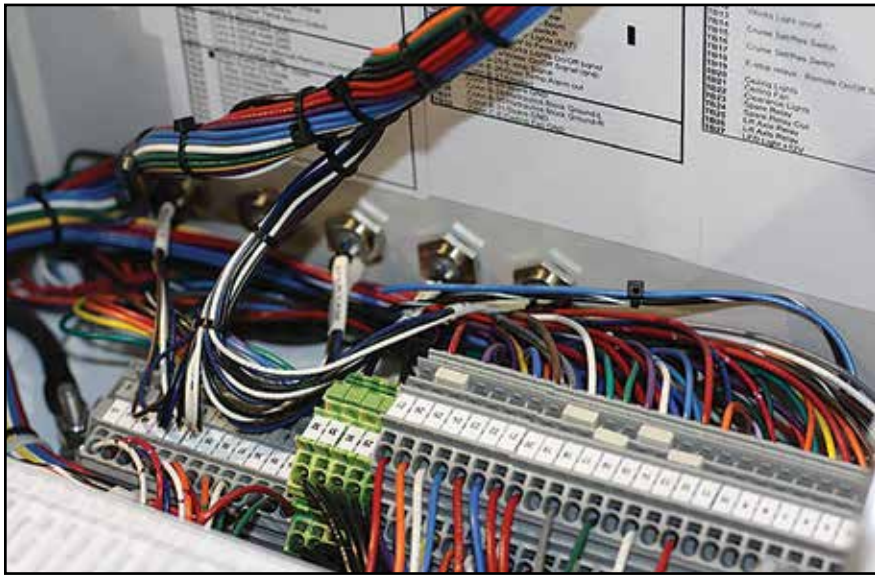
Continued from page 1

After just six months, Larry and his team were off and running. "It was just coming to a nice ripeness where the sales pipeline was full, production had started, and revenues were coming in," he said. Then he got the phone call. "The owner of the company told me that she had sold the company, and the new owners were no longer interested in the new strategy." Since she declared the new owners had no use for Larry or the employees, he picked up the pieces and started RPC Manufacturing. The business had humble beginnings, occupying only a small portion of a large warehouse that stored boats and travel trailers behind RPC's designated work area.


Larry and his early team chose a baptism-by-fire approach to the new venture. "When we started out, we felt like we needed some credibility, so we went after some of the more complex projects," he recalled. RPC did some ground support builds for NASA along with some harnesses to support satellites and the robotics industry. "We didn't have a reputation yet and we felt that going after complex and technical high reliability jobs would give us what we needed." It did, and the strategy worked out nicely.

That early model of very high mix, very low volume worked out well, but Larry felt that he could enhance

Continued on page 24




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# RPC Engineering

Continued from page 23 \_\_\_\_\_

his profitability by pursuing projects that were a bit higher in volume. As Brian described, “One of our early customers really took us from wire harnesses to panel/controller builds. The customer was in agricultural equipment, and business was booming for them.” These particular box builds were high in complexity with hundreds of wires per box. Volumes were up to 100 per box and the versions were expanding. “We became very efficient and effective at doing these larger run box builds,” he continued.

RPC progressed from the warehouse space into larger rented spaces until 2013 when they bought their own 11,000 sq. foot facility in Brookfield, CO. Today, they have 30 employees with a little over \$4 million in sales with about

70% coming from the mountain states. With a rather eclectic customer base, RPC does have a focus on the oil/gas, industrial goods, and medical industries. As the business grew, Larry’s youngest son Brian joined RPC in 2005, with his other son, Rob, joining the team a few years after.

The build standards at RPC are IPCA-620 for harnesses, A-630 for the panel builds, and A-610 for the printed circuit board assembly side. They are a UL certified shop with an ISO compliant quality system in place.

RPC has made several acquisitions of competing or complementary business including: Peak Contract Manufacturing (surface mount printed circuit board assembly), CVAS (cables and box builds), Quality Assembly and Manufacturing (through hole printed circuit board assembly house). The company continues to seek out acquisition possibilities.

### Uniqueness

When asked what makes RPC stand out, Larry mentioned their ability to focus equally on wire harnesses, circuit board assembly and complex box and panel builds. “Other companies with similar manufacturing abilities typically start producing printed circuit boards, then add wire assemblies or box builds as an add-on service available to their customers,” he explained. “We focus equally on all three production capabilities and we consider each to be a core competency with solid equipment and infrastructure to support each.” With design engineer Mats Jansson on board, RPC offers engineering assistance for all three pillars.

While RPCs’ technical abilities are first class, they are equally qualified to run the business with strong financial principals, and a solid understanding of cost structure. “This allows us to win more bids without sacrificing margins, and we believe that producing the most accurate bid is critical to our continued success,” Larry described. He then joked, “Does it sound like a CPA runs this company?”

Larry also cites the friendly approachable nature of RPC as part of their uniqueness. “As a family business, we feel our personal reputations and our business



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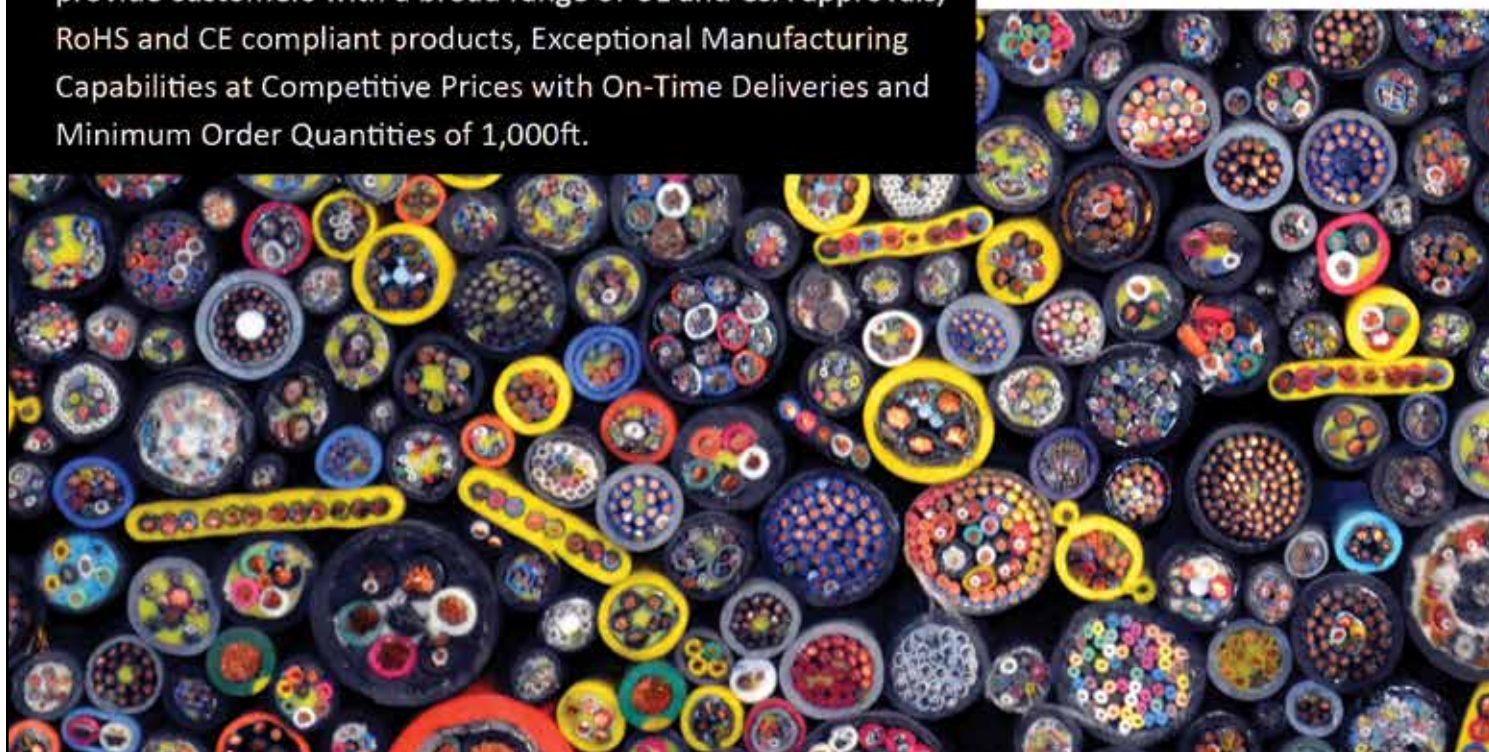
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reputation are directly tied together. We run our business with a high degree of ethics and a strong sense of fair play," he proudly mentioned.

#### Marketing at RPC

When discussing marketing, the importance of relationships was the predominant theme. RPC has a network of manufacturers reps with whom they have developed a great symbiosis. These firms also represent electronic component manufacturers. As they supply samples to engineers at various companies, they will often bring RPC in for the eventual assembly of new products. "Our feeling is that it's a losing proposition for us to think we are going to take business from our competition, and we don't really try to do that," Larry said. "We look for new projects and go after that work because we think that's a much more productive way to generate new business."

Vendor relations are another way RPC gains new business. "We work diligently to make sure our relationships with all of our key vendors are very solid," Larry acknowledged. It's been a win-win situation for them as he explained, "We take good care of them, pay them on time or early, and they tend to send us referrals."

It has been Rob's initiative to make sure RPC invests a fair amount on in-

ternet marketing and SEO. From time to time, they also run telemarketing campaigns to support the efforts of the manufacturer reps.

#### A Look to the Future

When asked about future plans, Larry was quick to mention increased automation as part of their evolving strategy. "This is really something Brian has taken on as an initiative within our company as we move towards automated processes and robotic assembly." He further explained, "It's tough because most high-volume work quickly goes off-shore, and trying to bring some of that back is like swimming upstream." He does feel, however, that by becoming more automated and reducing direct labor costs, a lot of that business will come back to US contract manufacturers. "At least lets hope," he pledged.

Brian capped off the conversation with some optimistic remarks. "In terms of the future, we are coming off our best year in 2017, and we feel we have a lot of momentum going into 2018." Both gentleman are also optimistic about where US manufacturing is going right now, and about their ability to help customers reach their goals. With 20 % growth year after year, its hard to imagine RPC will change its winning strategy.



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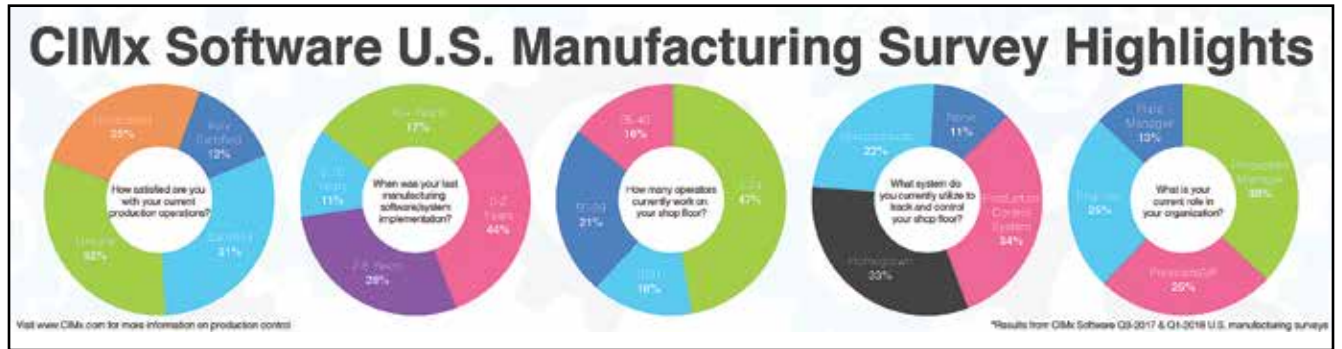
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# Manufacturers Who Are Meeting Production and Market Challenges Head-on

By David Oeters,  
Corporate Communications  
with CIMx Software

Wire and cable harness manufacturers strive to reduce production times while cutting costs and increasing quality. New regulations and stringent customer requirements push manufacturers to adapt to remain competitive. Paper-based processes and a front-office-based ERP for production control isn't a viable solution. "We were getting by," explained one production supervisor that reached out to CIMx for help. "But there were problems we didn't have a solution for... (no) records and no good way to track work. We had people just standing around the shop



because they were missing information or materials."

To overcome these challenges, companies are leveraging the agility, rapid implementation and process control found in Production Control Systems (PCS). These systems focus on the unique needs of production, managing the shop floor so the company can better run their business-at-large.

## Driving Production Velocity

PCS address many of the costly and error-prone processes in manufacturing. Process control and automation eliminate the mistakes and inefficiencies that occur when trying to manually manage production workflow. These agile solutions empower manufacturers to meet demands effectively and affordably.

With true production control, the

manufacturer can target and solve the root cause of problems. "Once we had actual data, we could make better decisions," said a floor supervisor. "It wasn't guesswork anymore; we knew where the problems were and what we had to do."

CIMx Software has worked with several Small- and Medium-sized Businesses (SMB) and wire harness companies that have already implemented a PCS like Quantum. Most report rapid, immediate benefits followed by sustainable process improvement, as well as increased efficiency and agility in meeting customer and production demands. A sample of reported benefits includes:

- A unified, flexible planning solution that allows engineers to rapidly create revision-controlled, visual work instructions while eliminating duplicate work. As best practices are integrated in the planning, variability is removed. The shop floor can better manage Customer Change Orders (CCO) and process changes.
- Process enforcement eliminates mistakes at every phase of work. Quality gates utilize digital controls for higher quality and lower scrap without sacrificing production.
- Real-time production status updates track work-in-progress (WIP). Leadership has the production data and status reports they need for informed decisions. Utilize the data to build a collaborative manufacturing environment for your team.

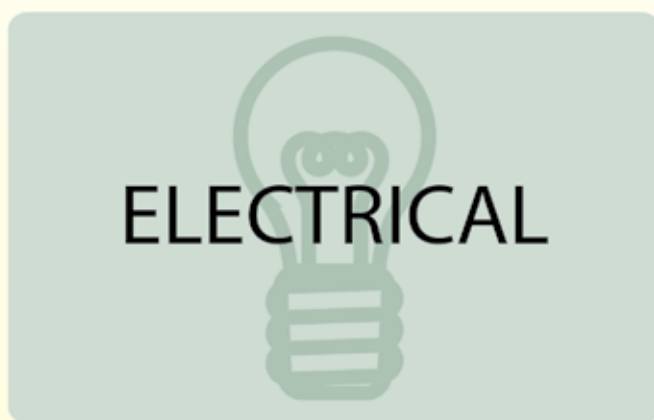
Place and resolve holds rapidly to maintain production velocity. Automate the quality and disposition process and rapidly get the team back to productive work while reducing scrap. Make your team more efficient and meet shipping deadlines while ensuring the highest quality.

The agility and power of Quantum PCS allows the manufacturer to rapidly roll out new product lines, add build value, utilize custom production reports, generate more accurate estimates and deliver shipments on time, every time.



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widely used in preventing flash ores and strikes. Because of their high shrink ratios, low shrink temperatures and flame resistance they have a wide acceptance. Thermosleeve-USA CDLT cold shrink tubing provides an alternative when applying heat shrink can be damaging.

- C)** Our RO material is used in electrical wiring harnesses and our CBHFT2000 material provides protection for metal pipes and fuel lines exposed to high temperatures and corrosion.
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adhesive lining are used in this industry because of their excellent protection against moisture/water in harsh environments.

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BY THE WAY, HERE ARE THE ANSWERS:  
 (C) Automotive (D) Energy (B) Electrical (A) Electronics  
 (E) Home Appliance  
 IF YOU GOT ALL OF THEM, THEN CONGRATULATIONS!

### Rapid Installation for Immediate Benefits

For companies concerned about implementation, the installation options for a PCS make it an ideal and low-cost fit for SMB businesses. "We don't have a dedicated IT staff so even starting the project was a concern. Would we even have the resources in place to make this work?" explained one project manager.

The rapid installation options alleviated their concerns:

- The core system is designed for SMB manufacturers, including wire and cable harness companies. There's no need for add-on modules that drive up costs and the project timeline. The system directly maps to your processes with options for further configuration. It's already in use on shop floors like yours across the country, with manufacturers benefiting every day.

- An intuitive UI (User Interface) adapts to your processes. At log-in, each user accesses only the information and functions needed to complete their work. Language options, certifications and accessibility settings allow the software to dynamically adjust the UI, increasing production velocity and drastically reducing training time for new employees.

- The dynamic planning capability enables companies to use their existing plans and material in Quantum, ensuring rapid roll out and user acceptance. Users work from plans they recognize. Over time, planning can be improved with quality gates, data collections, and visual work instructions - increasing benefit without delaying the project launch.

- With installation and support options, customers are in control, selecting the implementation plan

they want. A remote installation and support option can be accomplished in as little as a day, further lowering costs and freeing up your resources. An on-site application engineer and individualized training can be utilized if needed.


"Getting the system up and running was easier than we expected," explained another customer. "A lot of the work was done in the background so roll out and training was simple. The team was ready on day one and we started seeing benefits right out (of) the gate."

### Meeting Challenges Head-On

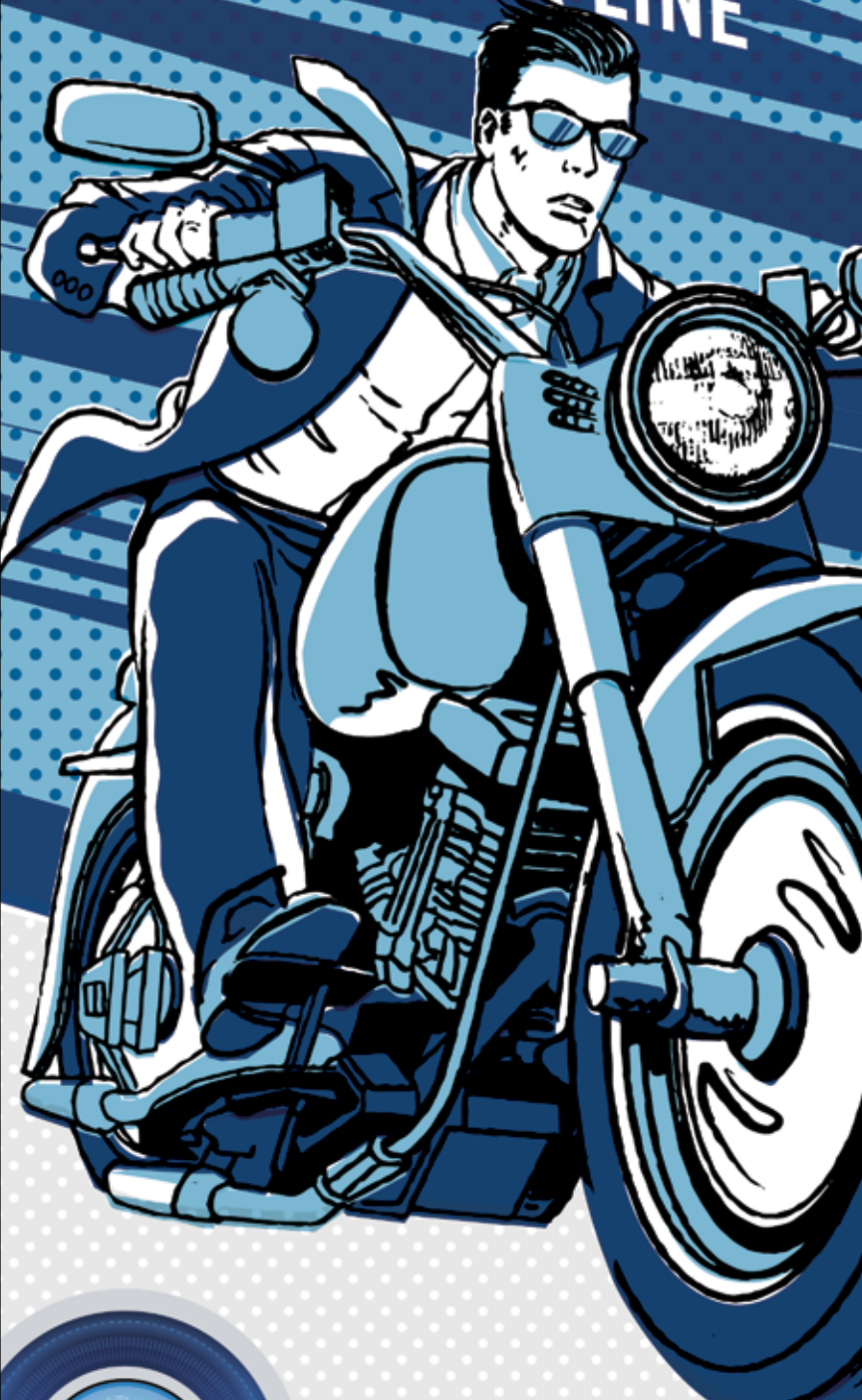
As manufacturers continue planning for a successful 2018, Production Control Systems are an option that address multiple challenges and provide an early ROI for your investment. Rather than hiring new workers or purchasing another machine, companies embracing PCS see an immediate positive impact. The long-term production benefits of the software make it the logical choice for investment.


"We don't see this as a replacement for our ERP," the project manager told us. "If anything it works with our other systems and gives us the production visibility we needed without messing with the business side our ERP was bought to handle in the first place."

If you'd like help in evaluating how a solution can benefit your company, and the ROI you should expect, CIMx can help. Reach out now and take advantage of our '18 Free in 2018' promotion and let CIMx prove its ease of implementation by covering the cost of installation. Want to learn more, and see what you can save? Visit us at [www.CIMx.com](http://www.CIMx.com) or contact us at [info@cimx.com](mailto:info@cimx.com).


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
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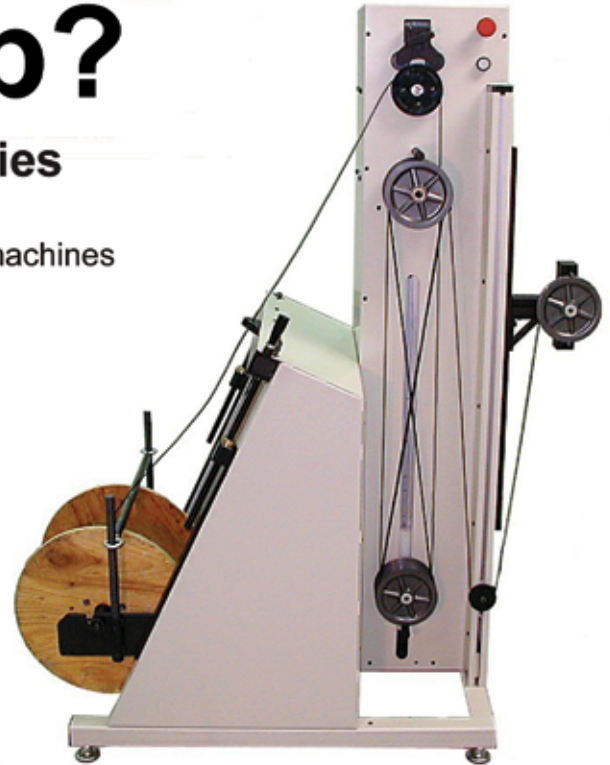
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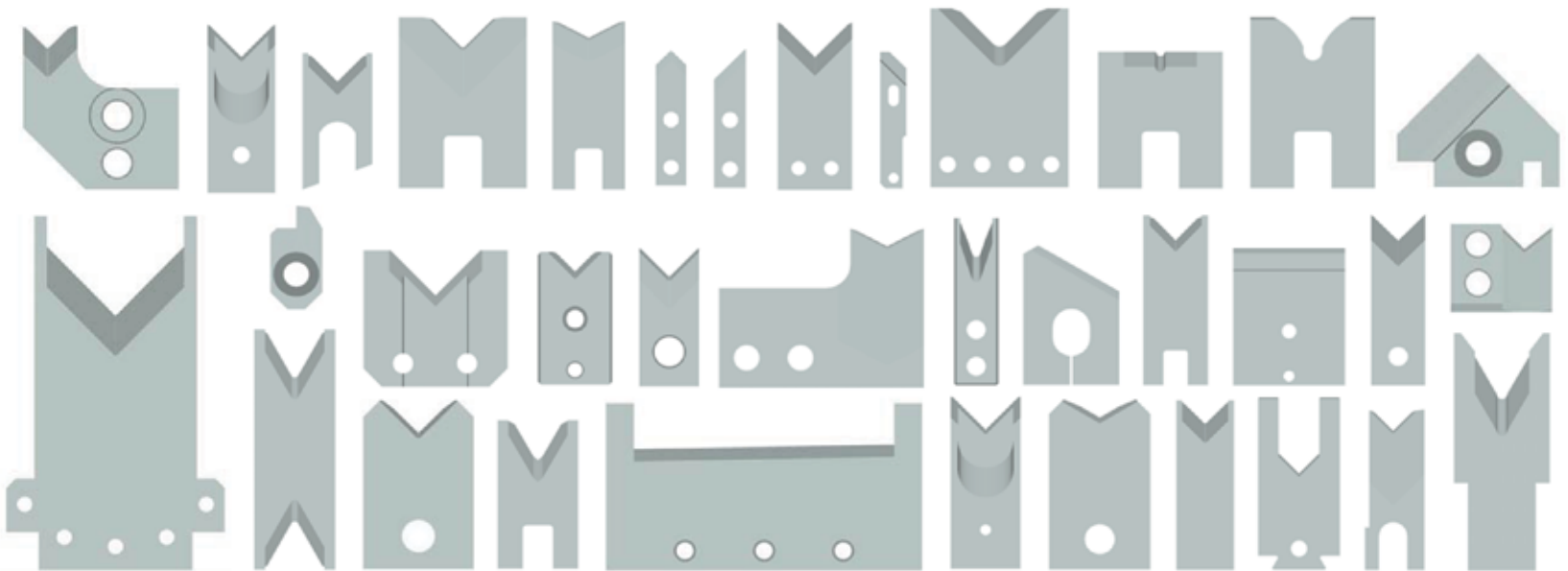
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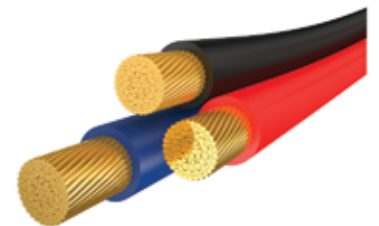
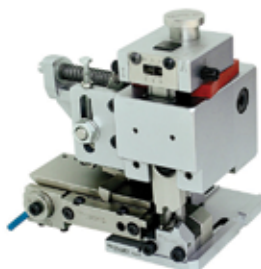
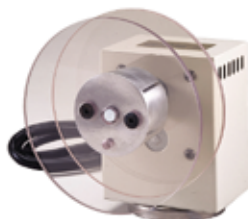
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## NEWS PLUGS continued



### CableEye® 64-Pin Header Isolator™

CAMI Research Inc. (Acton, MA) has released a new 64-pin Header Isolator™ for its CableEye automation-ready, cable and wire harness test systems.

Recommended when there is a need for repeat connection and disconnection of test fixture cables, it allows users to minimize bent pins and wear of the headers on the main unit, expansion modules, and free-standing QuickMount™ housings. The device may be used with any CableEye model and is rated to 500 Vdc/ac. Configuration

A leader in development of PC-based cable and wire harness, continuity, resistance and hipot test systems for over 20 years, CAMI offers the CableEye suite of products complete with accessories – including plug-in connector boards. The selection of these test fixture boards is constantly growing and is currently numbering over 60 – most of which are populated with families of connectors. When pre-populated boards are used, the tester GUI automatically displays a graphic of the connectors under test. The tester can be programmed to do the same for custom boards and fixtures. For wire/cable test interface connections only, this new device attaches to any tester header in the same quick and easy way as CAMI connector boards.

The CB25A solution (Item 755A, rated to 500 Vdc/ac), which attaches to headers only on the main unit or QuickMount housings, can be used with either wires/cables or CAMI connector boards. For higher test voltages (up to 1500 Vdc/1000 Vac) we offer Item 778A for base unit (i.e. top deck) and QuickMount headers and Item 778B for expansion module headers. Connector isolators are included in CableEye's standard, renewable one-year warranty of the tester for which they are purchased. Available immediately, the header isolator is sold as a set of two for \$38 (Item 868). Test fixture cables are not included. Contact sales@camiresearch.com or (978) 266-2655 for a quote.

The CB25A solution (Item 755A, rated to 500 Vdc/ac), which attaches to headers only on the main unit or QuickMount housings, can be used with either wires/cables or CAMI connector boards. For higher test voltages (up to 1500 Vdc/1000 Vac) we offer Item 778A for base unit (i.e. top deck) and QuickMount headers and Item 778B for expansion module headers. Connector isolators are included in CableEye's standard, renewable one-year warranty of the tester for which they are purchased. Available immediately, the header isolator is sold as a set of two for \$38 (Item 868). Test fixture cables are not included. Contact sales@camiresearch.com or (978) 266-2655 for a quote.



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# WIREwisdom™ ANIXTER

*In every issue of Wiring Harness News Anixter will bring you informative articles about wire and cable technology.*

## WHAT WIRE SIZE DO I NEED?

Choosing the right conductor size for a given application can be a daunting task. This Wire Wisdom will highlight critical considerations that influence the selection of a conductor size.

## ELECTRICAL CONSIDERATIONS

The dominant factor in determining a safe and efficient wire size is ampacity, the amount of current the wire can carry. The second most common consideration is voltage drop, or the amount of voltage reduced due to losses. For more information regarding these specific issues, see Wire and Cable Ampacity Ratings.

## WIRE SIZING CHECKLIST

### Ampacity-related considerations

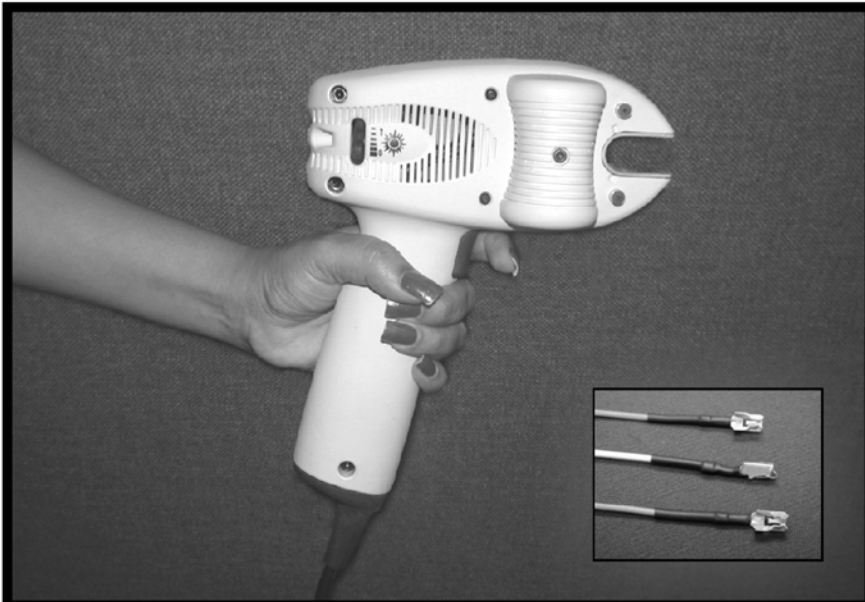
Current passing through a wire causes energy to be released in the form of heat due to resistance. Cable insulation only performs satisfactorily up to the upper temperature rating of a cable. Even if a cable had no insulation at all, the conductor would melt with excessive current or ambient temperatures (copper melts at 1,085°C). The following temperature factors can affect the maximum current:

- Temperature rating of wire or cable
- Short-circuit requirements
- Ambient operating temperature
- Installation environment
- Free airflow
- Thermal resistance of surroundings
- Adjacent current-carrying conductors
- Solar radiation
- Other sources of external heat (steam pipes, coils, etc.)
- Maximum expected current
- Temperature rating of termination

### Voltage-drop considerations

Because a real-world wire has resistance, the voltage at the load end of the circuit is not the same as the voltage at the source end. Consider the following when voltage drop becomes a factor when selecting wire size:

- Circuit length
- Required current of circuit
- Type of circuit (single-phase or three-phase)



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\*polyolefin, 5" length

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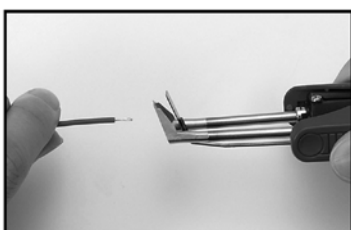
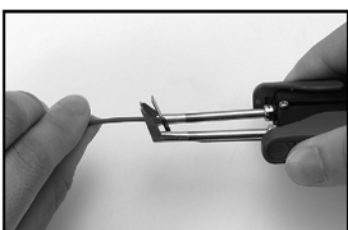
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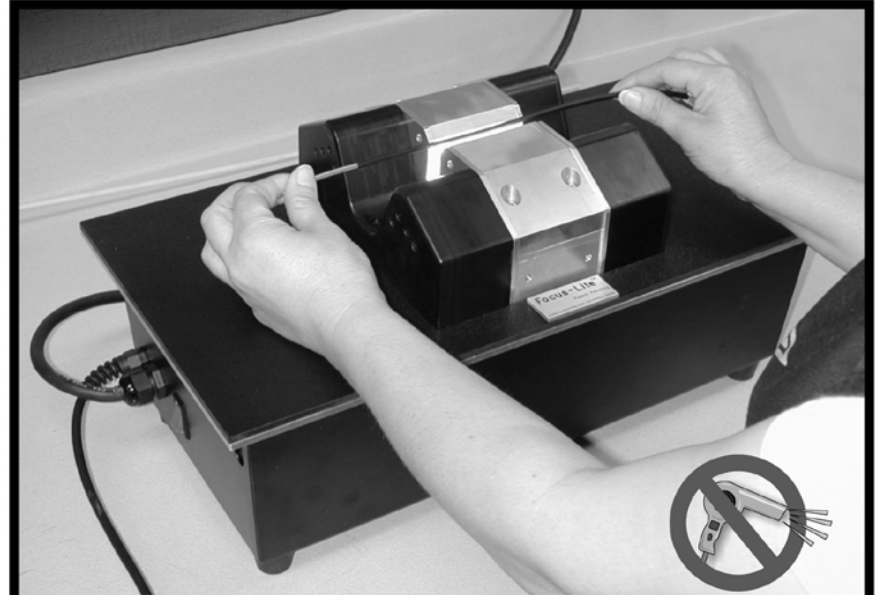
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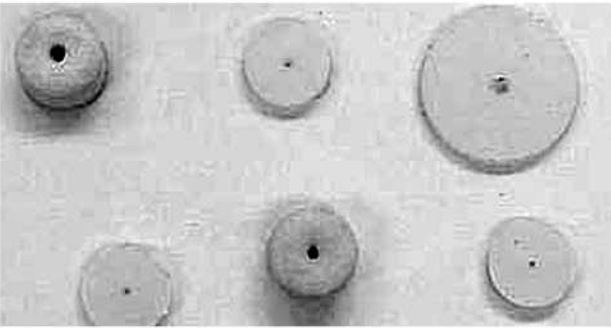
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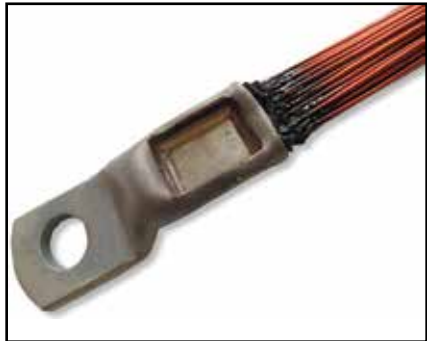
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## NEWS PLUGS continued



### Omni Cable Hires Chip Barrett as Director of Business Development

Omni Cable, headquartered in West Chester, PA, announces the hire of Chip Barrett as Director of Business Development.

"Since our business continues to evolve, Omni Cable realized there is a strong need for a full-time position to drive certain initiatives," said Greg Donato, Omni Cable COO. "I am excited to have Chip join the Omni Cable team, and I look forward to having him contribute to our future success," added Donato.

As Director of Business Development, Barrett's focus is the research and development of new products and expansion of existing products. "Omni Cable is a company that is uniquely positioned within the electrical distribution marketplace focused on delivering



**Chip Barrett,  
Director of Business  
Development, Omni Cable**

and expanding upon value-added services and products for both customers and supplier partners," said Barrett. "I had the pleasure of working closely with Omni Cable as a business partner early in my career, and I am excited for the opportunity to be a part of such a great organization," he added.

Barrett has over 20 years of industry experience in product management and business development.

Prior to Omni Cable, he spent 12 years with General Cable, with the last four years in Barcelona, Spain. Chip held several different roles while in Spain - Director of Product Management, VP of Supply Chain, and VP / General Manager of General Cable's Industrial, Construction, and Specialty Business Unit before returning to the states in 2017.

Barrett received his BS in marketing from Miami University, Ohio, and his MBA from the University of Dayton, Ohio.

Barrett can be reached at [cbarrett@omnicable.com](mailto:cbarrett@omnicable.com). For more information about Omni Cable, please visit [omnicable.com](http://omnicable.com).

### Molex Announces Grand Opening of Silicon Valley Technology Center

Koch Industries, has announced the official opening of a new technology center located in Fremont, California. The dedication ceremony, held on October 24, 2017, was attended by Molex employees, the Molex Board of Directors and global leadership team, and local and regional dignitaries.

"The new technology center will enable us to better serve our growing customer base and co-developers in the region, empower clos-

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**New Molex Silicon Valley Technology Center**

er collaboration, and provide important access to a leading center of investment and innovation," according to Martin Slark, chief executive officer, Molex.

Completion of the new building represents a significant investment by Molex to expand support for customers in the Silicon Valley. One of the largest San Francisco Bay area cities, Fremont boasts a vibrant backdrop and expanding area for technology innovators and industry leading companies.

"We extend an enthusiastic welcome to Molex and applaud the investments industry leaders are making in building the infrastructure and future of our city. Through the development of exciting technologies and collaborative initiatives they stand to make a positive and lasting impact regionally and beyond," said Fremont Mayor Lily Mei.

The technology center is one of the main innovation hubs for Molex Optical Solutions business and home to sales and customer development teams serving all of Molex customers in the region. Joining these groups are design and application development teams from many other technology businesses, enabling Molex to more rapidly provide solutions for a wide variety of platforms including data centers, telecommunications, and enterprise networks. The new technology center expands the scope and breadth of Molex design resources for Silicon Valley developers of medical devices, autonomous vehicles and other transportation technologies, as well as innovators in industrial automation.

In designing the Silicon Valley technology center, Molex sought to showcase modern technologies and collabora-

tion spaces designed to accelerate the development of solutions for customers.

The 108,000-sq. ft. building features over 50 miles of Molex Optical and Copper Cable Assembly Solutions, patch panels, adapter panels, modular office electronics and wire management tools. Advanced build-

ing capabilities include an intelligent, low-voltage Molex Transcend Network Connected Lighting System using a Power over Ethernet (PoE) LED lighting network to enable energy savings through sensor feedback.

Continued on page 48

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# The Role of the Blade in a Calibrated Wire Process

Continued from page 1

Calibration is understood essentially as the comparison of a result against a standard within a known and accepted value. As modern wire processing equipment has technologically evolved from its early years to present times, so has its calibration. Not only have the calibration standards evolved, so has the ability of the user to calibrate the equipment on-site. Early electro-mechanical machines were cam-and-lever based and were calibrated at the factory. They were difficult to re-calibrate in the field, especially as metal components became worn. Today's machines are built with advanced quasi-robotic

precise mechanisms based on light weight metals and other advanced materials. These work in combination with servo-motor based, computer controlled actions which not only reduce wear, but also allow software-based, user accessible calibration and re-calibration.

So, if we focus on the wire cutting and stripping procedure within the main process sequence, what should the role of the blades be in the calibration procedure?

Most users understand and recognize the role and importance of the terminal crimping tools as well as how to monitor and interpret the crimped terminal parameters after the process action. But not

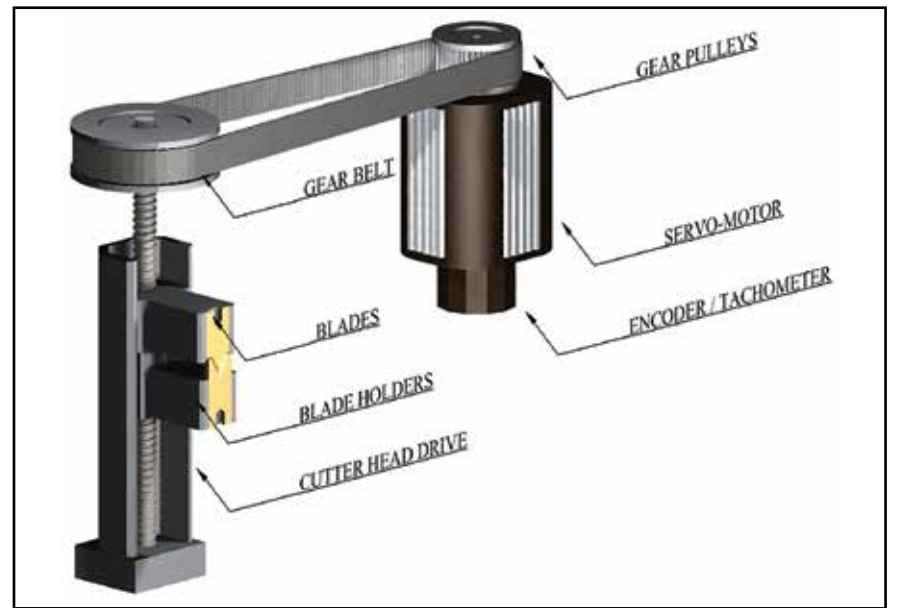


Figure 1. Servo-driven cutterhead components

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everyone fully understands or appreciates the contribution that a well-designed and manufactured blade has downstream in the success of the final crimping procedure. Maybe is the familiarity that we all have in using cutting blades in our daily life (knives, scissors, etc.) which prevents us in recognizing that the blade is as much as a precision tool as a crimping die is.

I would venture to say that the best way to appreciate the role of the blade in the process is to consider it as an extension, or better yet, a recurrently replaceable part of the cutter head mechanism. As such, it should intrinsically have dimensional and geometric parameters in line with the design and functionality of the mechanism itself.

Modern Servo-motor driven cutter heads take advantage of the extreme accuracy of movement made possible by the controlled rotation obtained by the closed-loop system between the servo-motor and the angular location feedback provided by the encoder. This system enables the cutter head motion to provide a displacement motion as precise as 0.001 linear millimeters. The tachometer system allows the regulation of rotating speeds. These capabilities in combination empower the user to fine tune the equipment for optimal performance. As

Continued on page 40



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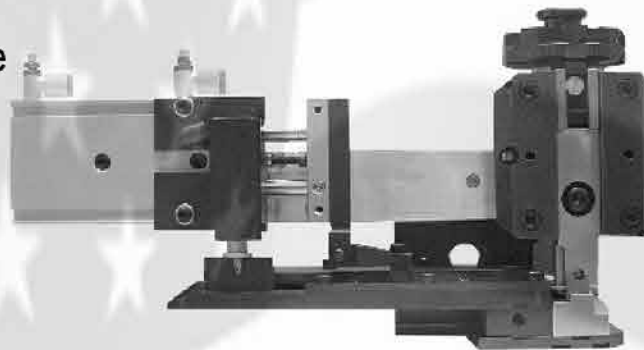


Model 1700

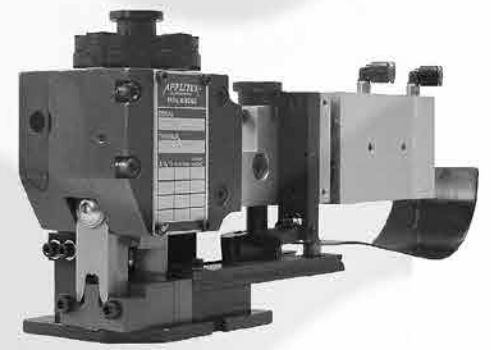


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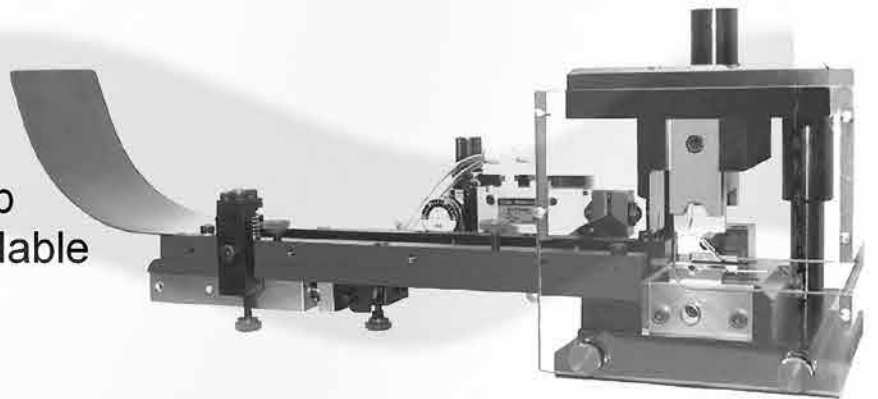


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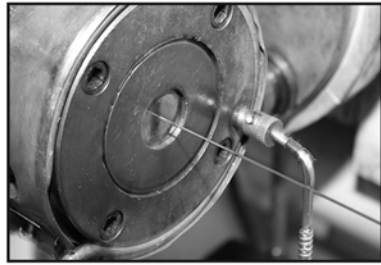


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# The Role of the Blade in a Calibrated Wire Process

Continued from page 38 \_\_\_\_\_ Co.)

you can see from the illustration on Figure 1, the blade holder unit is precisely aligned in all three axes and in order to maintain the cutter head's design functionality, any blade that is mounted on it should hold tolerance in all three axes as well.

To better understand this, let's consider an example of how a cutter head, as well as a capture and transfer swing arm and clamp, in a modern piece of equipment would be calibrated by a user in the field:

(Procedure examples for model Cr.01 courtesy of ARTOS Engineering

The machine's cutting action is performed via a servo-driven cutter head mechanism which controls the opening/closing sequence. The servo-drive movement is in turn regulated by an on-board encoder reading which translates (via software), into the relative linear vertical position of the cutter head, namely where in the "Y" axis the blade holder is located at any given point. At the same time, other servo-drives and encoder combos determine where the transfer swing arm and capture clamps are in space (Fig 2).

Continued from page 42



Figure 2. View of machine's servo cutterhead and swing arm.

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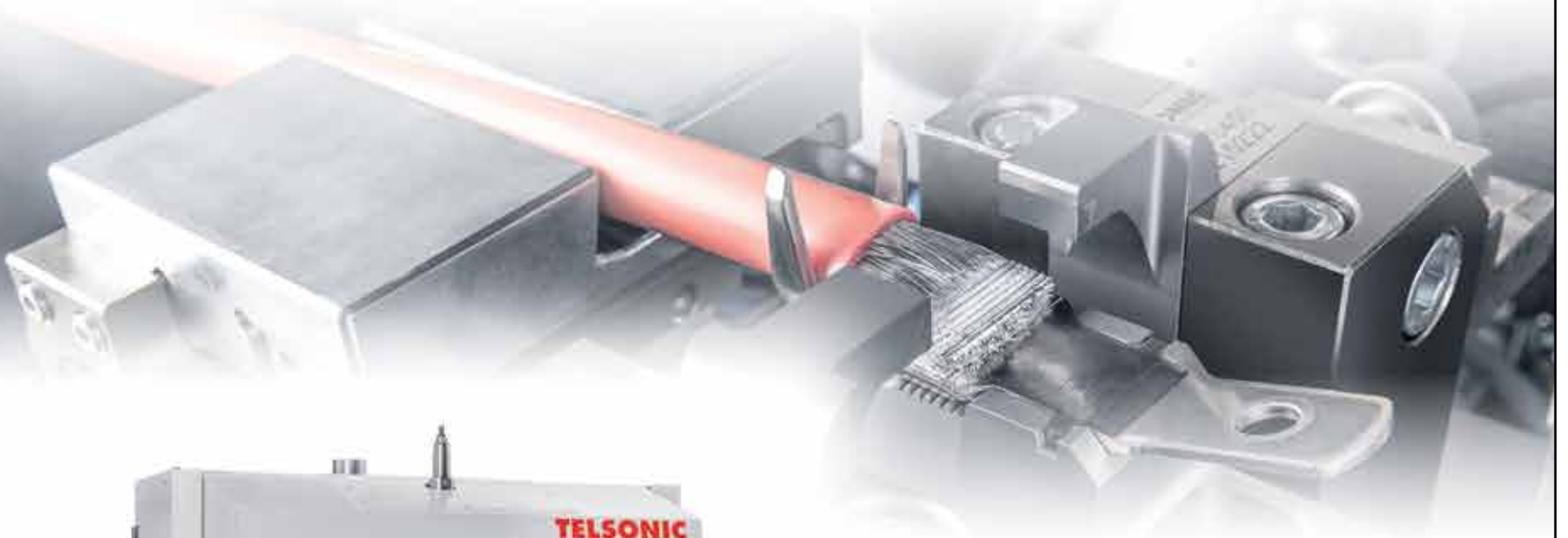




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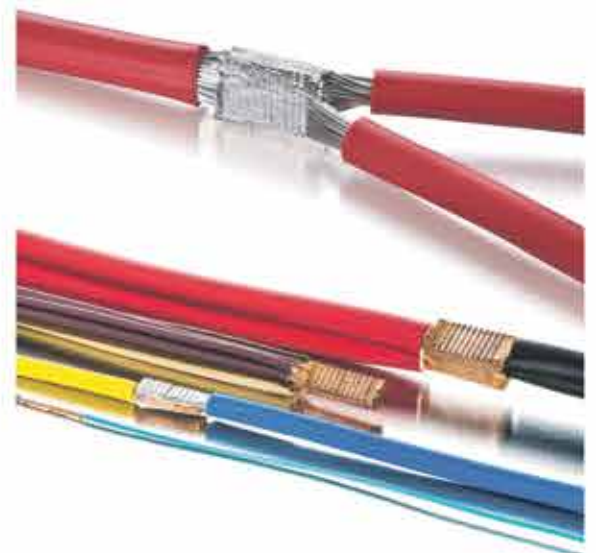
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# The Role of the Blade in a Calibrated Wire Process

Continued from page 38

Determining the relative position in space of the blade holder, the swing arm and the wire capture clamp is the calibration's fundamental basis. All we need now to complete

the calibration, is to provide the mechanisms reference or "standard" point in space (Figure 3).

Figure 4 indicates the first reference point with the cutterhead in the open position. This is the maximum open position and allows the wire to be

placed and positioned without any interference by the blades. This position can be fine-tuned to optimize the cycle time.

The second reference point with the cutterhead closed shown in Figure 5. This is also referred to as the zero-point, and it's the point where the strip blades edge vertexes just begin to bypass each other.

In the case of the ARTOS machine in the example, the cutter head reference point (or zero point) is where the bypassing blades have closed unto each other, and the vertexes of the blades are aligned in the same axes (blade edges at the vertex are just about to bypass each other). The swing arm position's reference point (zero point) is determined by an aligned position with a pre-determined closeness to the blade assembly. These two reference points are attainable by the use of ARTOS's master calibration reference fixture that comes with the equipment. Finally, the swing arm's rotational position is determined by its alignment to the crimp tool chamber as mounted on



Figure 3. View of master setup fixture installed in blade-holder area prior to zero-point calibration.

Continued on page 44

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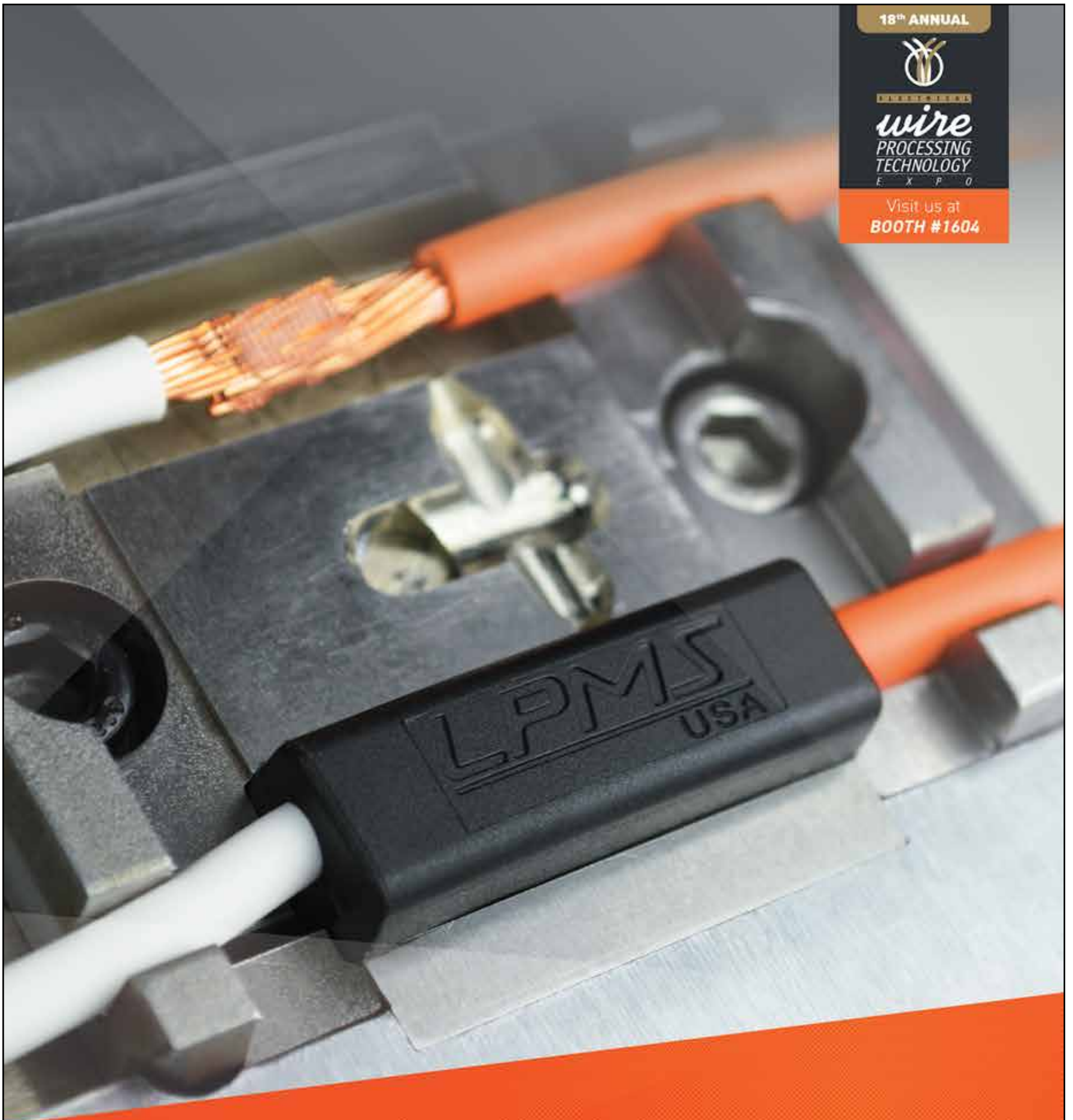
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# The Role of the Blade in a Calibrated Wire Process

Continued from page 42

the crimp die onto the press. This position is variable, since different tooling and die styles and geometries don't necessarily hold a constant position. Therefore, the operator must have the ability of reset this reference point as you substitute tooling and/or

crimp dies (Fig 6 and Fig 7).

Going back to the cutter head, the zero-point closure position becomes the standard reference point. The operator can then program any wire size (within the parameters of the equipment) at any time after the machine has been calibrated. Calibration itself should not be confused with setup. Re-calibration is performed only after

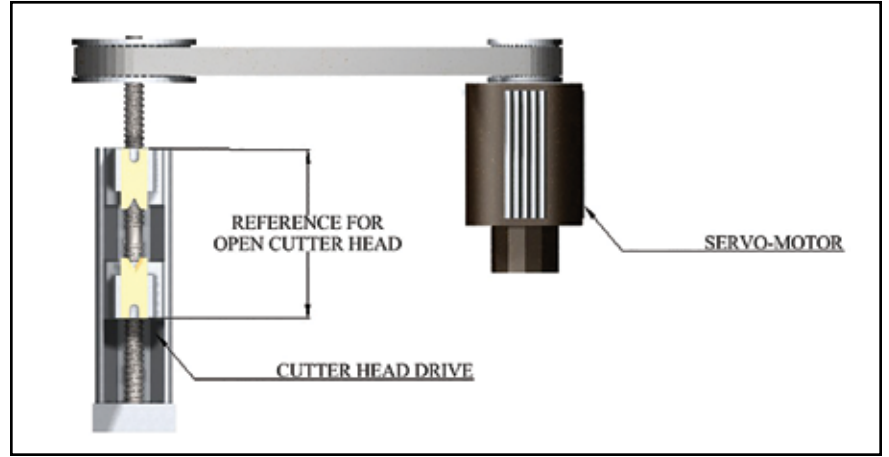


Figure 4. Servo head open.

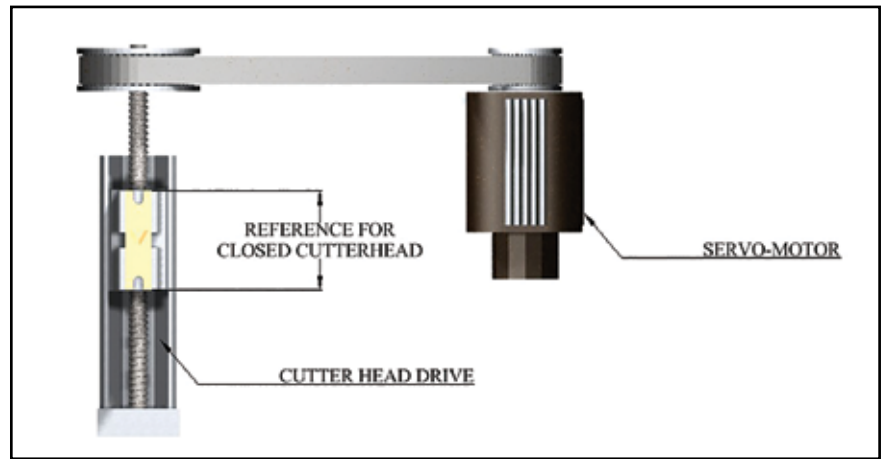


Figure 5. Servo head closed.

machine repairs or replacement of worn parts. Once you calibrate the machine, then you're done for an extended period.

As you can tell, the cutter head's zero-point calibration is set by the relative position on the by-pass of the blade. This, in turn, is calibrated not visually by looking at the point where blade's vertexes begin to by-

pass each other. Rather it is by the machine's master calibration fixture dimension itself. This procedure assumes that the blade sets mounted are dimensioned exactly to the cutter head's dimensional specifications. If not, the calibration setting would be invalidated by a faulty blade. This would be akin to expecting your car

Continued on page 53



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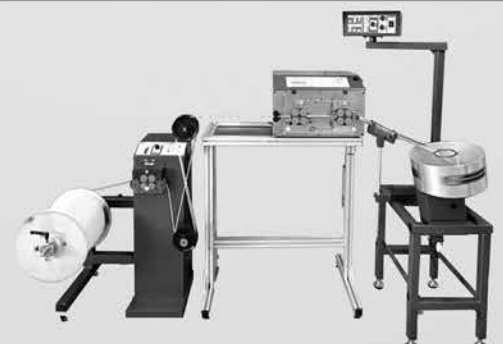
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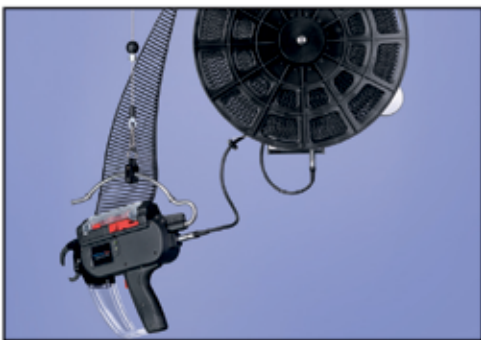




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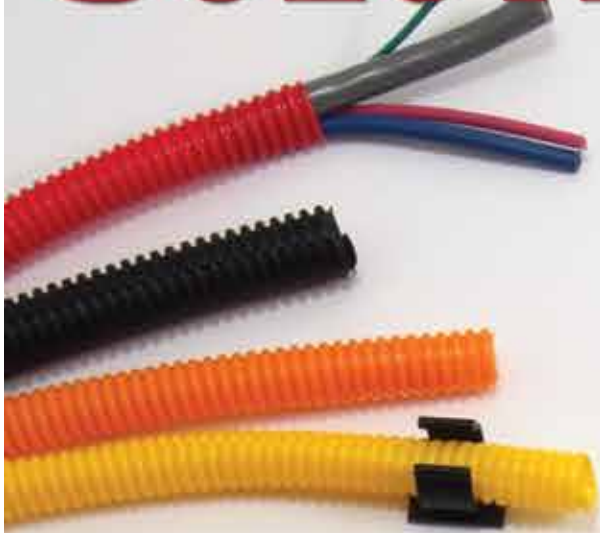
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**NEWS PLUGS** continued



**Indium Corporation Logistics Expert Shares Indium Metal Supply and Demand at 2017 Global Minor Metals Forum in China**

Indium Corporation's Donna Vareha-Walsh, Director, Metals Business Unit, shared insights into the global supply and demand for indium at the 2017 Global Minor Metals Forum on Nov. 29 in Chengdu Qinhuang, China.

Vareha-Walsh's presentation included an overview of the indium metal market, including detailed information on the international indium supply pattern, and analysis of supply and demand trends. In addition, she also outlined the basis for recent price fluctuation.

"While the price of indium fluctuates, this metal remains in abundant supply to meet current and future market demand globally," Vareha-Walsh explained. "In addition, recycled indium yields remain high with a large percentage of the indium-tin oxide (ITO) volume being recycled annually."

To learn more about the abundance of indium, visit [www.indium.com/indium-abundance](http://www.indium.com/indium-abundance). For more information on indium, high-purity indium, and indium alloys, visit [www.indium.com/indium](http://www.indium.com/indium).

Vareha-Walsh is responsible for sourcing of critical raw materials such as indium, gallium, germanium, tin, silver, and all products and services that support Indium Corporation's manufacturing operations. She is also responsible for the trading of metals and sales of reclaim services for Indium Corporation's Korean operation. She has more than 15 years of metals market experience, including Director of Global Procurement for a global premium alloy company, and Director of Metallurgical Op-



**Donna Vareha-Walsh**

erations and Procurement for a global tungsten-based business. She also has experience in finance as a Business Unit Controller, sales expertise as Director of Sales and New Business Development Manager, and participation in metals recycling and scrap/reclaim markets. Vareha-Walsh earned a bachelor's degree in finance from Duquesne University and an MBA from the University of Pittsburgh. She is a Certified Public Accountant (CPA), holds certificates in leadership development and manufacturing excellence, and has a Lean Six Sigma Green Belt.

Indium Corporation is a premier materials manufacturer and supplier to the global electronics, semiconductor, thin-film, and thermal management markets. Products include solders and fluxes; brazes; thermal interface materials; sputtering targets; indium, gallium, germanium, and tin metals and inorganic compounds; and NanoFoil®. Founded in 1934, the company has global technical support and factories located in China, Malaysia, Singapore, South Korea, the United Kingdom, and the USA.

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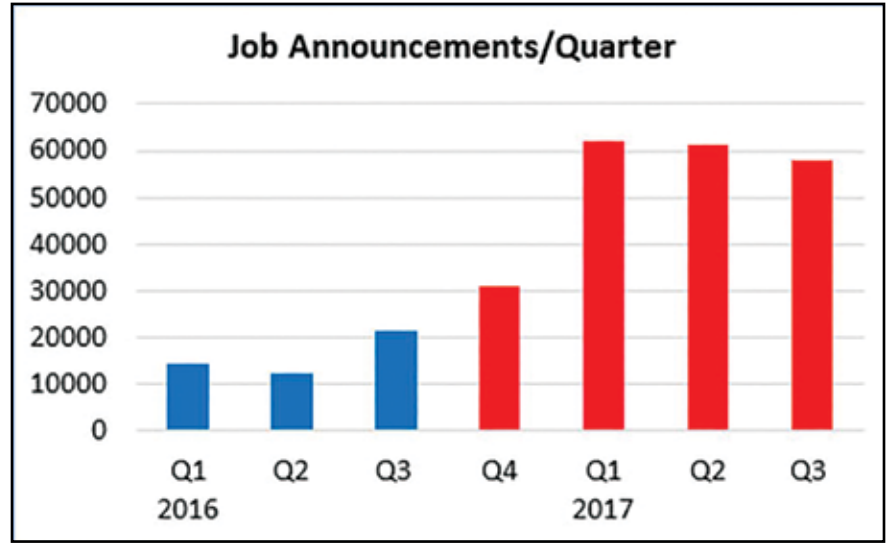


Continued from page 47

Molex also sourced high performance building products from other subsidiaries of its parent company, Koch Industries. These included over 100,000-sq. ft. of Guardian Glass and glazing, over 9,000 linear feet of interior Georgia-Pacific Gypsum wallboard, exterior Dens-Glas and a full range of facilities products including restroom and fitness center accessories, paper and tissue dispensers.

Slark concludes: "Our goal was to create a productive and inspiring space. By reflecting the rapidly changing way that talented people train, work and collaborate, together we can create more value for customers. The Molex technology center provides exceptional space and amenities that highlight what's possible—and connect people to that larger vision."

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**Fig.1 Data on reshoring and foreign direct investment (FDI) from the Reshoring Initiative Library.**

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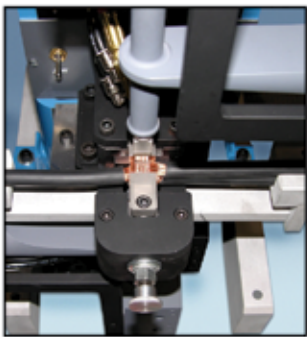
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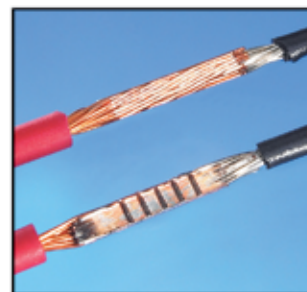


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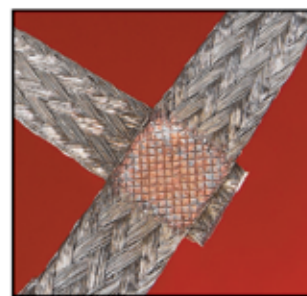


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**Reshoring and FDI Surging in 2017 From Reshoring Initiative**

The rate of jobs coming from offshore is up 200+% since the 2016 presidential election (Fig.1)

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Want to help? The Reshoring Initiative is seeking volunteers to help enter articles on cases of reshoring and FDI into our library/database. The resulting reported data is key to convincing more companies to reshore. If you are interested in helping, please email Millar Kelley for more details: [reshorenw@gmail.com](mailto:reshorenw@gmail.com). For more information on The Reshoring Initiative, visit [reshorenw.org](http://reshorenw.org).

See the classified ads pages 62-63



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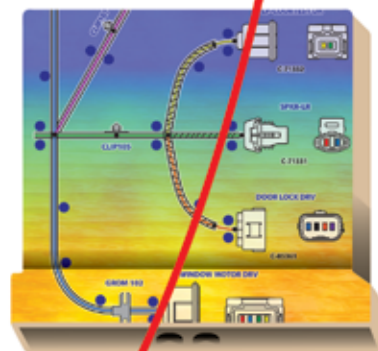
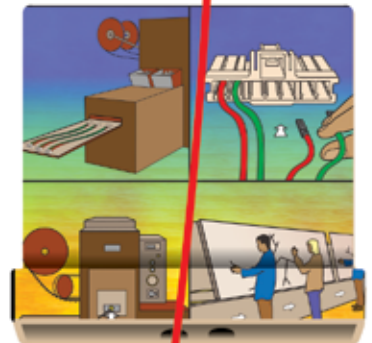
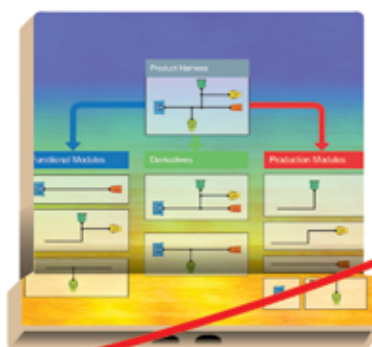
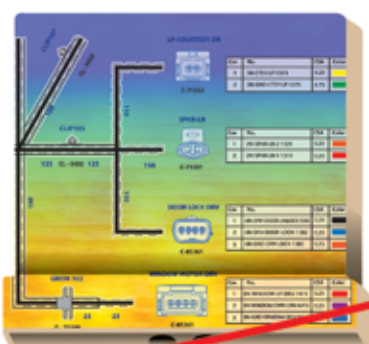
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## NEWS PLUGS continued


**Amtrak HQ Project Showcases Long-term Campus Network Connectivity Solution Utilizing Passive Optical LAN**

Passive Optical LANs are simpler, greener, long-term solution for enterprise bandwidth and wireless connectivity requirements.

Even before Amtrak began the renovation of the National Guard Building, which would become its new 82,000 sq. ft. headquarters in Washington DC, the national railroad was determined to create a state-of-the-art facility. Its goal was to create one of the most modern

and sophisticated telecommunications systems available today in order to meet its present and future telecommunications requirements.

Among the highest priorities was a converged network capable of providing high-bandwidth and wireless connectivity for up to 500 users housed throughout the four floors of newly remodeled office space. A fiber optic network was the obvious choice to achieve these requirements so Amtrak and its consulting engineers selected passive optical LAN due to its affordability, reliability, long life, and reduced power consumption.

Passive optical fiber networks (also known as PON, POL, GPON and OLAN) are widely recognized as a solution to eliminating data bottlenecks and to leverage a cabling infrastructure with unlimited bandwidth potential.



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They are also simpler, hence easier to configure and with a smaller footprint. In addition, they are capable of protecting high-security communications through advanced data encryption. Plus, they provide major cost savings over traditional networks, are easily expandable, and are greener with significantly fewer energy and cooling/ventilation requirements.

"GPON is transforming the Amtrak IT ecosystem into a highly resilient and scalable network aligned with future technology objectives," says Richard Thompson, Director of Network Engineering at Amtrak.

In order to undertake this project, Amtrak chose VT Group, a global systems integrator that undertakes contracts ranging from C5ISR afloat projects to fully integrated networks for commercial, hospitality, government, healthcare, and transportation clients, as its collaborating partner on the project.

"Amtrak already had some experience with passive optical networks at some of its passenger stations, including Chicago and Baltimore," explains Aaron Reale, RCDD and Director of Operations at VT Group, who designed the Optical Networks installed at those locations in recent years.

After reviewing all major manufacturers, Reale and his colleagues determined that OCC (Optical Cable Corporation), pioneers in fiber optic cable, could provide



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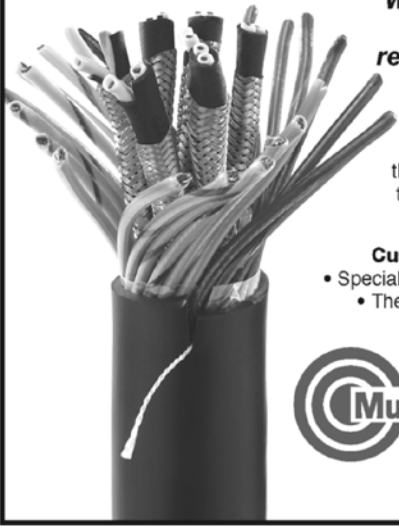


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## NEWS PLUGS continued



Continued from page 50

its newly released and UL listed Slimline Hybrid cable solution for the project within the strict timelines required.

The solution Reale recommended for the new facility was a GPON (Giga-bit-capable PON) fiber network, a high-speed version of basic PON that provides high-bandwidth in both directions (e.g. 2.48 GB/s of downstream and 1.24 GB/s upstream). GPON is a more robust form of increasingly popular PON networks (also known as POL, passive optical local area networks) that are composed of point-

to-multipoint fiber conducted through unpowered (passive) optical splitters.

"This GPON solution is truly cutting edge," Reale explains. "We use cable containing a single strand of single-mode fiber capable of providing hundreds of users' unlimited bandwidth. People often think that fiber optic cabling is fragile but it has a tensile strength almost three times that of traditional category 6 copper cable, and it's a fraction of the size and cost."

VT Group specified OCC's 'Bend Tolerant' single-mode fiber cable which has a 1" bend radius.

These passive networks enable enterprises to simultaneously converge multiple services such as data, VoIP (voice over internet protocol), video conferencing, building security, management services, and wireless devices – applications that are today chok-

ing many enterprises' copper- or Ethernet-based telecommunications capabilities. In addition, similar to optical services such as Verizon's FIOS, these networks can easily be expanded simply by adding nodes to a cable containing a single strand of fiber.

For GPON solutions, the use of single-mode fiber (rather than multi-mode) fiber optic cable ensures that these networks will be able to handle future requirements easily with an unprecedented 100+ terabits of data transmission capability.

"This is significant because many communications electronics have a cycle of approximately five years. Many communications devices require added bandwidth to handle increased traffic and applications," says Mike Long, LEED GA, and Sr. Network Consultant for OCC. "The single-mode fiber solution is considered "future-proof" because in many instances it is capable of handling added loads for decades to come."

Optical LAN technology is gaining significant market share in recent years. In addition to Amtrak, VT Group has deployed GPON connectivity to classified government projects, healthcare and corporate facilities, and at some of the largest resorts in North America.

"A few years ago, nobody even knew GPON was a viable option but now it makes up a significant portion of our business," Reale explains.

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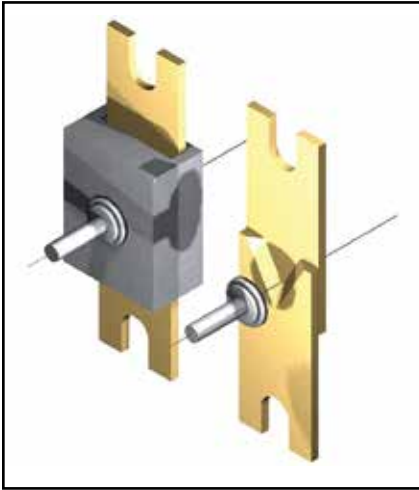
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Continued on page 55

# The Role of the Blade in a Calibrated Wire Process

Continued from page 44



**Figure 6. Point zero reference calibration for cutterhead gauge adjustments.**



to roll smoothly while installing one oversized tire after an alignment was performed (Fig 8 and Fig 9)

This brings up a question we get all the time from wire processing

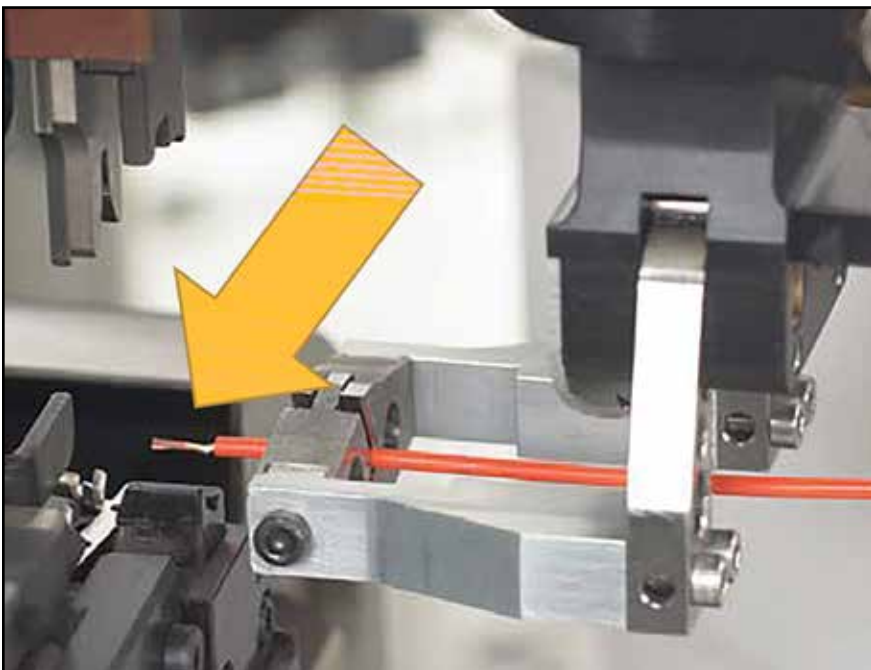
blade users: Can you re-sharpen the blades? The short answer is no, because sharpening the edges modifies the relative position where the blade vertexes by-pass and thus, negates the machine's calibration point. Subsequently the operator setup program is also invalidated.

In a wire processing blade, the dimension that turns it into an extension of the cutter head's zero-point calibration is what is generally known as the "shut height." The specific geometry is shown in Figure 10. Since the blade's edge is subject to wear and replacement, all the subsequent replacement blades should consistently hold this critical dimension. This way you are guaranteed that your calibration will always hold true and your process quality is maintained.

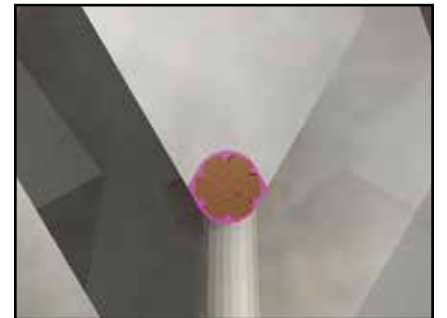
To illustrate the impact of the accuracy of new servo-driven, software controlled technology, the tolerance for this key dimension on blades has



**Figure 8. Depiction of a blade set which is not manufactured to calibration tolerance, the blade's relative opening to point zero calibration does not match the programmed gauge in the operator's setup screen menu.**



**Figure 7. Calibrating the swing arms position vs. the crimp chamber.**



**Figure 9. Showing a blade manufactured following the OEM's calibration parameters, notice how it opens to the exact dimension to strip the wire without damage to the core. The blade's physical opening matches the operator's gauge selection on his/her setup screen.**

become five times tighter than the ones used by much older equipment.

Continued on page 54

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**Because One Defective Wire Is One Too Many**

# The Role of the Blade in a Calibrated Wire Process

Continued from page 53

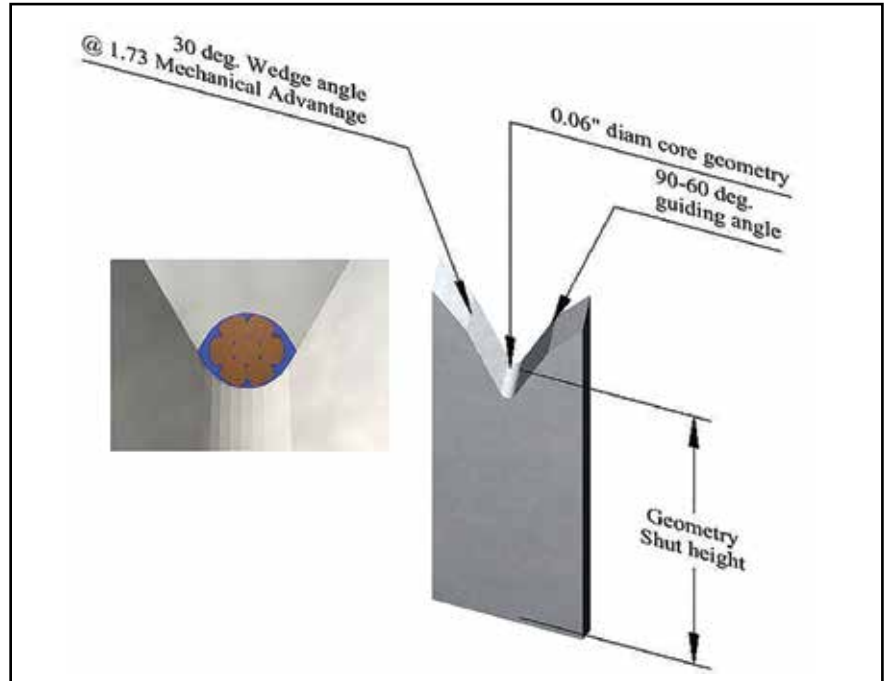


Figure 10. Examples of key dimensions for wire processing blades.

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Ruben Lozano is Vice President of Sales - Americas for Lakes Precision.

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**NEWS PLUGS** continued

Continued from page 52

**Power Challenges**

In the case of Amtrak HQ solution, maximum uptime and reliability were of paramount importance. Because of this, a hybrid fiber/copper infrastructure was the solution.

"Because Amtrak has operations at many historical sites, such as Baltimore's Penn Station and Washington Union Station, the company has too often experienced highly disruptive power outages. Our design eliminates this risk by consolidating all fiber and power cabling for all telecommunications to a single, protected space with fully redundant battery backup," says Reale.

While it is possible to incorporate copper wire into the same cable jacketing as the fiber, finding a manufacturer to supply the hybrid cable within a tight time frame can be an obstacle. In this case, the construction schedule was further tightened just before the cable was required to be installed. This put added pressure on VT Group to find a workable solution.

Reale found that none of Amtrak's traditional cable suppliers could meet the turnaround requirements. Having worked with OCC on many projects in the past, he contacted the company and found that they were flexible enough in their operations to ensure the materials could be manufactured prior to the official P.O. and could have everything arrive ahead of schedule.

"The turnaround requirement was our biggest challenge," Reale says. "OCC was able to do it; in fact, they delivered the cable about 10 days early allowing us to get ahead of the construction schedule."

The finished product is a single strand of bend-insensitive single-mode fiber that will provide unlimited bandwidth, plus two 18-gauge copper wires to carry electrical power to each work area outlet. The 18-gauge copper is slightly larger than today's requirement, but was designed so that no matter what happens in the future, the conductors will be able to handle it.

"If telecom technology keeps advancing at the rate it has, and we need to power something that exceeds the current Class 2 standard, this design will support it," Reale explains.

Because of the inherent drop in voltage that occurs over copper wire, Reale's team also incorporated digital electricity to enhance transmission performance. This emerging technology combines DC power and data into packets which are transmitted and received in a manner that is somewhat analogous to how informa-

tion packets are conveyed over networks.

"Digital electricity allows us to push power out to much longer distances without having to plan for the normal voltage drop – and without having massive copper wire size," says Reale. "We incorporate this technology into our designs when centralized power is a must and on projects when the facility's design doesn't support traditional cable lengths – such as rail stations, airports and sports venues."

**Saving valuable space**

While Amtrak's new headquarters are expansive, every inch of space has been accounted for operational use. One of the significant savings in using the passive optical network was gaining a considerable amount of space from what would have been utilized for telecommunications rooms.

"Traditionally with a four-floor space like this, we design eight 10x12-foot telecommunications closets, build out with racks, cabinets and other equipment," Reale explains. "Each closet requires a UPS battery backup, plus additional HVAC cooling because of the addition of concentrated heat within the space. Putting that all together in-

volves a lot of setup costs and a lot of recurring costs."

"Instead, just one telecommunications closet with two racks will support all the users; significantly reducing the footprint," Reale continues. "Real estate prices in Washington DC make this a very expensive space, so any additional square footage that we can give back for operational use is immense in the long term. So, rather than taking up 1,000 sq. ft. for telecommunications closets this system is taking up just 100 sq. ft. And the rest of the system utilizes much smaller pathways and light loads to distribute connectivity throughout the entire facility."

In order to eliminate the additional telecommunications rooms, VT Group designed and built customized Zone Enclosures which mount above the ceiling and act as infrastructure distribution nodes.

While GPON technology has been around for a few decades and used heavily by the large telecommunications carriers, many stakeholders are just

beginning to become familiarized with its benefits in an enterprise local area network.

"It has really only received meaningful attention recently," adds OCC's Long. "However, it is the right long-term solution for many of today's companies and more designers and users are seeing the ROI and other gains that can be realized by adopting it."

For information contact: Optical Cable Corp, 5290 Concourse Drive, Roanoke, VA, 24019; Phone: (800) 622-7711; Email: info@occfiber.com; Visit [www.occfiber.com](http://www.occfiber.com).

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# Best Practices in Crimp Applicator Maintenance

By Rob Boyd,  
Sr. Product Manager,  
Schleuniger Inc

A few years ago, I was asked to give a presentation at the Electrical Wire Processing Technology Expo on best practices for crimp applicator maintenance. At the time, I assumed that everyone knew how to maintain their crimp applicators. After all, one of the most significant factors in crimp quality is an applicator that is in good condition. With quality standards getting tighter and tighter and the implementation of crimp force

monitors continuing to rise, applicator maintenance is a key factor in any

crimp process. However, it's become clear that many companies neglect this key task or simply don't know what is needed. Therefore, I decided to put my presentation into an article.

In addition to Schleuniger's recommendations, I gathered feedback from other industry experts on crimping applicators such as TE, Panduit, Molex, Hanke, Applitek, and Mechtrix. The following is a culmination of the recommendations on how to best maintain crimping applicators to ensure high quality output and years of trouble-free performance.

## Basic cleaning

What is likely the most important thing about applicator maintenance is probably the simplest: keeping the

applicator clean and free from excessive dirt and terminal scraps. Applicators should be cleaned using a soft bristle brush and never with compressed air. Compressed air tends to blow particles into cracks and crevices where it shouldn't be.

Applicators should get a basic cleaning daily, or after every shift. They should get a thorough cleaning at least once a week or every 25,000 cycles.

A thorough cleaning would consist of completely disassembling the applicator so that dirt and metal scraps can be removed from the tool-



To prevent premature wear, take extra precaution by inspecting and properly installing the tooling when necessary.

ing, the slides, and the feed track. This is also a wonderful time to check the condition of the crimping dies and anvils to ensure that they are not damaged.

## Lubrication

Applicators should be lubricated once per day. Synthetic lubricants and greases such as Permatex (with PTFE), Superlube and Chevron Ultra Duty were commonly recommended. Synthetic motor oil such as SAE 20 or 30 was also recommended because it is relatively inexpensive and easy to purchase. A simple 3-in-1 oil is also commonly used.

A light coating of lubricant is all that is needed on any component that might see friction. Ensure the slides and tooling are thoroughly coated but don't put on too much. Too much grease tends to attract and hold dirt and debris which might work against you.

Finally, a **terminal oiler** is recommended for gold plated terminals. Because gold is so soft, it will rub off and start to coat the crimp tooling. Eventually, the buildup causes the terminals to stick excessively in the crimp tooling. A terminal oiler minimizes this buildup.

## Tooling setup

To prevent excess wear, tooling must be mounted properly. Therefore, when tooling must be replaced, take extra precautions to ensure that mounting surfaces are clean and in good condition. Crimp tooling must sit flush with the base plate and applicator ram. The upper tooling, or crimp dies, must be centered over the lower crimp anvil. A simple method to ensure that the upper tooling is centered is as follows:

1. Install the lower and upper tooling and hardware but do not

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completely tighten the screws.

2. Gently install the applicator ram ensuring the upper tooling does not contact the lower tooling.

3. Lay a **thin strip of paper** over the lower crimp anvil.

4. Gently but firmly push the upper tooling down over the anvil. While keeping downward pressure on the ram, tighten the screws to secure the upper and lower tooling.

Once you are sure that the tooling is installed properly, ensure that the terminal feed adjustment provides accurate terminal placement. This applies for pneumatic, mechanical, or motorized feeds. However, when working with a mechanical feed applicator, consider the press it will go into. Depending on the quality of the terminal brake, the feed adjustment might differ between a slower press, such as an older bench press, or faster presses, which are common on automatic machines.

**Prevent tooling crashes**

Most applicators are shipped with **ram collars**. The ram collars (red piece shown in the photo) prevent collisions between the upper and lower tooling when the applicator is not installed in a press. Such collisions may damage the tooling prematurely. Signs of tooling damage may be:

1. Scarring or marking inside the upper crimp die. This might also appear as consistent marking on the crimped terminal.

2. Rounded edges on the crimp anvil. This might reveal itself with excessive flash or burrs on the terminal.

Whenever an applicator is installed into a press, it is recommended to either hand-cycle or cycle the

press in jog mode two or three times to ensure the tooling closes properly without collisions.

Presses should be checked regularly to confirm that they are set for the proper shut height. For most mini-style applicators, the standard shut height is 135.78mm ± 0.02 or 5.345" ± 0.0008. If the shut height on one press is set too low, this may cause the tooling to crash. Furthermore, when presses are properly adjusted for shut height, consistent results can be expected when applicators are moved between presses. Shut heights can be confirmed using simple shut height gauges or with press analyzers which are readily available on the market.

**Preventative maintenance**

All machinery, including crimp applicators, should have a detailed preventive maintenance plan outlining service intervals and required steps. The plan should be well documented and key personnel should be thoroughly trained to ensure it is properly carried out.

Sometimes applicators must be taken out of use and stored for a long time. Prior to long term storage, make sure the applicator is well cleaned, lubricated and wrapped in plastic to prevent rust. This will ensure that it will be in good condition if it is needed again in the future.

**Training**

A thorough training program can save costs and increase efficiency. Operators and technicians should be trained on crimp quality indicators and other indicators surrounding basic applicator operation such as setup and handling. They should also

be trained on cleaning and the preventative maintenance procedure. Catching defects or seeing indicators early will minimize scrap and perhaps tooling damage and thereby minimize tooling costs.

Properly maintained applicators will not only save unwanted downtime and headaches, but they will also ensure better crimp quality. Hopefully these recommendations will help keep your applicators functioning at peak performance for years to come.



Tooling collision can be avoided by regularly checking presses for proper shut height and using ram collars when applicators are not in use.

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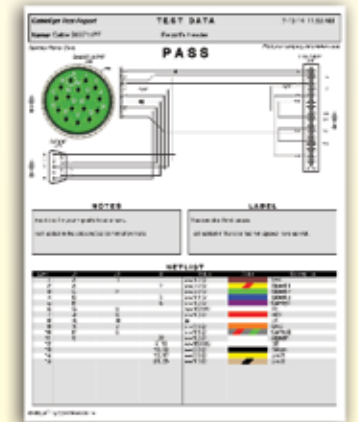
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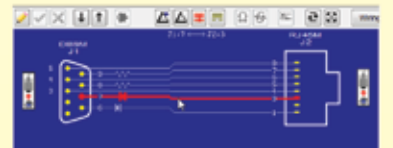


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3	4	5	≅ 100 Ω	-13.3% / 28.3%	Blue	Ground
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# Wire Harnessing in the 21st Century

By Brett Dibble  
Wire Harness Applications  
Solution Engineer for  
Tesa Tape, Inc.

With less available space in the engine compartment, harness routing poses a significant challenge.

Although most cars and trucks on the road today still run on fuel, elec-

tronic signals have become the life-blood of a modern vehicle. The wire harness in a modern vehicle doesn't just illuminate lights or lower the windows; it also moves millions of bits of information on temperature, pressure, voltage, acceleration, braking, yaw and roll of the vehicle, steering angle, and many other signals. Given how essential this assembly of electrical cables has become to the



Heat Source Temperature	Distance (Heat Source - Sleeve)	Bare Surface	Shielded Surface	Thermal Effectiveness
350°C	25mm	140°C	80°C	60%
450°C	25mm	190°C	100°C	90%
550°C	25mm	240°C	120°C	120%

performance, safety, and reliability of the cars we drive, wire harnessing has become a major design and engineering challenge for automotive OEMs and their tier suppliers.

**Smaller spaces, hotter temperatures.**

They say there's no replacement for displacement, but car-makers continue to prove that assertion wrong. Auto engineers are squeezing power and performance from smaller and smaller engines to meet tightening emissions and Corporate Average Fuel Economy (CAFE) standards. U.S. fuel efficiency standards will nearly double by 2025 under proposed regulations, and while the targets could change under a midterm review, the industry has had to proceed as if corporate fleets must average 54.5 M.P.G. in a decade from now.

There seems to be no limit to the power coming out of ever-smaller engines, and as automakers continue to develop new engines, transmissions, materials, and technology, the available space in the engine bay continues to shrink - leaving less space for heat to dissipate. This means that a vehicle's wire harness, which has become more complicated, has less space through which to be routed. As a result, the harness now comes in closer contact with higher temperatures and hotter engine

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# Nashville Host to WAI Operations Summit & Wire Expo 2018

The Wire Association International (WAI), Inc. returns to Nashville, Tennessee, for its biennial Operations Summit & Wire Expo, which will be held in conjunction with its 88th annual convention. All of the events are hosted at the Gaylord Opryland Resort &

Convention Center. The Summit runs May 14-16; exhibits are open May 15-16, 2018.

#### KEYNOTE SPEAKER

Curt Cronin, keynote speaker, and former Navy SEAL, is living proof that with the proper preparation and for-

titude anything is possible.

His presentation entitled, "Tapping into Your Potential: Attempting the Absurd and Achieving the Impossible," sets the tone for the convention and is open to all registrants.

#### EXHIBITS

As of press time nearly 80% of the available booth space has been sold; 125 exhibiting companies will occupy 150 stands. Displays cover more than 80 product types including wire and cable making machinery, supplies and ancillary equipment, and industry services. Wire Expo exhibits are open in The Ryman Convention Hall from 10:00 a.m. to 5:00 p.m. and 10:00 a.m. to 3:00 p.m. on May 15 and May 16, respectively.

#### ADDITIONAL HIGHLIGHTS

Production Solutions demonstrations, a popular staple in the exhibit hall, are scheduled on Wednesday, May 15. WAI members are invited to attend the WAI Rewards Breakfast and Annual Meeting, also on Wednesday. A post-show plant tour of the Nissan Motor Company's assembly plant in Smyrna, Tennessee, is planned on Thursday, May 17.

All event information and registration details are available at: [www.wireexpo18.com](http://www.wireexpo18.com).

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The Wire Association International, Inc., founded in 1930, is a worldwide technical society for wire and cable industry professionals dedicated to the promotion, collection, and dissemination of technical, manufacturing, and general business information and trends in the industry. Throughout the year, WAI organizes events such as Interwire and the WAI Operations Summit & Wire Expo trade shows, technical workshops and symposiums, the online Industry Search, and annual International Technical Conference.

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**NEWS PLUGS** continued**Fastest On-the-Fly Fiber Laser Marking to Date**

Cajo Technologies, manufacturer of highly advanced laser marking systems, has pioneered new levels of speed and precision for on-the-fly laser marking. Recent projects with cable, wire harnesses, aluminum extrusion, and pipe manufacturers inspired Cajo Technologies' team to push boundaries with both the range of materials that can be laser marked and the speeds at which they can be marked precisely – all while the workpiece is in motion on a production line. Many of these customers are replacing ink-jet systems.

Examples include a steel cable processor who needed their cables marked to prevent use counterfeit parts – critical in cases involving high-tolerance weight-bearing cables that, if unable to perform to the original suppliers' specs, could be extremely hazardous. This customer needed permanent, unique laser marking at a speed to match their production process. The Cajo Technologies team was able to meet their needs with a 100W fiber laser – allowing speeds of 200 meters/minute (656 feet/min). An incredible feat with the stability to be used in a rigorous production environment.

Another satisfied Cajo Technologies customer is a producer of wire harnesses for automotive engines with factory locations throughout Europe. They had found that over the course of their inkjet machine lifetimes, additives, downtime, were costing them much more than initially calculated – some machines' replacement parts, additives and service costing up to \$93K over 10 years. And this doesn't even acknowledge that the markings would wear off after some years. When they found that Cajo Technologies lasers could permanently mark polymer cable jackets at high speeds, with no additives, on-the-fly – up to 6m/sec (over 1000ft/min) on PE and PVC cables – they were convinced that Cajo Technologies laser marking systems were a perfect replacement for their aging ink jet systems.

Other successful projects involving high-speed, on-the-fly markings on aluminum

extrusions, PE pipes, and metal pipes have allowed customers to achieve the high-quality brand and traceability markings – all while maintaining or increasing production speed, with a clean, additive free, low-maintenance

**Sample PE Cable - Laser Marked vs Ink Jet**

marking solution. Contact us to find out more. Send material samples for laser marking solutions to: Cajo Technologies Inc. 1521 Washington Ave., New Orleans, LA 70130. Contact Ismo Rantala, President at (212) 810-0401 or ismo@cajotechnologies.com

Cajo Technologies produces innovative laser marking solutions for all industrial and branding purposes that can be easily integrated in factory production lines or one-off use. These laser marking systems are widely used in the metal, plastics, cable and cable harness, and the medical equipment industries. Cajo's laser marking solutions create precise and permanent component traceability, identification, and brand markings including 2D markings such as QR codes, bar codes, and data matrices with no product maintenance needed. In addition, the patented technology creates bright, repeatable colors on stainless steel, titanium, and chrome with no additives or pigments needed. [www.cajotechnologies.com](http://www.cajotechnologies.com)



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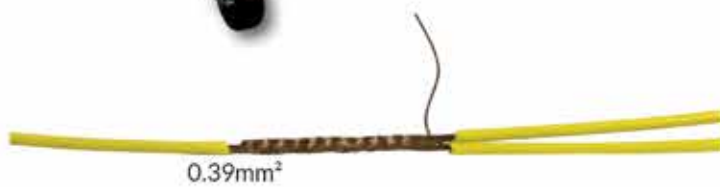


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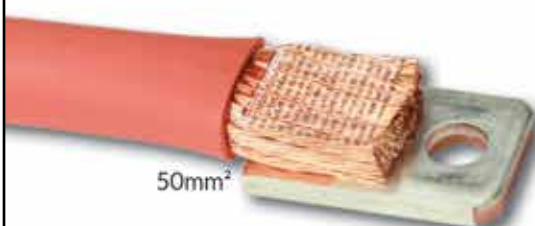
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0.39mm<sup>2</sup>

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A. \_\_\_\_\_

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A. \_\_\_\_\_

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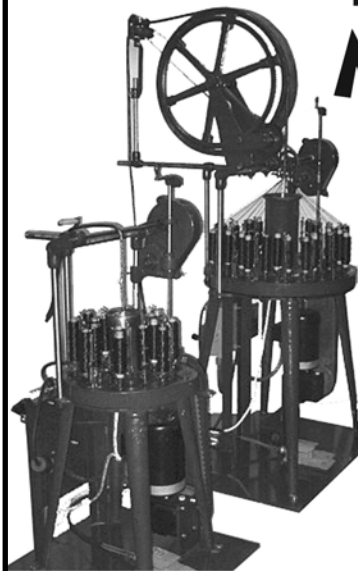
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