

## This Issue Features:

- Deal Killers
- Meeting Mr. Williams
- Moving Tests Upstream
- 15th Annual Electrical Wire Processing Expo
- Wire Wisdom - Thermocouple and RTD Wire
- Cable and Harness Manufacturing: Productivity through Flexibility



# Segue Manufacturing Services

By Fred Noer

Probably no better name could have been chosen for Segue Manufacturing Services.

The contract manufacturer embodies the definition of segue by having the ability to move without pause from one goal, order, project or process to another. The company has a broad spectrum of abundant resources to facilitate each movement.

The word Services in the name could be regarded as equally important, since the focus at Segue is on the services it

offers its customers. By partnering with Segue, they, too, are able to move fluidly toward meeting whatever goals they may have.

Segue is headquartered in Lowell, Mass., a city of approximately 109,000 residents 30 miles northwest of Boston. The firm does high-mix, low-volume manufacturing of harnesses, cables, control panels, power-distribution boxes and electromechanical assemblies. Potting, overmolding and CNC machining also are done.

The company has a second facility in Xiamen, China, a city of approximately 3.6 million people on the southeastern coast of China. Segue Asia, as the plant is

## 15th Annual Electrical Wire Processing Technology Expo

Save the date for the 15th Annual Electrical Wire Processing Technology Expo, to be held on Wednesday, May 13 and Thursday, May 14, 2015 at the Wisconsin Center in Milwaukee, Wisconsin. This Expo is tailored specifically for those in the electrical wire and cable manufacturing industries, processing industries and especially wire harness services.

Expo attendees will see the latest electrical wire processing equipment in operation, as well as various components and services that are used in the manufacture of wiring harnesses. Attendees will have the opportunity to meet one-on-one with industry experts, and can also attend valuable technical seminars focusing on emerging trends and the future of the industry.

The seminar schedule is as follows:

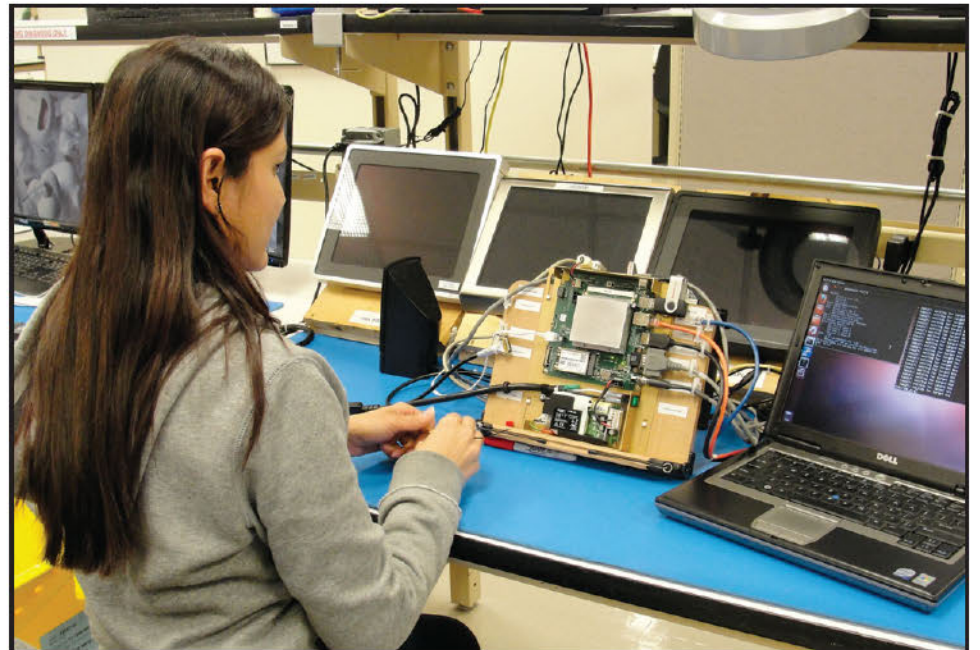
**Wednesday, May 13, 2015**

**8:30am - IPC/WHMA-A-620-B, A Critical Step to Becoming a World Class Supplier**

Presented by: Donnie Hill, President and COO of Precision Manufacturing Co & Rick Bromm, President of Altex Inc

WHMA presents how this globally accepted workmanship standard is a key to becoming a world class wire harness manufacturing company. The presentation will include insights on why it's important, how to get trained and how to validate your company to the standard. It will also provide information on why your current and future customers should and will require it.

*Continued on page 54*



Segue Manufacturing does high-mix, low-volume manufacturing of harnesses, cables, control panels, power-distribution boxes and electromechanical assemblies.

known, specializes in low-cost, high-volume production of similar types of items as Lowell in addition to printed circuit board assemblies and plastic injection-molded pieces. Low-cost components are sourced for customers, too.

Segue serves customers in the following markets: medical, 38 percent; robotics, automation and industrial capital equipment, 20; military and defense, 15; clean energy, 12; homeland security, 11; and miscellaneous such as test and measurement equipment, 4.

Segue has reached its current annual sales of \$50 million based on the vision of company president Bill Roderick, 52, who emphasizes the importance of being progressive. "If you stay stagnant and do not grow, your customers will lose you," he said. "They'll outgrow you. You need to create excitement for them. You also have to stay committed and

have good people behind you, people who believe in you in the good times and bad."

Roderick knows well the ups and downs. He used \$3,000 in savings to start a company called Cable Designs and Manufacturing (CDM), the predecessor to Segue. The start-up occurred in July 1991 in Billerica, eight miles south of Lowell. He and another person worked in a 100-square-foot space producing wiring harnesses and cable assemblies.

Revenue after one year totaled \$12,000, Roderick stated. Although the amount fell short of his annual income previously in his career, "I had put things in my own hands," he said. "There were a lot of long nights and hours on the road trying to develop the company. I built it

*Continued on page 42*

## Why Manufacturers are Over Paying for Electromechanical Assemblies

*When in-house work is outside an OEM's core competency, too costly or cumbersome, strategic domestic outsourcing can cut cost, improve quality, and even speed delivery*

For OEMs making and inventorying electromechanical assemblies, wire harnesses, cable assemblies, or even box-builds in-house, holding too tightly to every aspect of production can be a costly mistake.

The intended benefits of doing all the work in-house must be measured against its costs: higher facility overhead, including additional required inventory, manufacturing space, equipment, trained labor, as well as engineering and purchasing resources.

Too often, such in-house work is not actually the OEM's area of expertise, but instead a low margin activity that can consume precious corporate resources to little effect. When the in-house work performed is outside an OEM's core competency, too costly or cumbersome, strategic domestic outsourcing can cut cost, improve quality, and even speed delivery.

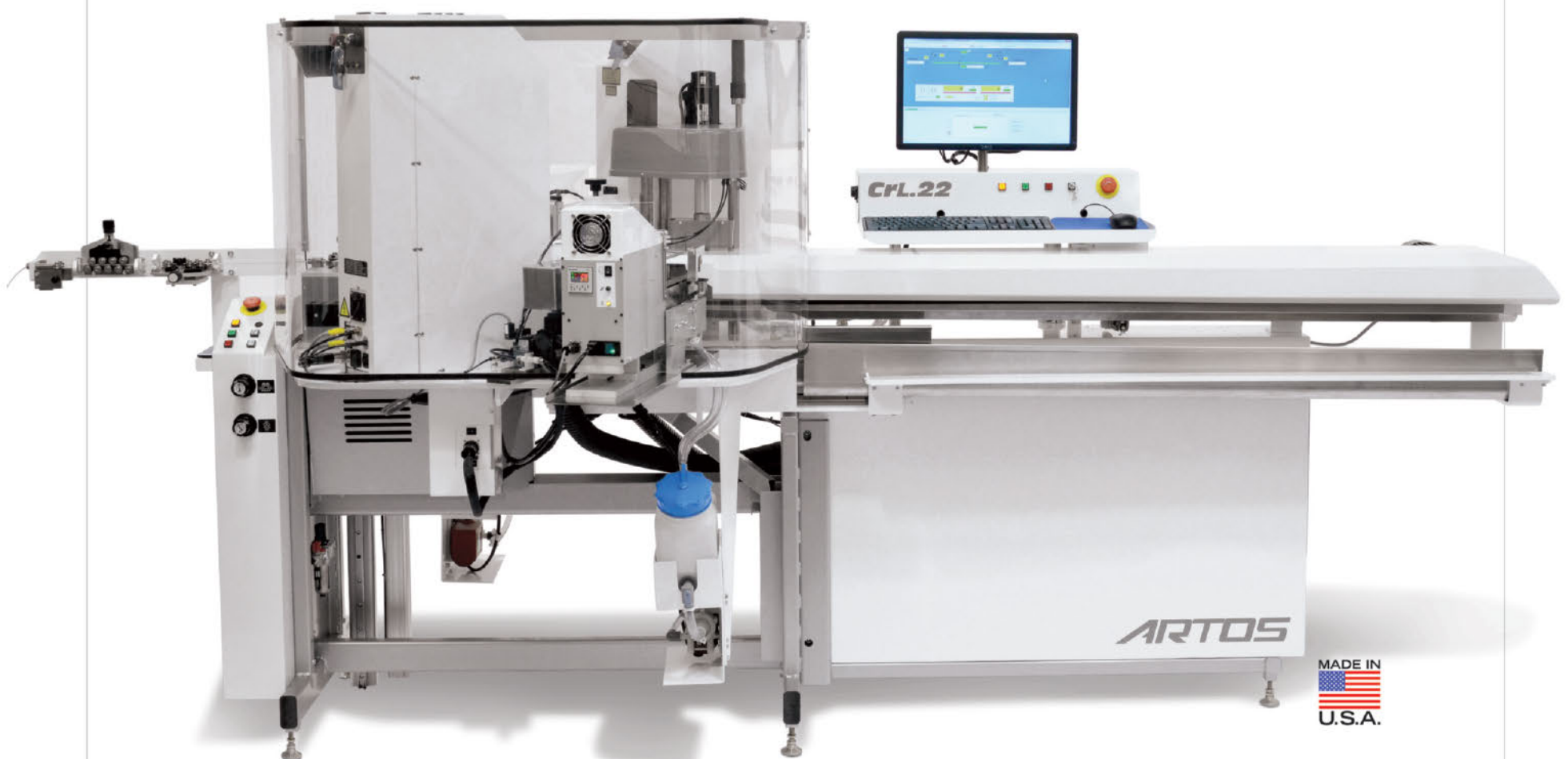
For instance, to focus on its core competency of system design, Evoqua Water Technologies domestically outsourced a junction box electromechanical assembly and wire harness to power its line of industrial water purification modules, according to Rahaoul Bhagat, Engineering and Quality Assurance Manager at its Lowell, Mass. facility. The company is a wastewater treatment products, systems

*Continued on page 7*

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RANGE  
OF WIRE  
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**INSIDE**

MARCH  
APRIL  
2015

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This year's event promises to be the most inspiring, informative, and innovative event for the Wiring Harness Association.

**1 15th Annual Electrical Wire Processing Expo**  
Save the date for the 15th Annual Electrical Wire Processing Technology Expo, to be held on Wednesday, May 13 and Thursday, May 14, 2015 at the Wisconsin Center in Milwaukee, Wisconsin

**18 Moving Tests Upstream**  
How can shops produce more cables quicker? What tools could help eliminate wasted time and money? How can complex harnesses be built with fewer errors?

**14 News Plugs**  
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**30 Cable and Harness Manufacturing: Productivity Through Flexibility**  
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why do it twice when once is better

## FreePoint wins award for Innovation

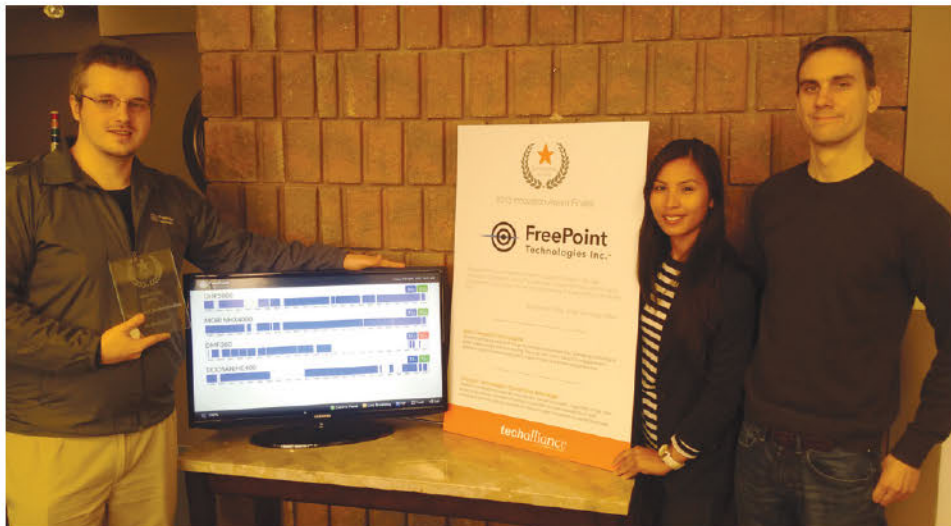
*“Real change doesn’t begin with technology, it begins with attitude”.*

The biggest changes in any organization don’t begin with processes, or plans, or organizational restructuring, or even technology; they begin with attitude. Changing a company’s attitude, from being a follower in their market segment to becoming a leader, sets a new course that can dramatically affect the company’s long term future. Similarly, changing the workers’

attitude from simply being “doers of tasks” to “contributors towards the goal”, can have an equally dramatic long term effect.

Although FreePoint looks like an IT (information technology) company, Sophear Net (FreePoint’s CTO) says it is far more than that. “We see ourselves as developing and deploying technology that reconnects work with meaning, and re-humanizes the factory workplace”. Will Favaro, who is responsible for client side application development, says it’s all about engagement. This is especially true with younger workers. Young work-

*Continued on page 8*



Left to right: Will Favaro, Sophear Net and Dan Kaptur, FreePoint's technology development team.

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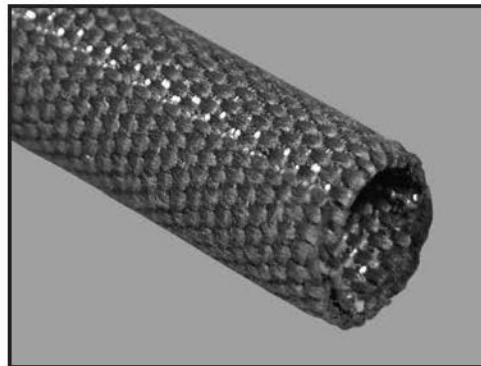
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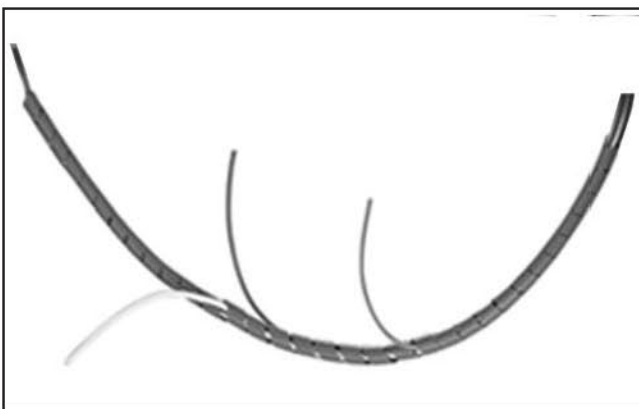
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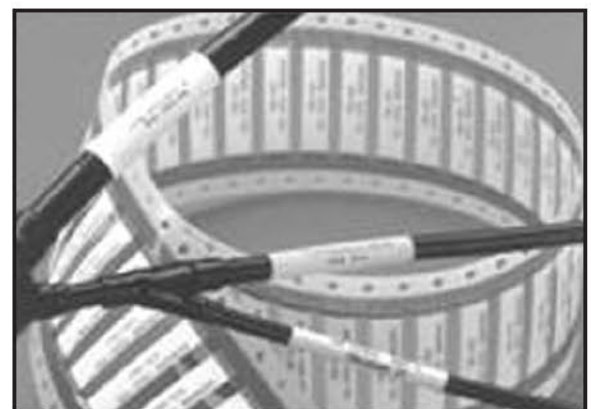
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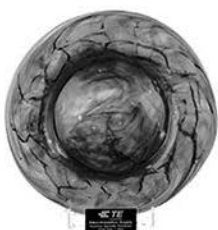
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## Why Manufacturers are Over Paying for Electromechanical Assemblies

Continued from page 1

and service provider for industrial and municipal customers.

"With lower required overhead, inventory, equipment, manufacturing space and labor training compared to doing all the junction box work in-house, we realized about a 20% overall cost savings and gained the ability to go straight from the sub-assembly to the finished product," says Bhagat. "The streamlined process helped us to meet demand for the product line, which grew over 50% last year."

### Overcoming In-House Challenges

When an OEM considers which areas are actually core to its business, and which should be outsourced, producing and inventorying every component down to the smallest electrical wire or electromechanical assembly does not always make the list.

"We didn't have the in-house infrastructure to build every component and sub-assembly from scratch," says Bhagat. "We would've had to expand our existing facility or add an offsite location, buy additional production equipment, as well as hire and train specialized labor.

Building all that extra in-house infrastructure would have been too costly and inefficient."

Technical electrical expertise can be a barrier to doing such work in-house. In fact, it has been shown that 44 percent of electronic failures are the result of poor quality control. Electronic failures due to faulty solder joints, improper wire crimps, nicked or cut wire strands, wrong wire gauges, or unauthorized material substitutions can not only impact the final assembly's quality, reliability, and durability but also cause delay, taint reputation, and even create serious liability.

"Quality and durability in the field was critical, says Bhagat. "If the wire were the wrong size, too thin, improperly rated, or had a poorly rated terminal block, it could compromise the junction box assembly, which is unacceptable."

Evoqua Water Technologies domestically outsourced the junction box electromechanical assembly and wire harness to power its line of industrial water purification modules to Wareham, Mass.-based Electro-Prep a turn-key and consignment contract manufacturer of

Continued on page 13



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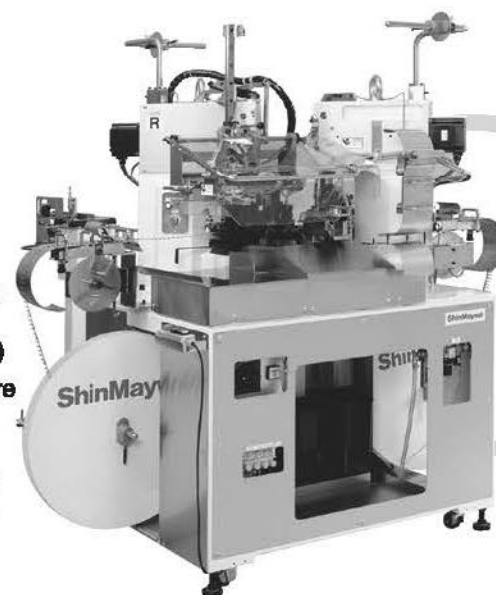
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# FreePoint wins award for Innovation

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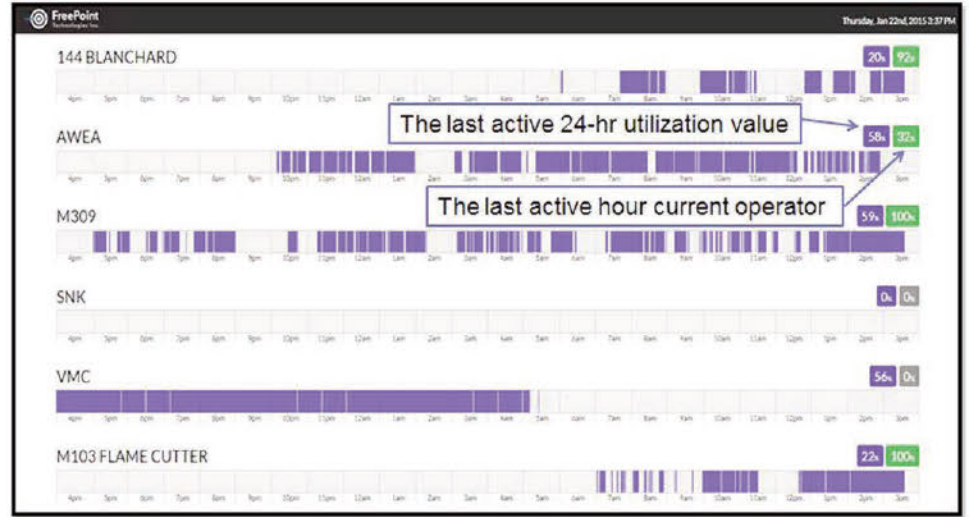
ers have grown up in a world where they have constant engagement and feedback, and this is often completely absent in the typical factory workplace.

After working hard towards these goals for two years, FreePoint has been awarded the 2015 Techcellence Award for Innovation. This award is presented annually by TechAlliance to a company in Southwestern Ontario that develops new technologies that change the way business is done, or uses technology to solve an existing problem in an innovative way.

FreePoint's technology development team (pictured above) includes Will Favaro, Sophear Net and Dan Kaptur.

FreePoint is not only changing the way information is collected off of the plant floor, it is also changing the way it is used. The company's slogan of "Measure. Analyze. Share. Don't forget to share." is the driving principal behind their technology. Whatever gets measured gets improved. FreePoint's product makes empirical measurement easy, and their analytic utilities make it simple to identify when "value adding work" is being done. The third component to success is the share component. To engage the workforce, information should be shared with everyone on the plant floor in real-time and in a meaningful way.

FreePoint leverages the power and flexibility of IoT (Internet of Things) technology to put everyone on the plant



A screen shot showing activity of 6 machines in real time

floor on the same page. Their black box devices measure the value adding work on machines and manual processes. Their analytic utilities quickly identify

the true value adding work being done, and from there their system pushes the actionable information out to large screens, tablets, and even cell phones where appropriate.

Dan Kaptur has been with the company since graduating from college. He has seen the product evolve and grow significantly from the early days, but it still comes down to having accurate information to work with. He says, "collecting data reliably, accurately and in real-time, is critical to any project's success". Will Favaro goes on to add, "and then being able to find the actionable information in all of that data is equally important." According to Sophear, "actionable information is any information that can be used by anyone in the company, from operator to management, to make an immediate and positive effect."

To FreePoint, IT is more than just information technology - it's inspiration technology, influence technology, and impact technology. Information, properly presented, inspires and influences positive outcomes. Positive outcomes, such as productivity improvement, increased job satisfaction, less absenteeism and turnover, all have positive impacts on a manufacturing company and the community it serves. Real change doesn't begin with technology, it begins with attitude.

For more information on FreePoint's award winning technology, contact [engage@getfreepoint.com](mailto:engage@getfreepoint.com) or visit [www.getfreepoint.com](http://www.getfreepoint.com).

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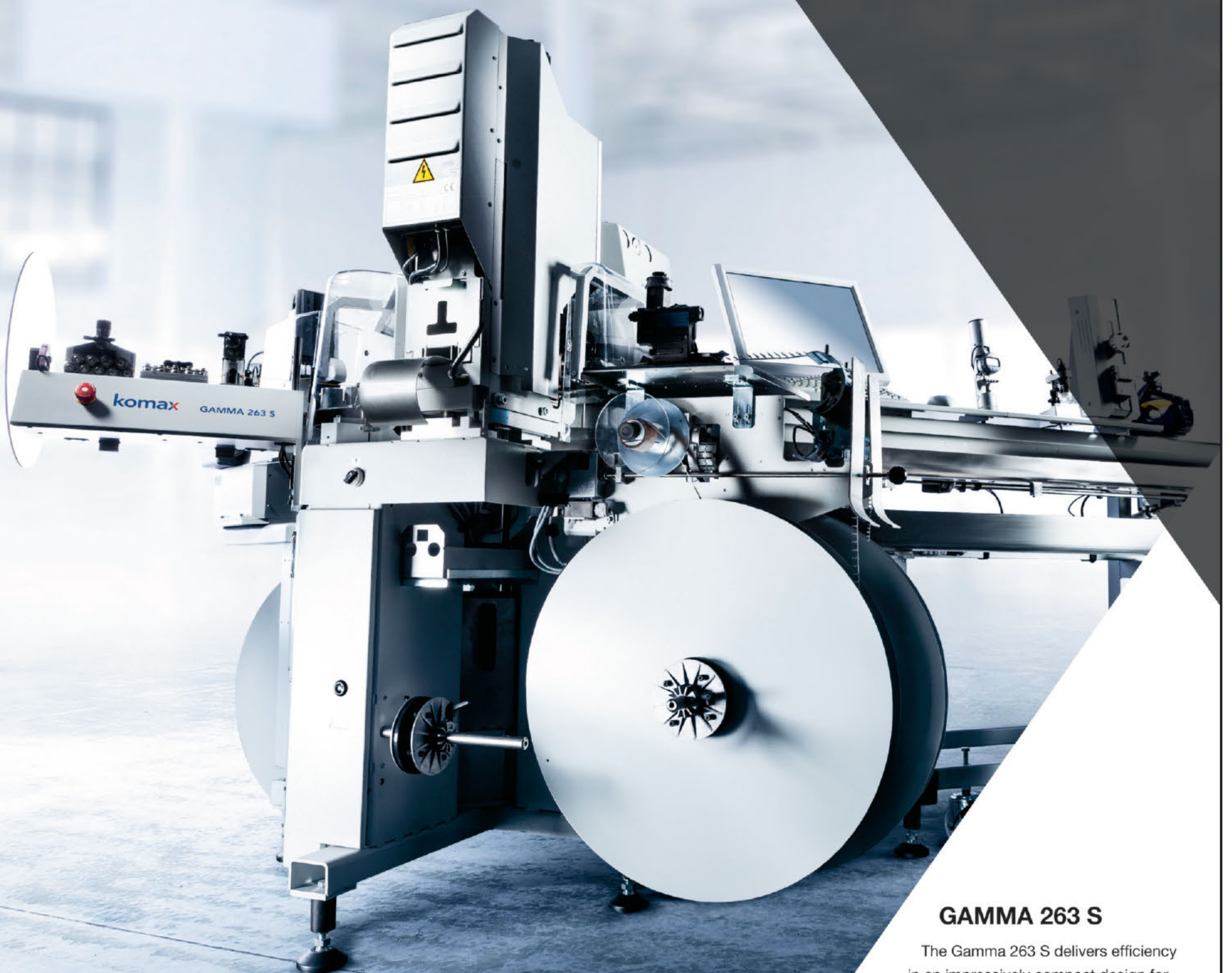


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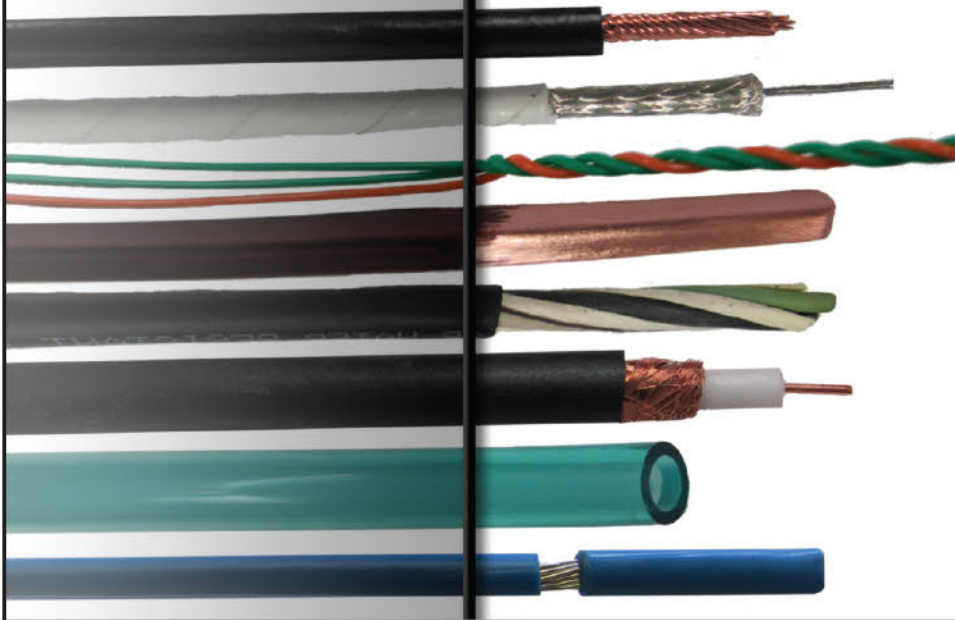


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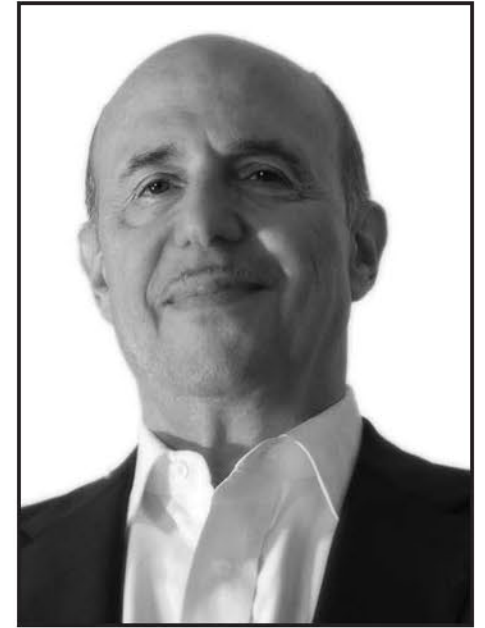
# Deal Killers

By Loren Smith

I'm often asked what is the most common deal killer. My response is that although there is no single culprit most often responsible for thwarting the process of selling a company, an underlying phenomenon to be wary of is "deal fatigue."

Think about it. Selling a business is always rigorous and sometimes excruciating. From the point that a letter of intent (LOI) is signed until money changes hands at the closing, the buyer and seller have to surmount numerous hurdles together. They need to reach agreement on a multitude of issues. And all that hurdle jumping creates fatigue.

Moreover, for the buyer there is another fatigue component: risk reduction. Worrying about whether a deal is just as it appears and taking pains to minimize the possibility of negative surprises post-closing saps one's energy.



Loren Smith, CEO

So what is the most effective antidote against deal fatigue? Trust. Whether we are the buyer or seller, the more we can build trust throughout the sales process, the better we can keep deal fatigue in check and increase the chances of clearing those looming hurdles.

Here, then, are the most common potential roadblocks. Any of the following, combined with sagging energy and patience, can sink a deal.

Reps and warranties. An asset or stock purchase agreement is usually a requirement of a sale. So to satisfy the agreement, the seller is expected to warrant (or guarantee) a variety of items while the buyer is typically seeking a level of certainty that exceeds the tolerance of the seller. Likely results are pushback, creating tension.



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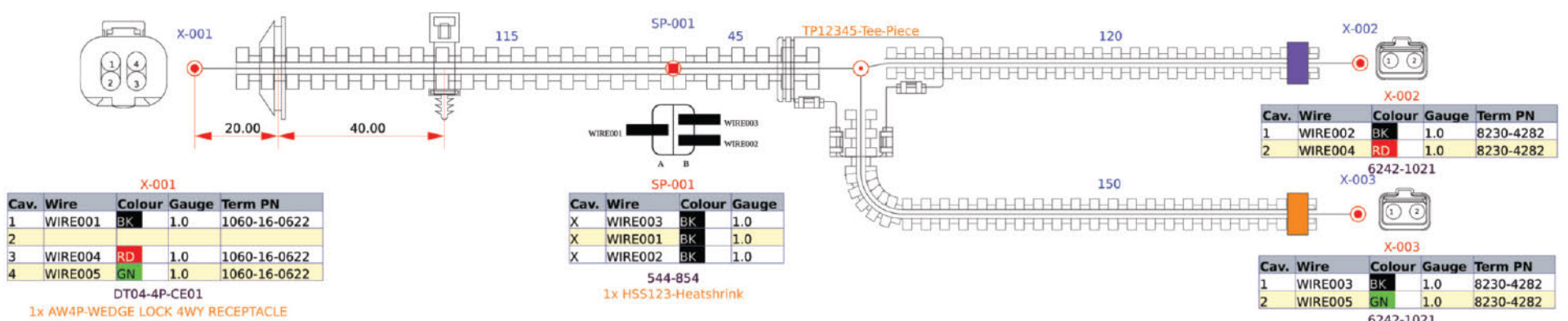
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# Deal Killers

Continued from page 10

**Holdback.** Deals customarily call for the seller to set aside a portion of the purchase price in escrow for a specified period to provide a ready pool of dollars in case the buyer deserves to be compensated for post-closing discoveries. Disagreement on the holdback is always a challenge.

**Employment agreement.** The seller is often required to remain involved with the business past the closing. All aspects of this agreement – such as compensation, role in the business and number of hours per week – are negotiable, but the most common sticking point is the length of time of overlap – especially when the seller is seeking a path to retirement. Differences on this key point can sour a deal.

**Seller note.** It's quite normal for a business to be sold with a portion of the sale price to be paid over time based on the amount, term, interest rate and other conditions as negotiated in a seller note. That's a lot of variables and can be a deal-breaker.

**Customer confirmation.** Buyers usually want to have some interaction with a company's customers pre-closing to help ensure that relationships will continue. The nature and timing of these interactions are always subject to negotiation – often complicated by confidentiality concerns – which can create potential break-

downs in the sale process.

**Working capital adjustment.** Working capital – the difference between current assets and current liabilities – moves up or down between the date the LOI is signed and the date of closing. The degree of allowable change and the mechanics of adjusting for this change are always negotiable. Moreover, the mechanics can be hard for the seller to grasp, particularly given the prospect of having to write a post-closing check in the event of a negative adjustment.

**Third parties.** Lawyers may get a bum rap here because of the cliché that lawyers are deal killers. In reality, any third party to the deal who does not have the expertise to play a helpful role in the transaction can gum up the works, and that might be an accountant, financial adviser, relative or, on occasion, a lawyer.

In the M&A world it is often said that "there are no easy deals." In my experience, this is mainly true, but I have also found that when the buyer and seller are truly committed to consummating a deal, the process isn't always pretty, but the deal gets done – especially when at least one of the parties is intent on building trust.

Loren Smith can be reached at [lms@blvcapital.com](mailto:lms@blvcapital.com) or [www.bluevalley-capital.com](http://www.bluevalley-capital.com)

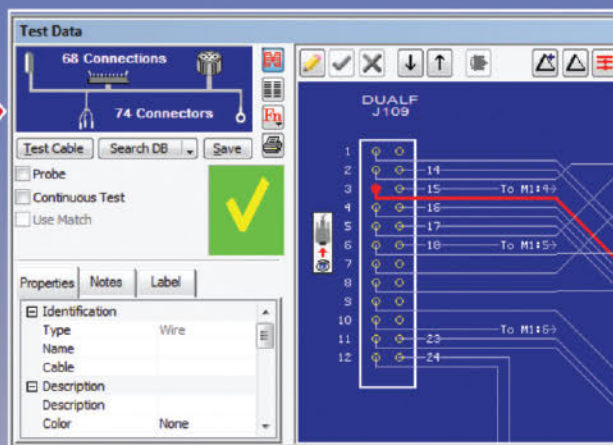


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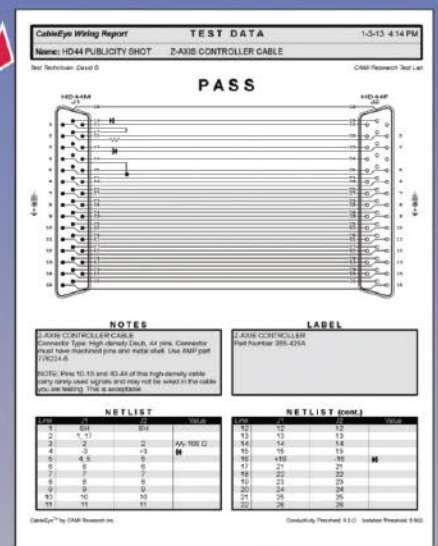
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# Why Manufacturers are Over Paying for Electromechanical Assemblies

Continued from page 7

wire harnesses, cable assemblies, electro-mechanical assemblies, and box-builds.

In looking for a capable supplier of electrical components, it is important not only to choose one that maintains industry standard internal quality assurance and auditing programs but also is subject to regular onsite inspections and outside audits.

“A key element in ensuring quality is assuring the supplier has their ISO 9001:2008 certification (quality and strong process controls),” says Skip Sullivan, President of Electro-Prep. “Combine this with IPC/WHMA-A-620 training and certification (industry assembly standards), as well as J-STD-001 training and certification (soldering certification), and you have a good idea that your supplier is a true professional that takes their partnership with you seriously.”

Sullivan adds that UL listing in the U.S., CSA certification in Canada, as well as RoHS (and non-RoHS) capabilities are also increasingly vital designations for electrical components.

According to Bhagat, “When used as intended, we’ve had no junction box failures on our industrial water purification module since we put it in the field six years ago.”

Bhagat credits his supplier for cooperating with Evoqua Water Technologies to produce an improved design. “Electro-Prep offered a number of ideas for improvement that we incorporated into our design. For instance, they helped to secure a din rail in the terminal block, preventing a potential quality issue during assembly. This helped with quality control and manufacturability.”

According to Bhagat, his domestic contract manufacturer has a significant delivery advantage over offshore outsourcers. By working with them, he avoids the long shipping lead times of typical overseas outsourcing. He also resolves any issues more quickly, with easier logistics and coordination within the same time zone, language, and culture.

For OEMs looking to expedite delivery on outsourced electromechanical assemblies, wire harnesses, cable assemblies, or even box-builds, working with a

flexible partner can be important. Sullivan, for instance, suggests that OEMs work with a supplier that offers flexible delivery options such as JIT, rush deliveries, third party drop ships, Kanban (for very short turnaround for ongoing requirements), as well as pull-ins or push outs (without the hassle of unnecessary, additional charges).

“While Electro-Prep typically turns product around for us in four to five weeks, they will rush us product if needed and can supply on a JIT basis,” says Bhagat. “We’re not relying on JIT delivery now, but it could be useful if we have a fur-

ther surge in demand or want to further expedite our delivery. We’ve never run out of parts they’ve supplied us.”

Bhagat says that ultimately, “Domestic outsourcing to a trusted partner helps us stay in control of our process. By focusing on system design and working on modules rather than many individual components, we leverage our core competency and outsource what’s not core.”

For more info, visit [www.electro-prep.com](http://www.electro-prep.com); or write to Electro-Prep, Inc. at 14 Kendrick Rd., Unit 3, Wareham, MA 02571.



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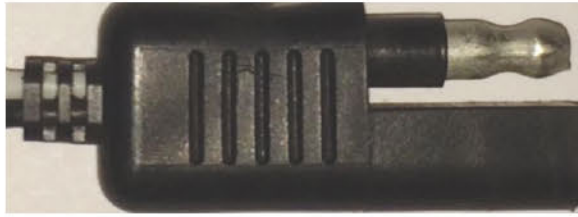
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## NEWS PLUGS

### BURNDY® Announces the Expansion of HYREDUCER™ Kits

BURNDY®, a leading manufacturer and provider of connector solutions to the industrial, energy, construction, telecommunication, petrochemical, data center, and transportation industries, announces the expanded line of HYREDUCER™ (YSR-TC) In-line Splice Reducer Product Line. Originally designed for the telecommunication industry to provide better wire management solutions when reducing conductors with irreversible compression con-

nectors, other industries have seen the benefits and to answer these needs, BURNDY has expanded the line. These connector kits provide an in-line reduction of two conductors while keeping space requirements to a minimum.

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approved heat shrink and an installation instruction sheet. All YSR-TC connectors have an inspection hole to visually check for a fully inserted conductor. All YSR-TC are UL Listed and CSA Certified when crimped with the approved tool and die combination, a part of the BURNDY® Engineered System.

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### Electronic Components International Makes Acquisition

January 2015 Electronic Components International Inc. Acquired Global Harness Systems Inc. Blue Valley Capital LLC acted as an advisor to Global Harness Systems Inc. in the transaction. For further information visit [www.Bluevalleycapital.com](http://www.Bluevalleycapital.com) or phone 913-660-8039.

### Zuken Announces Dates for Global Conferences

Zuken announces the locations and dates for its popular Zuken Innovation World conferences. The conferences launch in Germany in May, moving around Europe and North America, before landing in Japan in October. Registration is now open for most events at [www.zuken.com/ziw](http://www.zuken.com/ziw)

The call for papers for the North American and European conferences is open and the conference programs are taking shape. Incorporating sessions presented by industry partners, customers and Zuken technology experts, the conferences attract more than 1,500 attendees from around the globe each year.

"We're building on the successful format with an added focus on networking, hands-on sessions and customer experience presentations," said Steve Chidester, Zuken's Head of International Marketing. "The topics will range from product best practices to technology innovations such as interdisciplinary mechatronic product development and systems engineering. We're looking forward to conversations on the latest issues such as the Internet of Things and Industry 4.0."

Each of the seven events has a local focus, with conference programs developed around the interests

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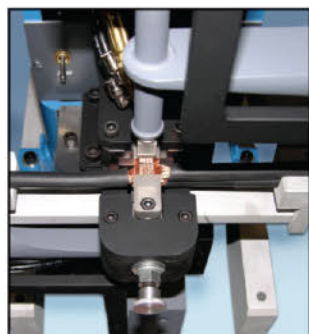
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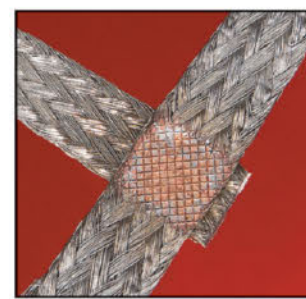
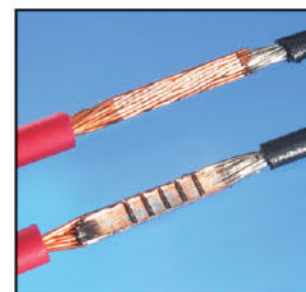
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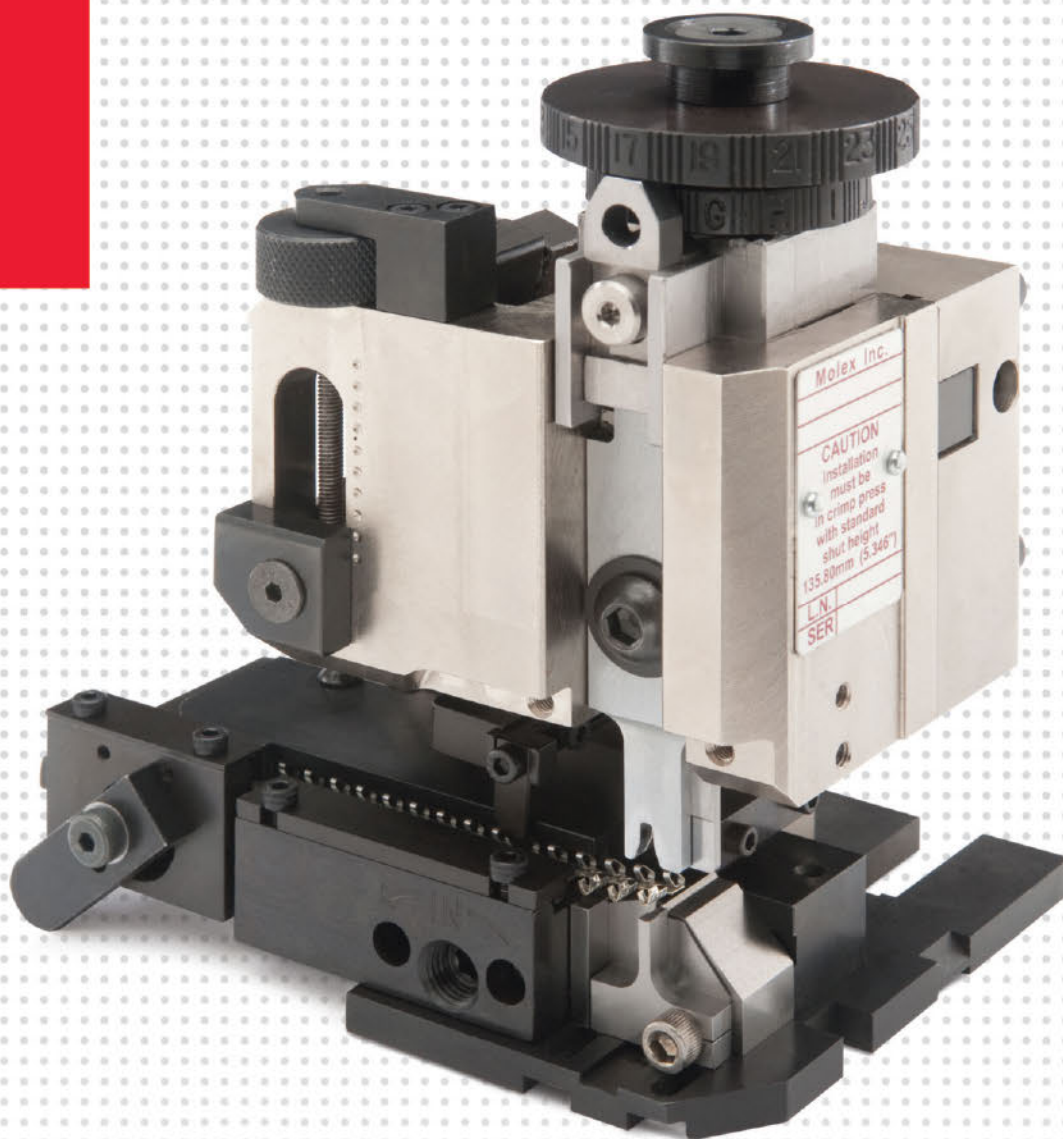
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—Continued on page 16

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*Continued from page 14*

and key industry sectors for each location. With the common theme of "Network, Learn, Innovate," the events are structured to enable every delegate to make the most of their conference experience to gain inspiration, new knowledge and new contacts.



### Zuken announces dates for its annual Zuken Innovation World Conferences

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- San Diego, CA – June 1-3

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- Seeheim-Jugenheim/Frankfurt, Germany - May 20-21
- Roissy-en-France, France - June 11
- Bologna, Italy – June 16
- Luzerne, Switzerland – September 10
- Leicester, United Kingdom – September 30

Asia

- Yokohama, Japan – October 15-16

Follow the lead-up to all our events as we announce our conference agendas, keynote speakers, and more on the ZukenBlog, LinkedIn, Facebook and Twitter (@ZukenAmericas, @ZukenUK\_SCAN, @Zuken-CentralEur).

For more information and to find your local Zuken Innovation World event, visit [www.zuken.com/ziw](http://www.zuken.com/ziw).



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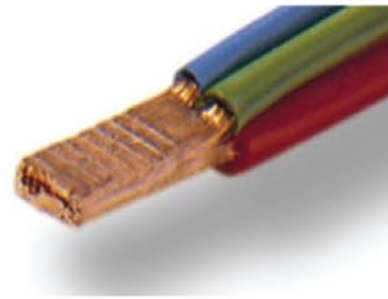
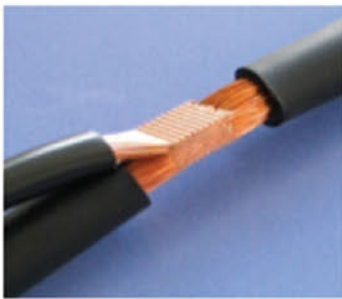
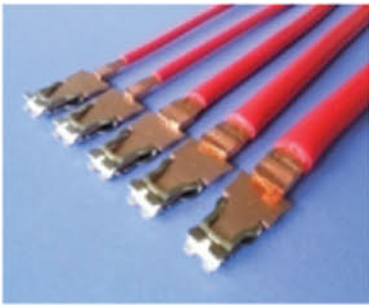


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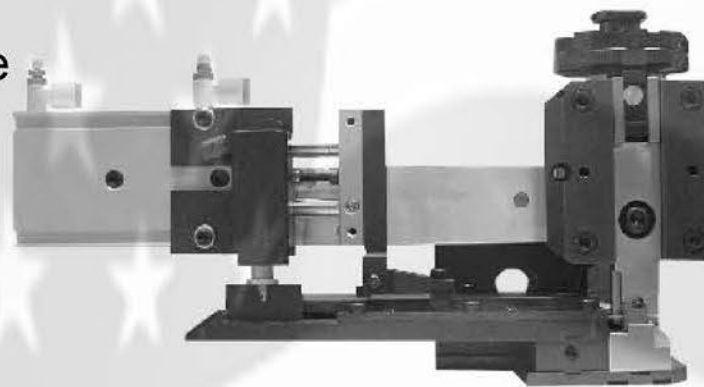


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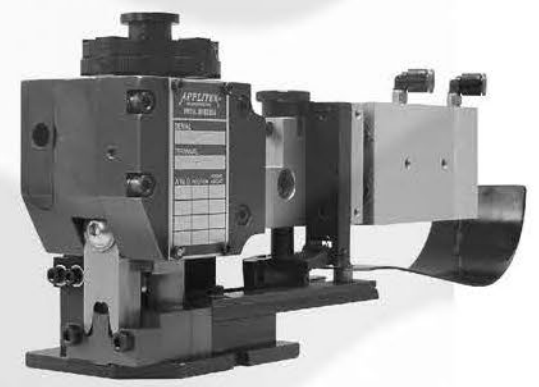


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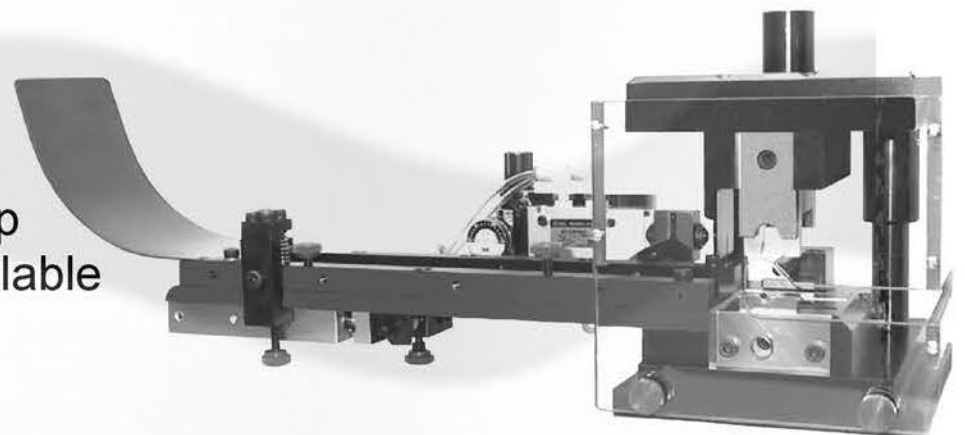


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# Moving Tests Upstream

By Sarah Landeen  
Cirris Systems

By adding automated testing earlier throughout the build process, cable and harness manufacturers can find errors sooner; this saves time, money, and provides a competitive advantage.

Rising expectations in the cable/harness industry demand that manufacturers build more complex assemblies in less time. Accomplishing this feat means manufacturers must re-evaluate their processes. How can shops produce more cables more quickly? What tools could help eliminate wasted time and money? How can complex harnesses be built with fewer errors?



Most cable/harness shops have practices set in place to guarantee the quality of their products before shipping. This likely includes a series of tests to check for functionality and accuracy. The problem is that many shops wait until after a cable is complete before testing. Then if mistakes are found, manufacturers must dismantle the cable to locate and repair the errors or even scrap the cable and start over. By the time the cable is ready to ship a second time the manufacturer has wasted time and money redoing work that was already paid for. We'll call this type of process the downstream process.

In the downstream process testing is held off until the end of building after all of the value has been added to the materials. Finding a mistake at that point could mean precious minutes or hours of lost labor. Imagine the time wasted in shops that build complex harnesses containing hundreds of wires and connectors that can take hours or days to build. Think of the cost for shops that manufacture thousands of the same types of cables every day. If an early prevention method existed to stop waste from occurring, the savings in time and money would likely pay for changes to the process.

## STORMTRONICS

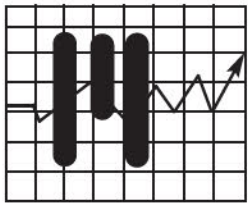
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### The Upstream Process

Look at your current process. Is there a better way to build a cable or harness that would allow you to perform testing earlier? Could you test sub-assemblies before connecting them to the rest of the harness? Could you test assemblies before connector shells are fully assembled or molded? The upstream process means you look for ways to find errors sooner, possibly by testing earlier and using equipment that can make your process quicker and more accurate.

One way to implement the upstream process is to use smaller, low voltage testers at each line or work station to help during the initial build. Depending on brand and capabilities, the tester can guide the manufacturer through the assembly process, testing each wire and connection as it is being built. When the cable is finished there is no doubt about its functionality, especially since it can be documented by the tester.

When asked about the effects of the upstream process, one manufacturer boasted that he was able to eliminate end-of-line testing completely. His cables were shipped on-time and error-free. The right tools and early testing made this possible.

### The Right Tools for the Process

Depending on the project, hand beeping tools and multimeters require time and are prone to human error. One cable manufacturer explained that it took twenty minutes to test a cable of just ten wires using a multimeter. He felt frustrated over the loss of money due to time-consuming tests and errors in hand-written numbers on reports that still did not guarantee a passed product in the end.

As soon as this manufacturer invested in upstreaming his process by adding automated cable testers, the twenty minutes dropped to twenty seconds. The automated tester gave him access to printed reports which allowed him to validate his process and quality to customers. The time and money saved by making this change to his process gave this manufacturer the competitive edge, and the reports gave the end customer even more confidence in his supplier's capabilities.

### The Right Time for the Process

The further downstream the process you wait to test, the more a mistake will cost. If you can find a way to test the cable/harness as it is being built, perhaps by testing wires and sub-assemblies, you can know that most if not all of the assembly is good before you even perform the final test.

This ideal solution of testing during the build process can be made possible by

using smaller, less expensive test units. If each build station includes one of these low cost test units, manufacturers can perform multiple tests at once. Each builder can test with the ability to find and fix any errors while they are still holding the wire in their hand and before anymore value is added. Some customers require a more expensive and strenuous final test. This usually involves high voltage testing which can be performed with the confidence knowing that it will pass the connectivity portion of the test.

### The Right Process for You

In the early 1900s, Joseph Malines published a poem titled "The Fence or the Ambulance" where he told the story of a town located at the top of a cliff. People who walked too near the cliff often fell resulting in injury and death. As a solution, the town placed ambulances at the bottom of the cliff to rescue the people who fell. One man from

the town had the idea to build a fence around the top of the cliff to prevent people from falling. Malines left it up to the reader to decide if preventing the problem from occurring was better than dealing with the consequences. Like the town in this poem, you can decide if you would rather prevent problems or repair them later.

The suggestions provided in this article may not be ideal for every situation. No matter what your circumstances will allow, try to find ways of moving tests upstream. Evaluate your build instructions to find sub-assemblies that can be tested earlier. Bring automated testers into your process to test assemblies sooner. Create a dia-

logue within your business about how you can save time and money while improving quality. This is all part of moving tests upstream.

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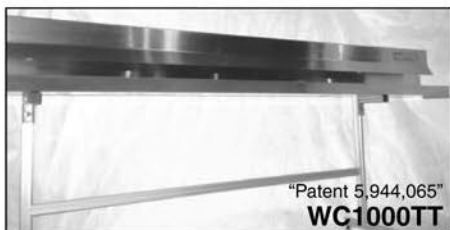
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## Meeting Mr. Williams

By Paul Hogendoorn

Last November, I had the pleasure of visiting Atlanta for a tradeshow (FabTech) we were exhibiting in. It's been a long time since I had been there, and much had changed. I was impressed with its parks and buildings, its air of confidence, and the friendliness of its people. When it comes right down to it though, great cities are made by the people that live there.

I met Mr. Williams shortly after I parked my car. I had a lot on my mind - I had to get registered, find my booth, and figure out a way to tote all my stuff there, and all in less than an hour. Mr. Williams started the conversation. "Excuse me sir. It was really cold last night, and I'm hungry. I was wondering if you could help me out."

It was hard to guess his age - he could have been forty, he could've been sixty. The only thing that seemed obvious, from his appearance and his manner, was that he has lived this way for many years.

I am not shocked or surprised when this happens, because it's a fact of life in our society, especially in the larger cities. I have spent some time in various community organizations that focus on



Paul Hogendoorn

the issue of homelessness. Through this, and the wise insights of some really dedicated people, I have gained a sense for some of the reasons a person might end up on the street. It's not as easy as "drugs", or "alcohol", or "laziness", or even "choices". For many, it's a mental or emotional health issue. For others, it was a matter of having no choice; home was not a safe place. And for others, likely Mr. Williams, it's a trans-generational issue; their grandparents were jobless and largely homeless, their parents were born into that state, and then they were too. It's hard to break the cycle, and safety nets alone won't fix it.

I usually keep a few loose bills in my pocket, but the moment I heard his

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polite petition, I knew I was caught in an awkward state; I only had Canadian money in my pocket, and a couple \$20 US bills in my wallet safely tucked in my inside jacket pocket. I answered as kindly as I could; "all I have is a few Canadian dollars, if you want them, you can have them." I lied. He started walking away. But then he turned and came back, and as if he didn't hear or understand my explanation (or perhaps he didn't believe it), he asked again, "please sir, can you help me?" I knew what the answer was - it was 'yes', of course I could help him. The real question to me was would I help him, or would I lie again? At the same moment, another business traveller a couple of parking spaces away yelled out, "hey! Quit bothering those people. Why don't you get a job!"

In that moment, I realized I can be part of the continuing broken paradigm, where the beggars beg and the rest of us don't have the energy to really understand, or I could slow down for a moment and see him as an individual, not all that different from me. "What's your name?" I said, I as began the process of fishing out my wallet. "Mr. Williams", he answered. "Mr. Williams" I said, "I'm sorry I lied." I gave him twenty bucks, and then continued to load marketing material and a computer screen on a dolly I brought with me. He asked to help, but I told him I had it covered. He insisted, nearly begging me to accept his help. I was worried about the screen falling off the dolly, and said I'd prefer to do it myself. I hope he understood, but I realized afterward that my accepting his help would've been a bigger blessing to him than the money I gave him.

We, the manufacturers, the entrepreneurs, the business leaders and the workers - we are the true wealth generators of our society. It's not Wall Street, or the government, its 'us'. We also are the beginning of the solution - not the whole solution, but the start. We can't cure society's problems with our money, no matter how much we might make or give away. Where we need to be more generous however, is with our time, our caring, and our understanding. Mr. Williams might have been asking for a few dollars, but what he really needed was to matter to someone - in that morning, me. I don't know what needs to be done to change his life, but I think

spending a bit of time with him may have changed his day a bit - and who knows what happens from there. I do know it changed my day - and who knows what happens from there. Changes are needed in our society, but I think it starts with us, at a more personal level.

Thank you, Mr. Williams. I hope you are doing well.

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



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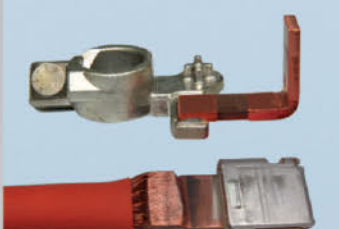
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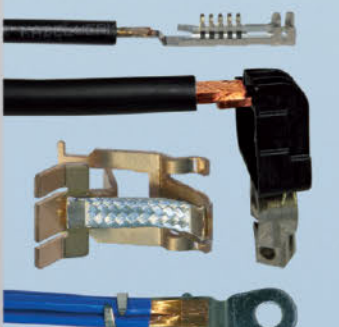
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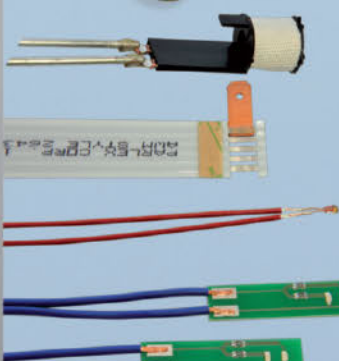


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## Schleuniger, Inc. Announces IPC/WHMA-A-620 Certification of All Service and Direct Sales Employees

Schleuniger, a leading international manufacturer of wire processing machines, announced that as of January 2015, all of the company's technical service personnel and direct sales representatives are IPC/WHMA-A-620 certified. IPC/WHMA-A-620 is the first consensus standard for cable and wire harness fabrication and installation and has been embraced by original equipment manufacturers and electronics manufacturing services companies worldwide. A joint project of IPC (Institute of Printed Circuits) and WHMA (Wire Harness Manufacturers Association), IPC/WHMA-A-620 has become the industry standard against which quality is measured.

Problems within cable and wire harness assemblies can be hard to diagnose. Companies that adhere to the IPC/WHMA-A-620 standard have well-defined criteria for what is acceptable and unacceptable and therefore often see reduced problems and significant improvements in quality.

"Schleuniger already has a reputation for high-quality products and service. Taking the next step of IPC/WHMA-A-620 Certification for our sales and service staff provides us the ability to advise

customers in this important quality standard and better support their needs," says Darren Teasck, President and Managing Director, Schleuniger, Inc. "The certification of our sales and technical service teams is just one example of how Schleuniger is dedicated to being not just an industry supplier, but an industry resource for our customers."

If you have IPC/WHMA-A-620 requirements, Schleuniger is available to help.

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## DTi Seals and Trim Approved by UL as Recognized Components

Device Technologies, Inc. (DTi), a leader in the design and manufacture of enclosure related and environmental protection components, announced today that Underwriters Labs (UL) has approved its Seal-Fast™ Door Seals and Trim-Fast™ Edge Trim for EPDM gasketing materials to the stringent UL50E standard. Thanks to this Recognized Component designation, any finished product that uses these seals and trim automatically now receives a significant quality upgrade, creating greater value for their customers.

The new certification is especially important to companies needing performance materials that comply with NEMA standards to protect critical equipment like Telco switches, data center racks and chassis, and routers. In addition, DTi seals and trim are used on truck bodies and enclosures for generators and inverters and other applications in environments ranging from back office to rugged mobile shelters for the military.

"We are committed to responding to our customers' demands by delivering

the highest quality equipment protection," said Nick Petri, DTi President. "Having our components listed on UL Yellow Cards provides a valuable enhancement to our customers' brands and further validates our commitment to our ISO and AS Quality System, and ongoing Continuous Improvement program."

The Seal-Fast Edge Seal "D" Series EPDM provides a clean, fast method to protect equipment in a variety of industries from dust, wide temperature variations, and moisture. The Trim-Fast "S" Series Edge Trim for EPDM offers superior protection from wire and cable abrasion for critical equipment.

DTi's high performance, top quality enclosure and edge protection offers customers an affordable way to upgrade existing equipment with UL-certified components. Using UL listed components saves both time and money since the material itself has already been qualified and eliminates the need for further testing. It also enhances compliance and can minimize liability exposure in case of disaster such as a major fire.

For additional information visit [www.devicetech.com](http://www.devicetech.com).



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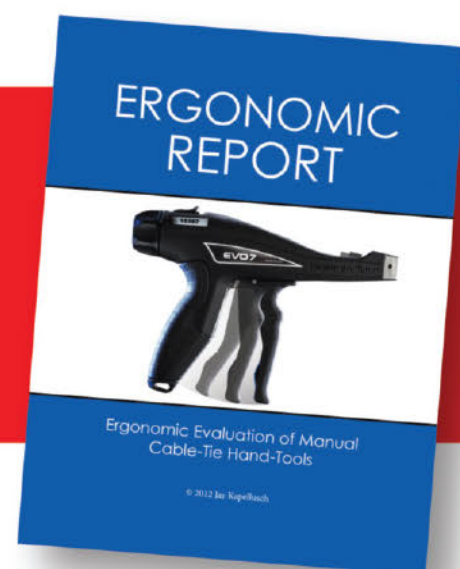
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## Thermoplastic Elastomers for Sensory-Sensitive Applications

**P**olymax Thermoplastic Elastomers, Inc., a manufacturer and custom compounder of thermoplastic elastomer (TPE) materials, announced the availability of new grades of premium quality TPE for sensory-sensitive applications.

In response to the high market demand for better packaging materials that protect the freshness, quality and safety of food and beverages, PolymaxTPE has developed new formulations that now provide low extractables, organoleptic neutrality, excellent sealing properties and superior clarity. As a result, the company's new sensory-sensitive TPEs offer solutions for a wide range of applications in food and beverage packaging, transport and storage. These new materials were showcased at the NPE2015 tradeshow in Orlando, FL.

"The development of TPE for sensory-sensitive applications was extremely challenging," said PolymaxTPE Chairman Dr. Martin Lu. "It required extensive polymer science and compounding expertise, customized manufacturing equipment, and close teamwork with our customers."

Specialty compounds and formulations of PolymaxTPE sensory-sensitive materials can be used to manage permeation of carbon dioxide, water vapor, and oxygen, in addition to improving sealing properties in applications such as screw cap liners and engineered wine closures. Furthermore, these materials can be used in tubing for the delivery of dairy products, commercial food packaging, and bag-in-box wine. The PolymaxTPE sensory-sensitive product grades meet most food and beverage contact standards of the FDA, EU and GB, and are fully recyclable.

The new PolymaxTPE full-service facility in Waukegan, Illinois was engineered to produce the company's current range of more than 500 grades of thermoplastic elastomers, as well as the next-generation of TPE innovations such as its sensory-sensitive range. The plant includes highly automated production equipment that was custom designed for PolymaxTPE by some of the world's leading providers of extrusion and compounding technolo-

gies. The company's investment in top-of-the-line production and testing equipment ensures premium product quality, consistency, and performance at optimum production speed and cost.

PolymaxTPE specializes in the development of premium thermoplastic elastomer materials and custom applications for manufacturers across a wide range of market segments in North America, Asia and Europe. PolymaxTPE has a full-service facility near Chicago, IL, USA. A sister company, Nantong Polymax, is one of the three leading TPE manufacturers in China, the global hub for TPE research and development.

PolymaxTPE leverages its technical expertise and extensive platform of materials and technologies to create innovative solutions for use in injection molding, extrusion and blow molding processes in the automotive, healthcare, electrical, electronic, construction, packaging and consumer products industries. The company's products are marketed under the PolymaxTPE and Maxelast™ brands. Founded and led by American entrepreneur, Dr. Martin Lu, PolymaxTPE is dedicated to adding value for its customers by creating better solutions faster. For more information, visit [www.polymaxtpe.com](http://www.polymaxtpe.com).

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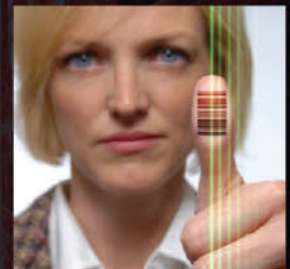
Print a bar code label only if the harness passes?



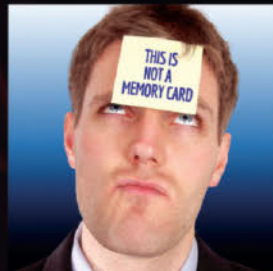
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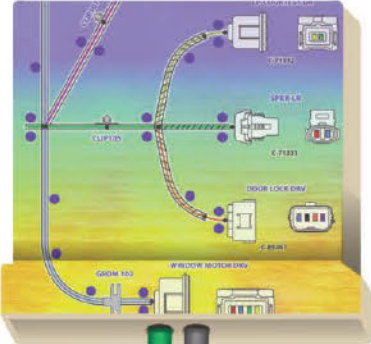
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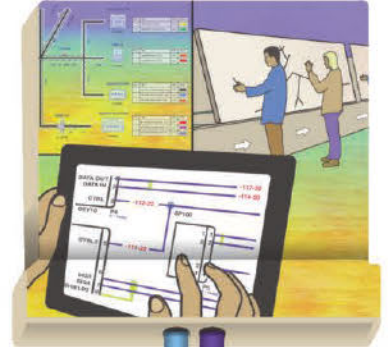
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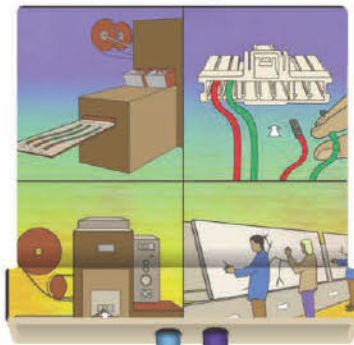
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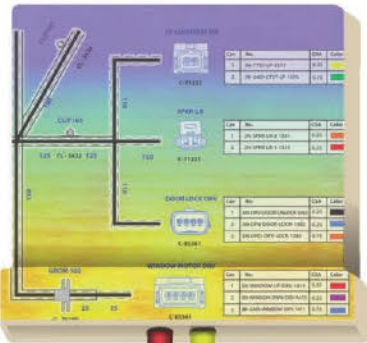
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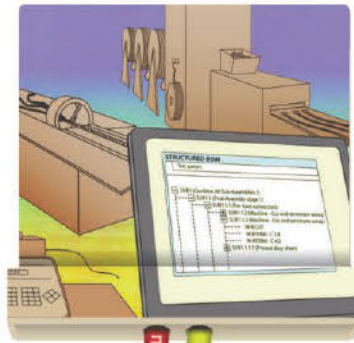
Cost & time calculation, faithful to assembly process



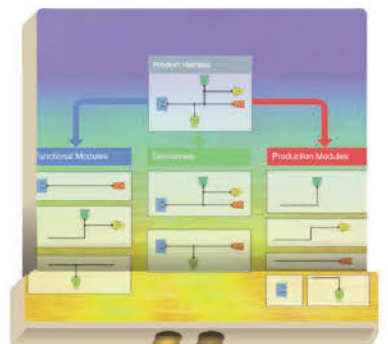
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# Great Wall Motors Standardizes on Mentor Graphics Capital Tools

Mentor Graphics Corporation and China's largest SUV and pickup manufacturer Great Wall Motors (GWM) announced that GWM has standardized on the Mentor Graphics® Capital® electrical design tools. This follows a successful deployment on the Haval SUV model.

The Capital product is an advanced software suite for the electrical systems and wire harness domain. Used by leading automotive OEMs and Tier 1 suppliers worldwide, the Capital tool is built to support the complex demands of integrated processes from initial product definition through electrical system design, harness manufacture and vehicle service.

GWM used Mentor Graphics Capital Logic™, Capital Integrator™ and Capital HarnessXC™ software for electrical system design and integration, and harness design of the Haval SUV. GWM deployed the Mentor® Capital generative flow, a breakthrough in the automation of systems integration. The generative flow automatically merges re-usable system signal connectivity data with physical topologies to synthesize fully-detailed vehicle wiring designs. This removes a huge part of the system integration task, saving time and improving quality. This benefit left GWM engineers free to innovate, for example by investigating a wide range of possibilities to determine the optimum electrical implementation in terms of cost and weight.

"The Capital suite provided a great improvement in data reuse and efficiency of system integration. It is also a practical product cost optimization tool. The benefits GMW will obtain from Capital will be even larger as we use the tools in a yet more sophisticated manner," said Xinhong Zhang, the project manager in Great Wall Motors.

"Using Capital GWM has achieved a very high level of development efficiency," said Nick Smith, business development director of the Mentor Graphics Corporation Integrated Electrical Systems Division. "This puts them in an excellent position as vehicle electrical systems become more complex and time-to-market cycles become ever shorter."

For further information contact Mentor Graphics at 8005 S.W. Boeckman Road, Wilsonville, Oregon 97070-7777. World Wide Web site: <http://www.mentor.com>



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# Cable and Harness Manufacturing: Productivity through Flexibility

Choosing a flexible wire cable and harness test system is part of a decision process that supports improved productivity. A truly flexible system will ensure usability, and thus investment longevity, across product lines, lifecycles, and generations. As a consequence, such a system must handle extensive product complexity, and have a comprehensive test portfolio. In so doing, it will remain relevant as product design changes. Naturally, the system must also provide fast, reliable, and accurate tests.

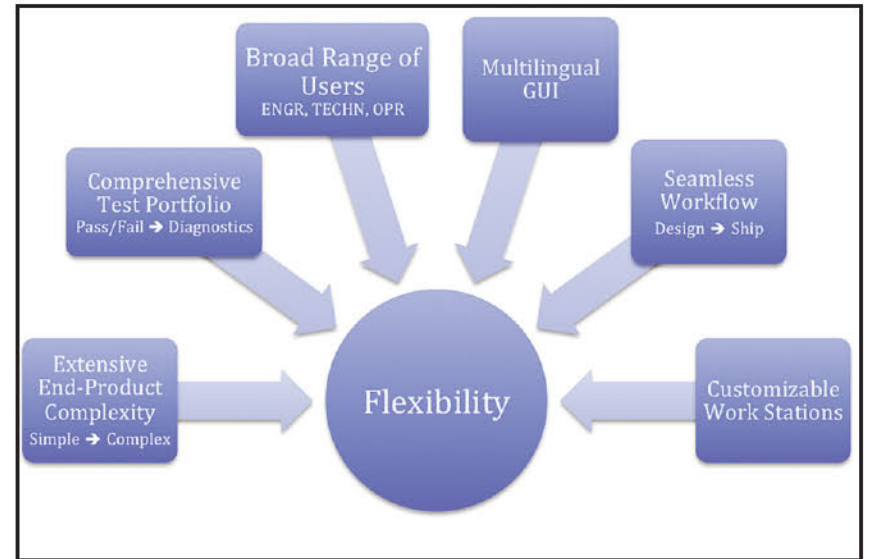


Fig. 1: Cable and Harness Test Systems Flexibility

### System Flexibility

A flexible system (Fig. 1) provides value to a broad range of users: It will address job function and language differences, supporting a seamless workflow from Design through Shipping. To help achieve this, the system must offer customizable workstations, touch screen compliance, and a multilingual Graphical User Interface (GUI). In so doing, the user sees

only the features required for their job function - whether full Engineering and QC design and test diagnostic capabilities, or simple pass/fail automated testing on an operator's no-frills, touch screen production floor workstation. We note that any system that offers a GUI is necessarily PC-based.

### Seamless Workflow

By way of example, consider a

workflow scenario for a new product, consisting of a mission-critical cable with a complex connector, destined for volume production (Fig. 2). To demonstrate how we can benefit from a flexible wire cable and harness test system, let us assume the product traverses a design-to-ship workflow that passes through prototype and pilot manufacturing stages, before being ramped to volume in assembly and production.

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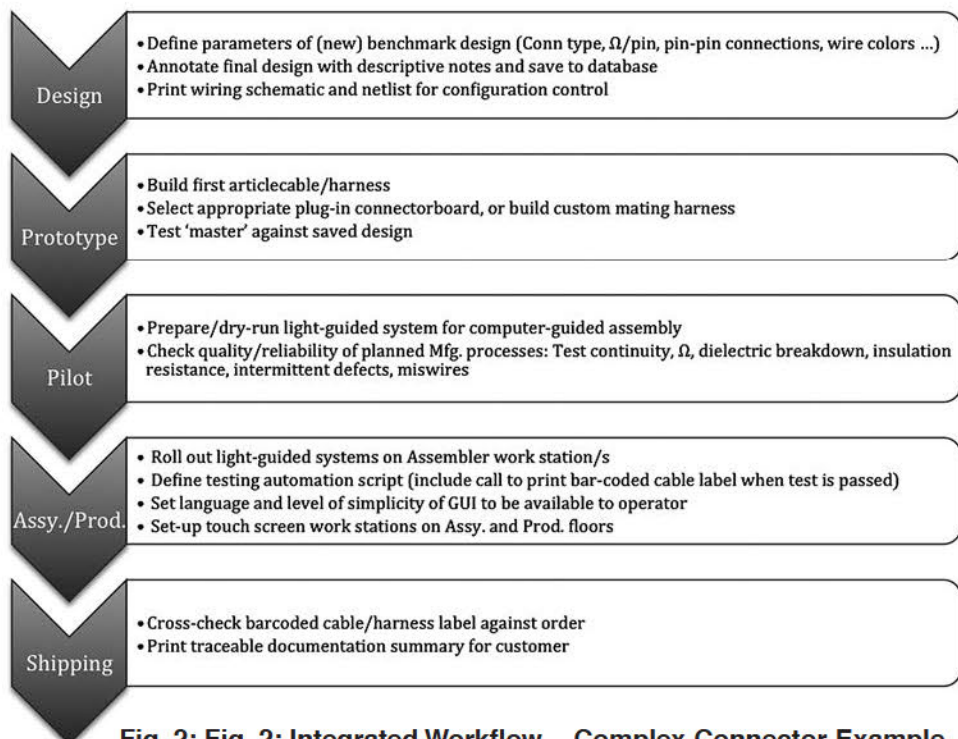


Fig. 2: Fig. 2: Integrated Workflow – Complex Connector Example

An engineer uses the design features to define the color-coded wiring schematic and netlist for the new product (Fig. 3 Page 33). S/he defines connector type, resistance per wire, pin-to-pin connections, and wire colors, and even the test data against which the prototype will be measured. The annotated design saves to the database for quick, error-free pick up at the next stage of the workflow - in this case prototyping.

At the prototype stage, engineers build the First Article ('master') cable (or harness) against the saved design and prepare the test interface for proofing the 'master'. This might involve simply selecting the appropriate plug-in test board if standard connectors are employed, or building a custom mating harness if the connector-types are unique.

In this scenario, the Pilot Line takes over, developing assembly and manufacturing processes then test-driving a

small production run to generate and verify a robust and manufacturable design. Since the product has a complex, mission-critical connector, the Pilot Line team wisely chooses to design-in light-guided assembly (Fig. 4) into the process. This will ensure fast production

of high quality product (CAMI Research reports that its Light-Guided Assembly System can as much as double assembly rates over manual methods while nearly eliminating errors (Fig. 4)). The Pilot Line

Continued on page 33

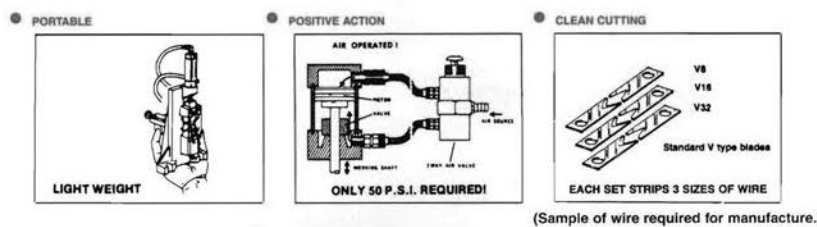


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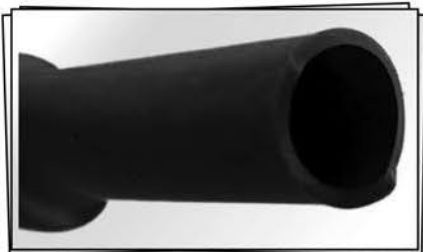
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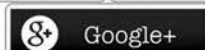
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# Cable and Harness Manufacturing: Productivity through Flexibility

Continued from page 31  
 team prepares a custom-mounting fixture using a light-guided assembly kit, and sets up the GUI on a touch screen to help streamline the main assembly line workstations.

Using the full suite of diagnostic tests (Fig. 5 Page 38), the Pilot Line team proceeds to check the quality and reliability

of the planned manufacturing processes. The test suite includes continuity, resistance, dielectric breakdown, insulation resistance, miswire, and intermittent defects. A truly flexible cable and harness test system will not be limited by connector type (or indeed whether a connector occurs at all), and will cope

Continued on page 34

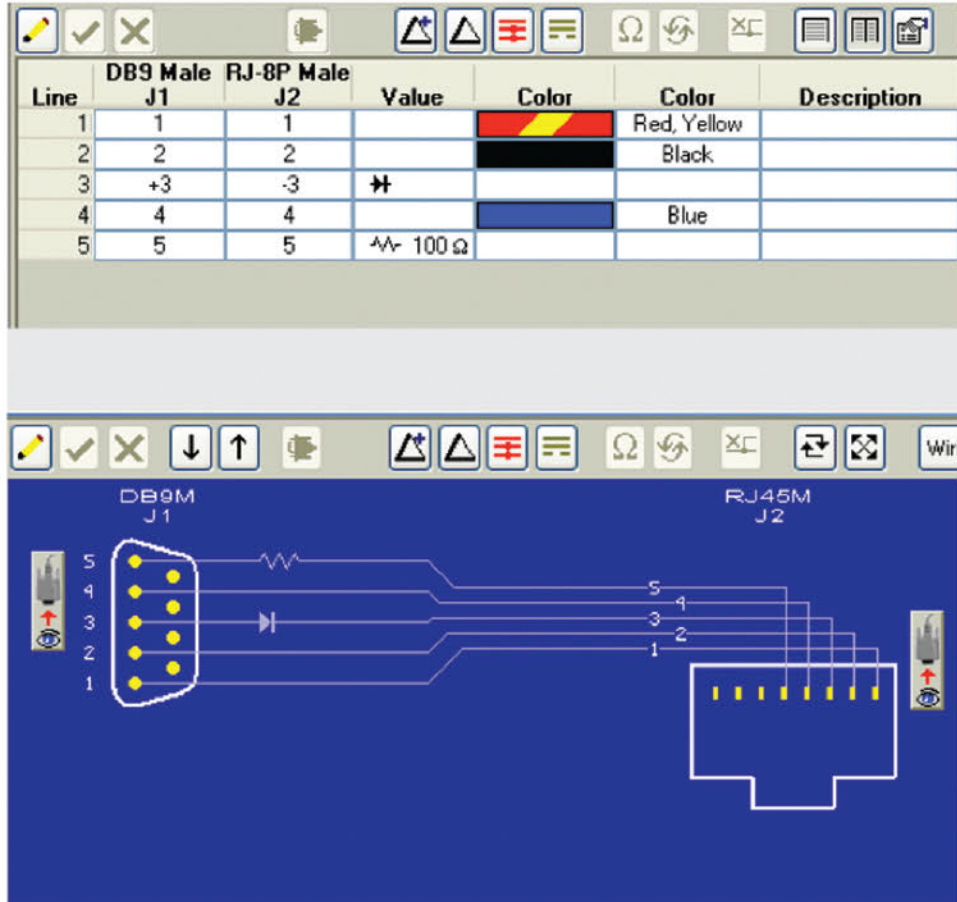


Fig. 3: CableEye Netlist and Schematic

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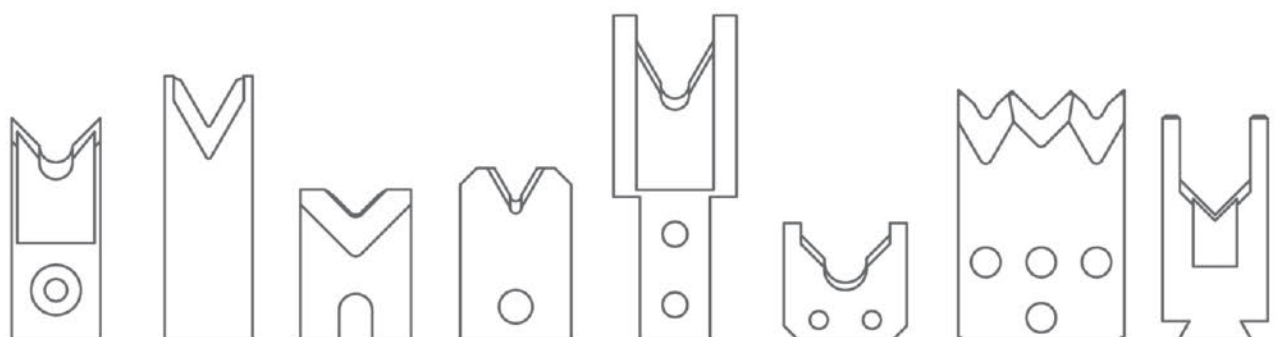
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# Cable and Harness Manufacturing

Continued from page 33

with long cables or no cables (e.g. backplane, PCB).

With success on the Pilot Line, Assembly and Production prepare for higher volume production. Engineers roll out light-guided assembly systems on Assembler workstations, define test automation scripts, and customize each GUI. Customization includes setting the language and level of simplicity of GUI required for each test operator, and loading the test automation shortcut onto each operator's touch screen test workstation. Being mission critical, the products need effortless traceability: the engineers include a call to print bar-coded labels when testing is passed - linking the product back to the schematics and data amassed in the test system's

database.

With flexibility comes versatility: The inherent breadth of completeness that comes with a flexible system, allows engineers to tap into a truly comprehensive list of test options (Fig. 5 Page 38) to customize automation scripts, and prepare a wide range of Pass/Fail tests for the production floor. Products that fail the scripted tests may be passed to other workstations (e.g. QC) for more complete, unscripted, diagnostics. This illustrates just one way in which a manufacturer may adapt a versatile system to the needs of the facility.

Our workflow scenario concludes at Shipping, where the worker crosschecks the barcoded product against the order, and prints impressive traceable docu-

mentation for the customer - including a batch test summary.

This seamless workflow only exists because of a test system with an adaptable, expandable, modular design, underpinned by a PC. Modern PC-Based systems have the advantage of being able to capitalize on full-screen high-resolution color graphics, high-speed computation, large storage capacity, full-sized keyboard, mouse, trackball, touch screen, voice control, and more, while being compact and unobtrusive on the test bench.

## Productivity

We can see that a test system this flexible encourages productivity at each workstation and across the workflow. At

the workstation level, it can be as complex as required for design and diagnostics, or as simple as required for automated pass/fail testing. Yet, significantly, there remains a common look and feel at each workstation level, allowing staff to become productive quickly as they switch between product lines, products, or between job function levels. Moreover, as the product line changes and grows, the system can adapt in concert. Different types of test systems are not required at each stage of the workflow, resulting in minimal cross training. Even when switching, for example, from a low voltage product line to a HiPot product line, operators need little retraining, as the flexible test system HiPot hardware and software have a very similar look and feel. Empowered by a common system (across workflow and product lines), managers and supervisors enjoy being able to reassign operators with ease and confidence when faced with day-to-day staffing issues such as unexpected absences.

Maximum investment longevity (an important consideration when purchasing equipment) comes with a Cable and Harness Test system that not only has expandable and upgradable capabilities, but also remains backwards compatible for all system hardware and software upgrades. Such backwards compatibility will provide confidence that the capital equipment, test fixtures, data-acquisition electronics, connector cards, and the procedures and processes into which the system becomes embedded, remain viable.

The level of flexibility discussed here and above exists with PC-based cable and harness test systems such as the CableEye® system from CAMI Research. A PC-based system not only tests cables, but also provides an integrated software package for cable design, labeling, documentation, cataloging, data logging, on-line assembly checking, and test scripting. It supports elimination of errors in transcription, drawing, and rekeying of wire lists as cables pass through design, test, and documentation phases. Christopher E. Strangio, President of CAMI Research, notes, "Our customers report amazing increases in productivity using CableEye. They have measured production time

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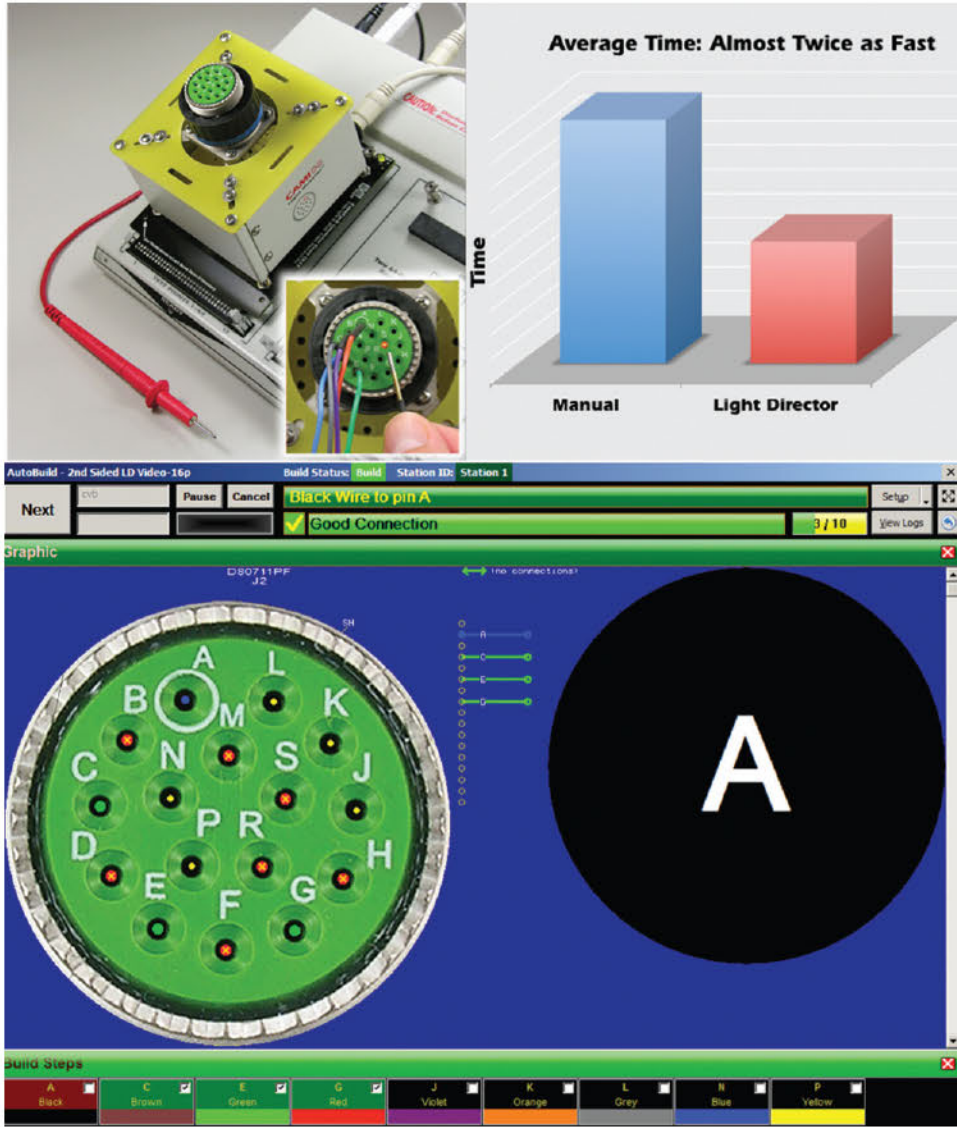
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Continued on page 38

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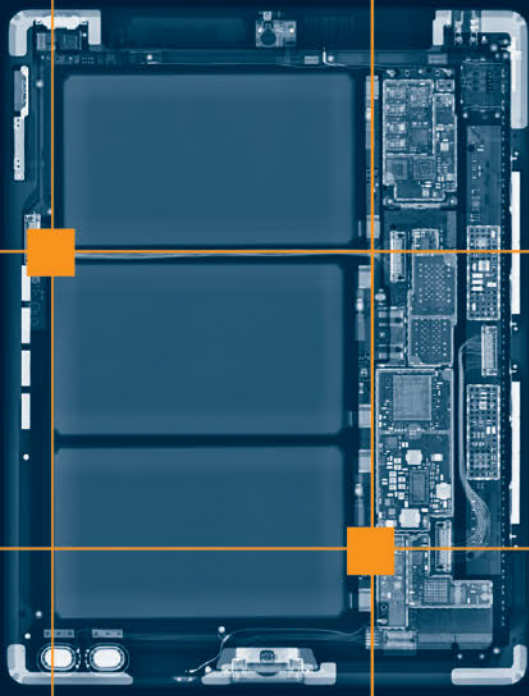


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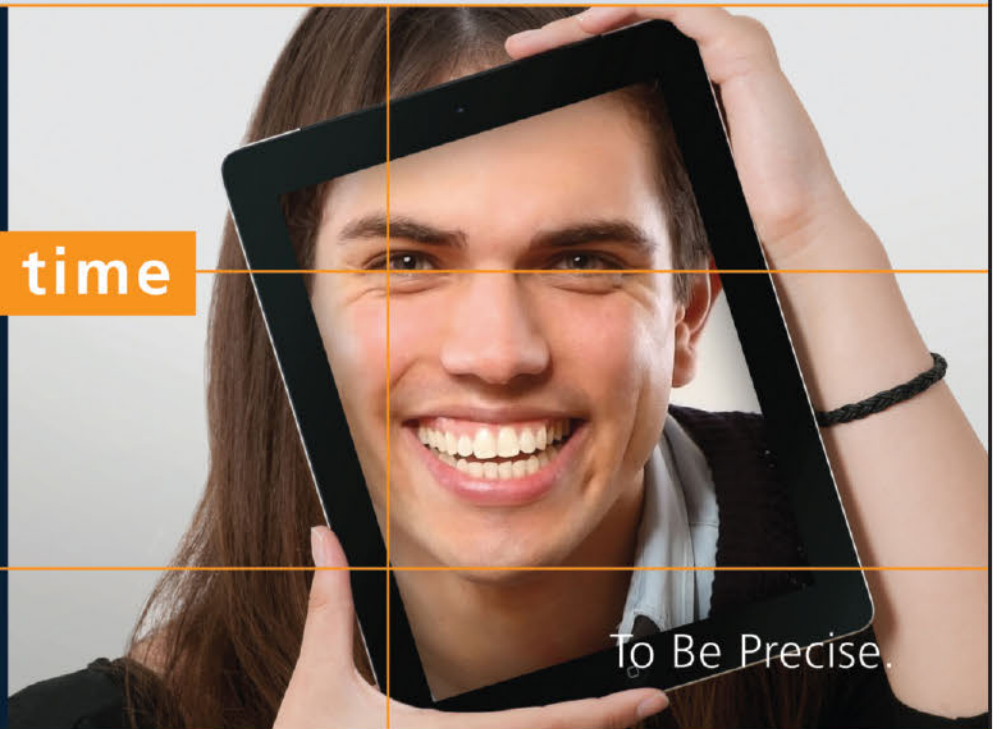
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## Cable and Harness Manufacturing: Productivity through Flexibility

Continued from page 35

reduction in just the first few hours of use." He adds that, "Significantly, for PC-based systems, new software advances can be applied to years-old hardware to keep pace with new test automation and reporting requirements. In fact, several of our customers are still using 15 year old CableEye systems because they

have been able to keep them relevant by installing software updates."

PC-based cable and harness test systems provide the flexibility that supports improved productivity. They ensure usability, and thus investment longevity, across product lines, lifecycles, and generations, and will remain relevant as product design changes.

*CAMI Research produces expandable*

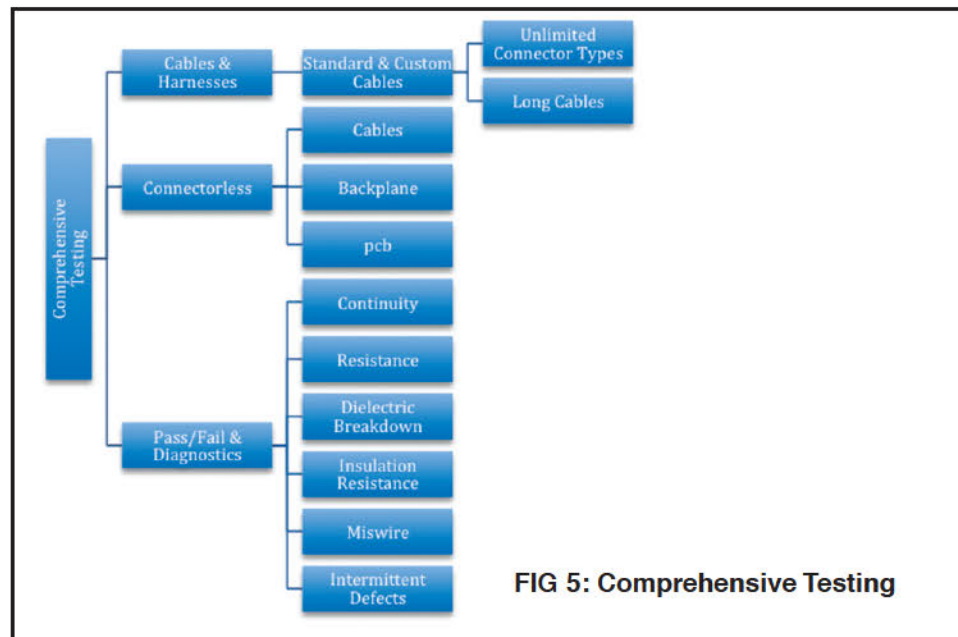


FIG 5: Comprehensive Testing

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## Schleuniger, Inc. to Debut New Cut and Strip Machine at Electrical Wire Processing Expo

and upgradable diagnostic Cable & Harness Test Systems for assembly, prototyping, production, and QC of standard or custom cables. CableEye® Testers display, and document basic electrical properties such as continuity, resistance, dielectric breakdown, insulation resistance, miswires, and sporadic defects

Schleuniger, Inc., a leading international manufacturer of high-precision wire processing machines, will be among the over 145 world-class suppliers and service companies to

exhibit at the 2015 Electrical Wire Processing Technology Expo. Now in its 15th year, this exclusive showcase for the wire and cable processing industry will be held May 13 - 14, 2015 at The Wisconsin Center in Milwaukee, WI. Schleuniger will be at booth #1631 providing hands-on demonstrations of innovative solutions for stripping, cutting, sealing, crimping, and marking of all types of wire and cable.

For the first time at the Electrical Wire Processing Technology Expo, Schleuniger will show its newest cut and strip machine, the MultiStrip 9480. The new MultiStrip 9480 furthers Schleuniger's position as the worldwide leader in rotary stripping solutions. The machine's high resolution indexing cutter head and programmable rotary incision capability set the benchmark for high precision processing of coaxial and other shielded cables. The MultiStrip 9480 family offers various machine versions to meet your specific production needs. With many additional options and accessories, the MultiStrip 9480 can handle a nearly endless range of applications. Designed with efficiency in mind, the SmartBlade system and magnetically held guides increase output and maximize production by reducing changeover times.

Another new product Schleuniger will unveil at the show is the PreFeeder 4300; a compact cable feeding system for cable reels weighing up to 400 kg (880 lbs.). The system distinguishes itself through its simple design and ease of use. The shaftless design for easy loading and unloading of reels along with motorized axes allow reel hand-

ing with just one person. The machine's high feeding dynamic allows for higher production rates and increases the economic efficiency of the entire processing line.

In addition, Schleuniger will debut the new CT 65 wire crimping machine. The CT 65 is a hydraulic press with 15 tons of crimping force. It features quick-release mechanisms for fast die changes as well as programmable

*Continued on page 40*



CT 65 Wire Crimping Machine

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# Schleuniger, Inc. to Debut New Cut and Strip Machine at Electrical Wire Processing Expo

Continued from page 39

die close and open positions to minimize stroke and processing times. Up to 30 jobs can be stored in memory for easy recall and programs can be secured with a key switch.

The UniCrimp 100 will also be highlighted. The UniCrimp 100 is a benchtop crimping machine that delivers up to 2 tons of force. The safety guards can be completely opened to allow easy access to the working area along with simple, fast changeover, adjustment and set up times. The UniCrimp 100 accepts most applicators on the market and provides quality crimping for wires up to 6mm2 (10AWG).

Additional products to be demonstrated include the CrimpCenter 36 S, S.WOP software for wire optimized production, MegaStrip 9650, PowerStrip 9550, StripCrimp 200, UniStrip 2300, and RotaryStrip 2400 among many others.

In addition to exhibiting at the trade show, Schleuniger's Senior Product Manager, Rob Boyd, will present an educational seminar on "Comprehensive Quality for Wire Processing." The presentation will be held on Thursday, May 14, 2015 at 10:30 am in room 201 and is open to all attendees. Quality pertains to many facets of production. Designed to educate attendees on the current quality trends and solutions that are available today in the

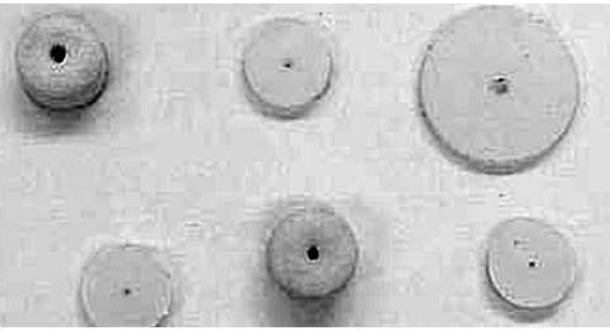


**MultiStrip 9480  
Cut and Strip Machine**

wire processing industry, the presentation will cover the importance of quality in every area from bench-top processing to production with automatic termination machines.

More information can be found at [www.schleuniger-na.com/wpte](http://www.schleuniger-na.com/wpte). Should you have any questions, please e-mail [sales@schleuniger.com](mailto:sales@schleuniger.com) or call (603) 668-8117.

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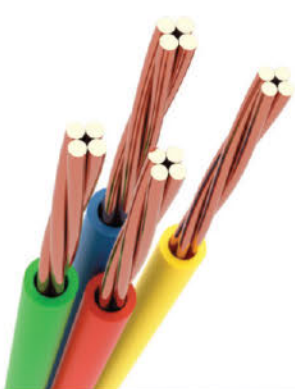
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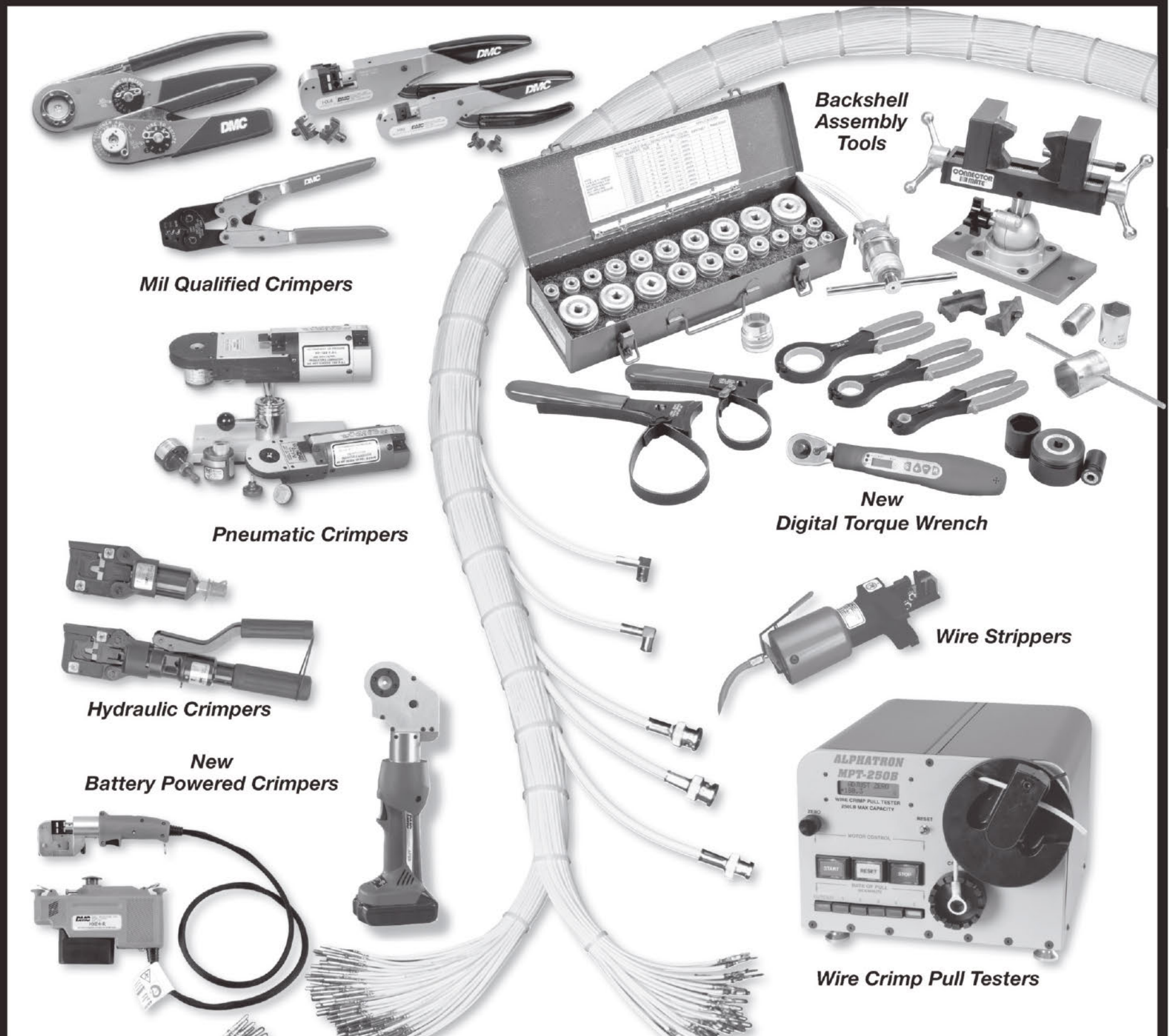
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Visit Daniels Manufacturing at the Electrical Wire Processing Technology Expo in Booth #1319

# Segue Manufacturing

Continued from page 1

by working hard and trying to get other companies to believe in me."

Before CDM he worked six months in the cable division of QPL Electronics in Billerica that did contract manufacturing for major military customers. The division was shut down due a poor economy.

That short stint followed two years of unemployment. From October 1979 to December 1987 Roderick directed the quality and testing departments at Keytek Instrument Corp. in Wilmington, Mass. The firm made electrostatic discharge simulators and surge generators.

"Lots of companies outsourced cables in the early '90s, and they were

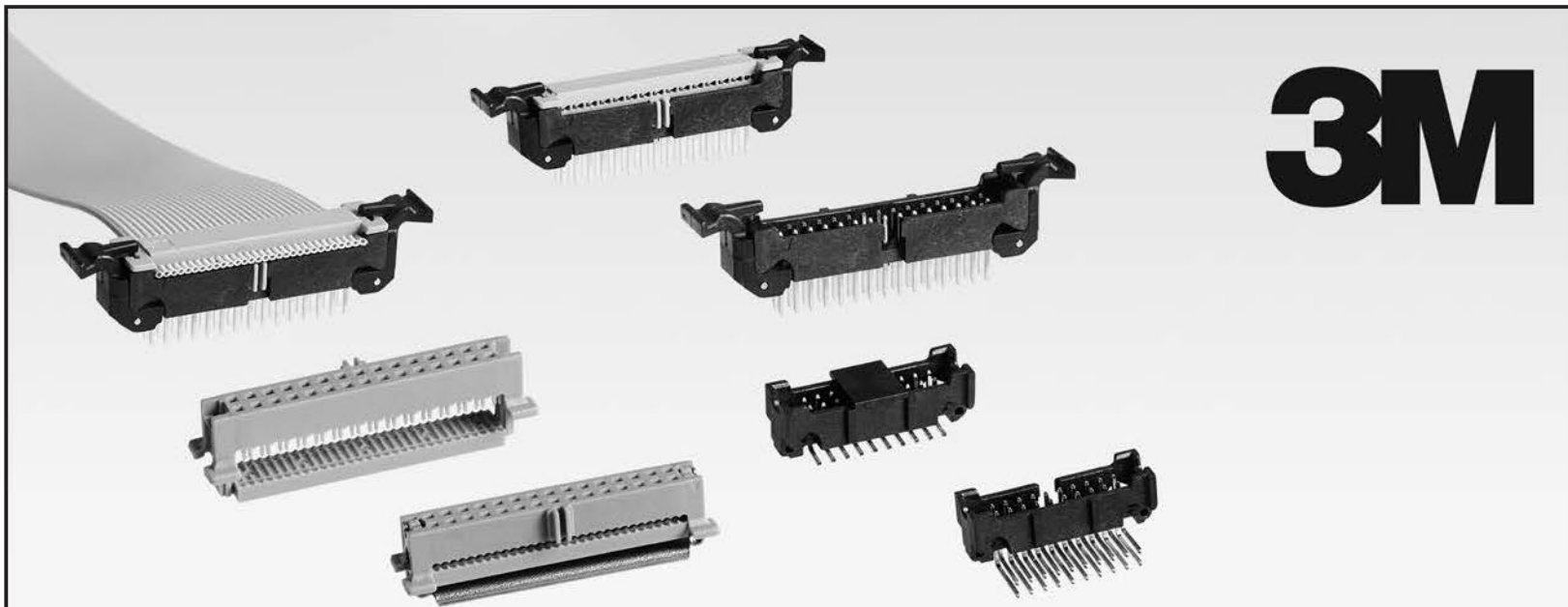
the easiest point of entry into the market," Roderick said. "As CDM got more mature, we went after electromechanical assemblies. They were a real key for us because one of them can cost \$1,000 versus \$1 for a cable."

CDM flourished the next 16 years, becoming a multimillion-dollar firm. It relocated four times, going from 100 to 2,500 to 6,000 to 25,000 square feet before finally settling into its current 45,000-square-foot facility in 1999. Next door is a 6,000-square-foot warehouse that stocks items produced at the 100,000-square-foot Xiamen facility.

With Roderick's success came periodic inquiries about buying the business. "I didn't give them serious thought until I worked at trying to make CDM a more



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- Multiple configurations available

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- Extremely small: .050" pitch
- Enables mass termination
- Innovative header ejector latch mechanism
- Multiple configurations available

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global company that would serve companies in the United States and a low-cost region such as Mexico or China," he said. Since he founded it, CDM primarily had customers in New England.

Raising funds from others to supplement his own did not total what Roderick needed. "Then I realized it was time to get something back from all the hard work I had put in. People with the same vision as me for the company approached me," he said.

The sale of CDM occurred in December 2007 to the private equity investment firm Axia Partners in Burlington, Mass., but Roderick remained with the new company of Segue Manufacturing Services as a major stockholder. He serves on the Segue board of directors with chairman James Pelusi, Peter Simone, John O'Connor and Wayne Meng.

Pelusi is a managing director and cofounder of Axia as well as Valero Capital Partners in Lowell, and Simone consults with private companies and investors. O'Connor, former vice chairman of services for PricewaterhouseCoopers, serves on the boards of Abt Associates, mTuitive, Oversight Systems, LeMaitre Vascular, G6 Capital and the Dana-Farber Cancer Institute.

Meng is president and CEO of PMD Healthcare in Allentown, Pa. Before PMD, he founded and headed Sanbor Corp. in Xiamen. The firm was a cable assembly contract manufacturer, and one division was Sanbor Interconnect (SI).

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To extend the international reach of Segue as Roderick envisioned, in 2009 it purchased SI and named it Segue Asia. It is managed by Stephanie Lin, who began with SI in 1996. Before that she did engineering at ITT Cannon and Leoni Group.

"Our mission is to provide a low-cost solution for customers in the United States and overseas, and we do that through a mixed model for the most competitive cost," Roderick said. "We procure materials in a low-cost area and then manufacture them in the U.S. or have more integration in China and the final work in the U.S."

Unlike many other U.S. harness and

cable companies subcontracting manufacturing overseas, Segue owns the Xiamen facility, a significant point, according to Mark Griffith, 48, Segue vice president of global sales and marketing since November. He has experience in executive positions with American Battery Company, ACT Electronics, Interconnect Systems, Calgreg Electronics and Heiland Electronics.

"We have our systems in place over there," Griffith said. "Bill and our management team travel there, and the China team comes to Lowell. There is a yearly

*Continued on page 44*

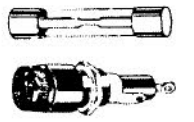


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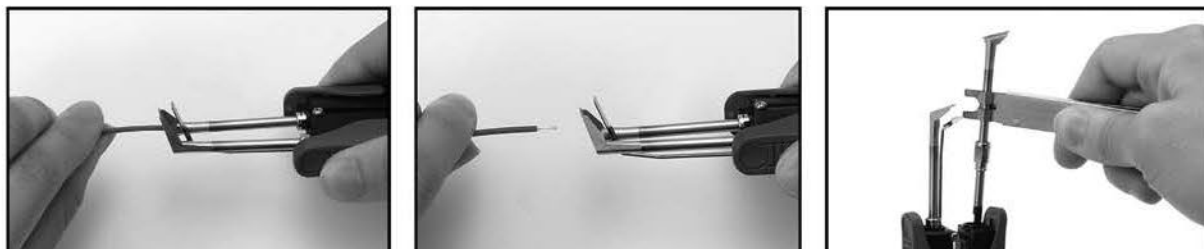
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# Segue Manufacturing

Continued from page 43



Electromechanical Assembly at Segue.

quality and facility audit done, and it was very successful on our recent trip on January."

Lowell is approximately 8,000 miles from Xiamen, but the distance is overcome by communication. "My philosophy is that no matter how distant we are in miles we become one as a company," Roderick said. "There are a lot of conversations back and forth, and our people are very flexible."

"They work with the 12-hour time difference between the two facilities and make it as seamless as possible," said Roderick, who visits the Xiamen facility every six weeks. "It's really a 24-hour schedule. They bond and make it a team



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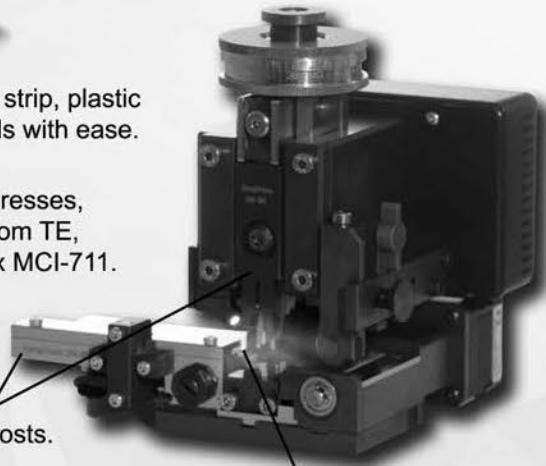


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atmosphere.”

Coordination of projects, orders, products and operations between the two staffs is according to ISO 9001:2008, ISO 13485, UL, CSA, CE, IPC-WHMA A-620 and IPC J-STD-001 certifications. Segue Asia also has ISO/TS 16949:2009 certification, while Segue U.S. has ITAR registration.

“Our credentials cause us to rise to the top,” Griffith said. “A lot of companies do what we do, but when you add our credentials the list gets shorter and shorter. We’re a strong company based on our product breadth and our credentials and how we help our customers.”

Roderick echoed the importance of such strengths when a customer is intent on reducing its supplier number. “We can be one vendor versus a customer dealing with many of them and having a higher overall cost,” he said. “We’re good at offering a customer ways of integrating it all together and seeing a cost savings. Buying just one part number instead of several makes the purchasing manager or the director of procurement look good and earn the kudos of management.”

As much as Segue is focused on cost, service is most important, Roderick stressed. “We value how we deal with customers on a day-to-day basis,” he said. “You can always be the lowest cost, but if the relationship with the customer is not there, cost does not matter.”

Serving Segue customers is accomplished by 500 staff members – 100 in Lowell and 400 in Xiamen. The breakdowns of production and administrative staffers are 65 and 35 percent in Lowell and 80 and 20 percent in Xiamen. Annual staff turnover is almost nil in Lowell and 5-10 percent in Xiamen.

“We try to be creative to keep people happy,” Roderick said. “I’d say my management style is impromptu. I walk the production floor so I am visible. A big thing for me is problem-solving, and I task my people to creatively solve problems in their own work areas. If they take initiative and are engaged with the development of their own future and that of the company, that gives them more opportunities to grow and get promotions.”

While Lin manages the Xiamen factory, her Lowell counterpart is Chris Brothers, VP of operations and supply chain. He has been with CDM and Segue since 1998 in supervisory and managerial positions, and he

has been a lead electrical technician at Crowe Electrical Services and owner of CJ Brothers Electrical Contracting.

Pete DiDomenico, who joined Segue four years ago, is the chief financial officer. Jeff Shupe directs human resources, accounts payable and accounts receivable. He has been with CDM and Segue since 1998.

According to Griffith, cable assemblies account for 60 percent of production, with the 40-percent balance spread among other products, led by electro-mechanical assemblies. He noted growth areas are cables for the medical industry, of which New England is the

second largest area in the United States, as well as power-distribution boxes and robotics.

Production runs range from one to one million pieces per year. The number of major customers is 25, which account for 80 percent of orders. Customers are located throughout the United States and especially in New England, the Midwest, California and Texas. China customers are in Shanghai, Hong Kong and Shenzhen.

Segue annual revenue, currently at \$50 million, has doubled since the transition from CDM in late 2007. Growth was 10 percent in 2010 and 20 percent



Potting and Overmolding cables.

Continued on page 44

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# Segue Manufacturing

Continued from page 45

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Unlike many other U.S. harness and cable companies subcontracting manufacturing overseas, Segue owns the Xiamen facility.

in 2011, but the last three years have been flat, Roderick stated, pointing out a major customer went out of business before the plateau. Had that not happened, growth would have been 25 percent.

The Segue business plan calls for growth at 10 percent annually the next four years. "We're going after new business very aggressively," Griffith said. "We need more recurring revenue where we do more business at existing locations. We'd like to get a champion in each location to help us expand our business at other locations at our corporate account."

Griffith directs a sales effort that includes two employees in Lowell, one in Pennsylvania and five manufacturers reps across the United States. Five customer service reps are in Lowell and three in Xiamen. Their work is bolstered

by a Web site, two trade shows this year, e-mail and direct-mail campaigns, a newsletter and press releases.

"I like playing a role in the sales aspect and dealing with customers," Roderick said. "I like the challenge of trying to solve problems for customers. I communicate to the sales team that they should convert problems into sales."

Roderick recognizes numerous challenges that arise in such a complex, demanding industry. "The main one is to continue to be as dynamic as possible," Roderick said. "If you are not like a chameleon and always change, you won't be around to service customers, have your employees taken care of and create opportunities for companies to grow."

For more information, visit [www.segue-mfg.com](http://www.segue-mfg.com) or write 70 Industrial Ave. E., Lowell, MA 01852.

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**NEWS PLUGS** continued



**BURNDY Announces New Southeast  
Regional Sales Manager**

BURNDY®, a leading manufacturer and provider of connector solutions to the industrial, energy, construction, telecommunication, petrochemical, data center, and transportation industries, is pleased to announce the promotion of Mr. Mike Hennings to the position of Southeast Regional Sales Manager. He will report to Warren Jenkins, VP Sales & Marketing. He assumed his new role on February 1, 2015.

Mike will lead the Southeast Region sales team which includes Alabama, Arkansas, Florida, Georgia, Mississippi, Tennessee and Puerto Rico. Mike will lead both the C&I and Utility Sales Force.

Mike is currently a Field Sales Representative in South Florida.

He has had excellent results in both Louisiana and South Florida markets. He has consistently exceeded sales targets and done an excellent job with the Miami Export Distributors.

Before joining BURNDY, Mike was an Account Manager with CED in Baton



**Mike Hennings, BURNDY  
Southeast Regional Sales Manager**

Rouge. He managed a diverse customer base and delivered strong results. Mike achieved EPEC Bronze Certification from NAED. He was part of the CED Management Training Program from 2007-2008.

Mike holds a BS in Psychology from the University of Florida-Gainesville and participated in the clinical Psychology Doctoral Graduate Program at Louisiana State University-Baton Rouge. Mike and his family will continue to live in the West Palm Beach, Florida Area.

For further information visit website [www.BURNDY.com](http://www.BURNDY.com)

**Visit these companies at the Electrical Wire  
Processing Technology Expo**

**Connector Micro ToolingSystems Inc, Booth #1354**

# Looking to reach new customers?

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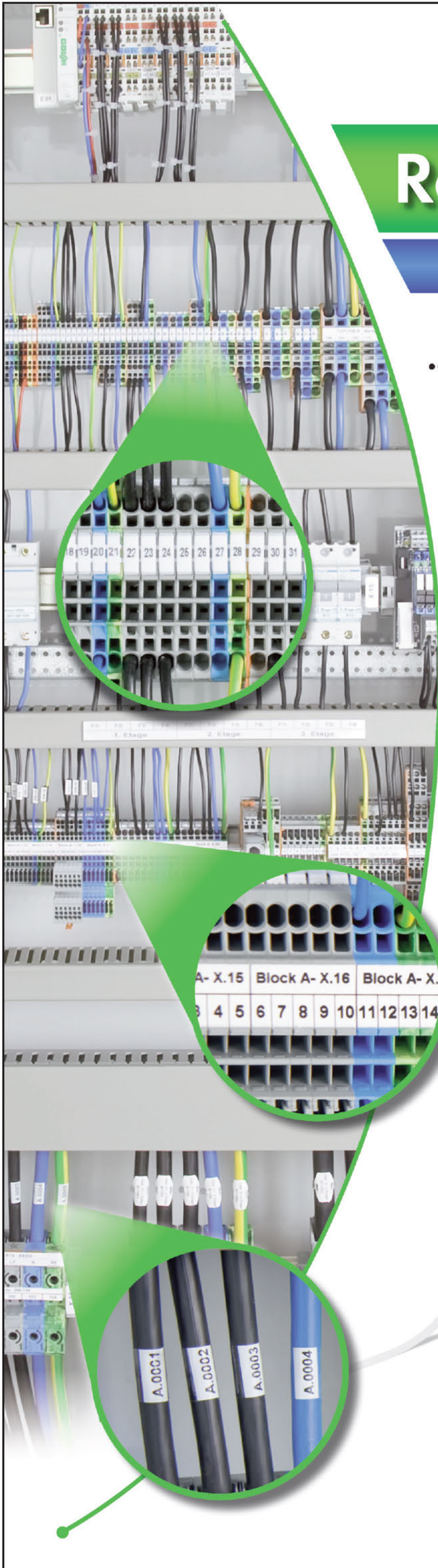
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**NEWS PLUGS** continued



**Partex Marking Systems, Inc. Moves to New Location**

Partex Marking Systems, Inc. has relocated their office and warehouse to their new 10,000 square foot facility at 1155 North Main Street, Lombard, IL 60148.

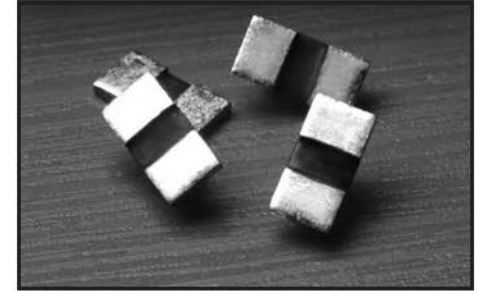
A leading manufacturer of wire marking/identification products with over 60 years of industry experience, the move of the USA branch is necessitated by increased growth and overwhelming demand for the Partex brand in North America.

"The move makes sense". Says Barb Susmilch, General Manager of Partex Marking Systems, Inc. "We have always been highly committed to the success of our customers. That means being certain that we have sufficient amounts of product and well trained staff in place to help our customers succeed".

For more information, please contact Partex Marking Systems at 630-516-0400.

**Amphenol OCS High-Speed Connectors**

Amphenol OCS connectors (oval contact system) are the newest high-speed interconnects delivering data rates of up to 10 Gbps per pair. The Amphenol OCS



**TLR2HW Metal Plate Chip Current Sense Resistor**

series features improved signal integrity via reduced cross talk. OCS offers enhanced attenuation performance as compared to other industry-standard quadax high-speed connectors.

This rugged, durable connector is ideal for high-speed data transfer applications using protocols such as HDMI, 10G Base T, SATA 3.0, Serial RapidIO and more for the military, commercial and industrial markets.

Amphenol OCS Series Feature:

- High Density: contains (4) 100 Ohm differential pairs capable of delivering data transfer of speeds of 10Gbps per pair
  - Size 13 MIL-DTL-38999 connector shells
  - Front release rear removable contact system for easy repair
  - Solder or PCB tail contacts available
  - Meets environmental requirements of MIL-DTL-38999
  - Uses off-the-shelf Mil Spec backshells
- For further information visit <http://www.peigenesis.com/>

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### Mechtrix Prefeeders Optimize Your Capabilities

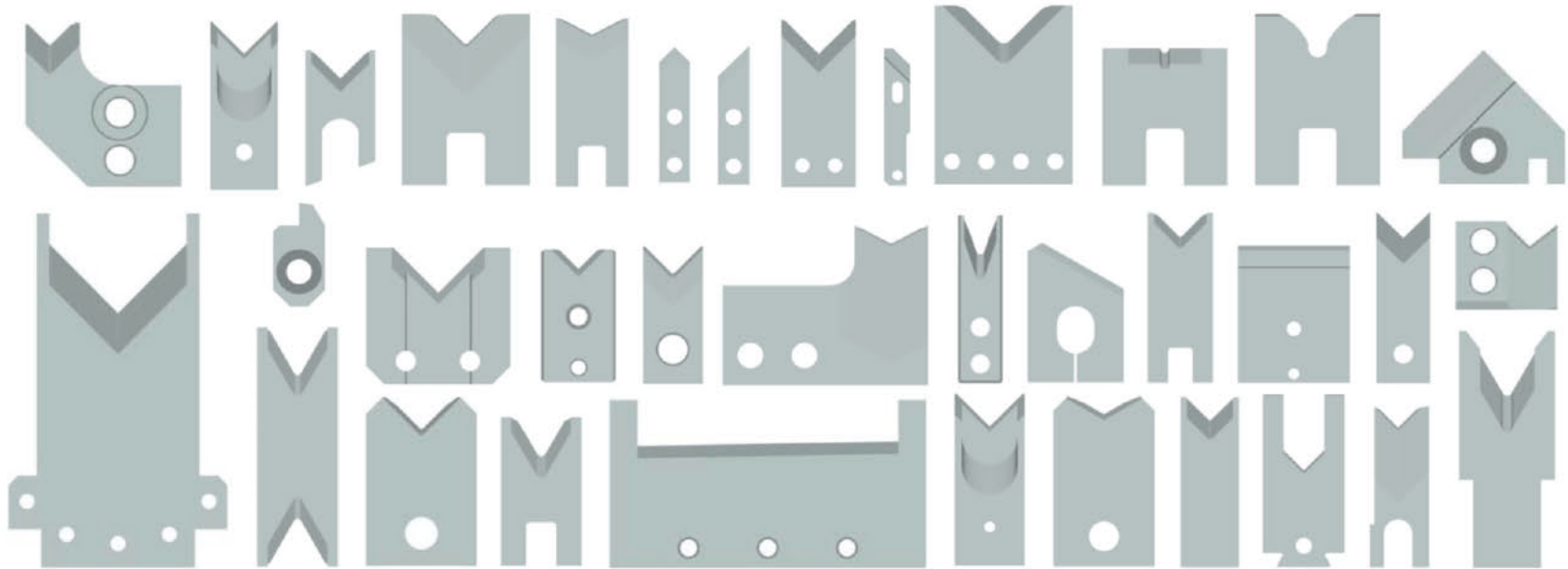
- MPF-33 Prefeeders for bench-top wire processing machines
- MPF-35 Prefeeders for high speed fully automatic wire processing machines



### Mechtrix Stripping Blades

Mechtrix designs and manufactures standard replacement and custom stripping blades for:

- |               |               |           |                 |                   |                      |
|---------------|---------------|-----------|-----------------|-------------------|----------------------|
| • Amp/Tyco/TE | • Ideal       | • Kirsten | • Kut-Rite/Weix | • Schäfer/Megomat | • Tekuwa/Dorema      |
| • Artos       | • KM Digitech | • Koderia | • Makfil        | • Schleuniger     | • Toyojamco/JAM      |
| • Eubanks     | • KMI         | • Komax   | • Metzner       | • ShinMaywa       | • and many others... |



### Mechtrix Equipment

Mechtrix has designed a number of unique machines to solve specific wire processing problems. These machines range in complexity from our patented center stripping machines to terminal paper winding machines. These machines include:

- |   |  |
|---|--|
| • Wire Prefeeding Equipment                   | • Terminal Carrier Strip Cut-off Devices |
| • Heavy Duty Benchtop Wire Stripping Machines | • Terminal Paper Winding Machines        |
| • Automatic Center Stripping Machines         | • Terminal Applicators                   |



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 Menomonee Falls, WI 53051  
 Tel (262) 255-6555  
 Fax (262) 255-2628  
 sales@mechtrix.com  
 www.mechtrix.com

**NEWS PLUGS** continued**Saki Corporation Expands its Operations in the Americas**

Saki Corporation, an innovator in the field of automated optical inspection equipment, announces that it has expand-

ed its operations in the Americas. As part of the expansion, Saki America has signed an agreement with Lean Stream LLC to be its representative for the western United States. In addition, Satoshi (John) Otake, deputy general manager, is heading up operations for Saki America, with headquarters located in San Jose, California. Quintin Armstrong has been hired as general manager, North America sales and service, based out of Florida.



Mr. Robert Jones, president, Lean Stream, and Mr. Satoshi (John) Otake, Deputy General Manager, Saki America, Inc.

Lean Stream provides LEAN solutions to meet the SMT manufacturing needs of the EMS and OEM community in Northern California, Nevada, and the Pacific Northwest. They will represent Saki's complete line of 2D and 3D automated optical, x-ray, and solder paste inspection systems.

Armstrong has over 20 years of experience in sales and field engineering management in the electronics and general automation industries, specializing in managing international business. He was previously with Panasonic Factory Solutions. Armstrong will oversee the Saki America sales and service team for the East Coast, Midwest, and South.

"Saki has experienced exponential sales growth in Brazil, Mexico, and the United States in 2014 and in response has

expanded its Saki America operations," said Otake, who has been with Saki for over 15 years. "One of the reasons for our rapid growth has been our new 3D automated optical, solder paste, and x-ray inspection systems. We are excited that Quintin has joined our team, and know that Lean Stream will be a powerful partner in supporting our 2D and 3D products that are capable of inspecting even the most complex PCB assemblies. Our expansion in the Americas enables us to provide even more service and support to our new and existing customers."

For more information email Saki at [saki.us@sakicorp.com](mailto:saki.us@sakicorp.com), call +1 408-456-0332, follow us on twitter at [www.twitter.com/SakiCorp\\_us](http://www.twitter.com/SakiCorp_us), or visit our website at [www.sakicorp.com](http://www.sakicorp.com).



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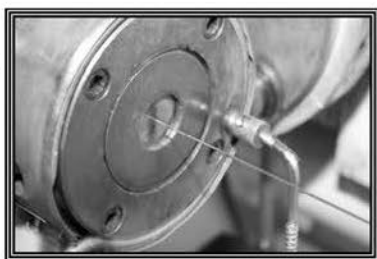
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Industrial Wire and Cable Corp. has been manufacturing wire and cable products for over 40 years. We only produce the highest quality products at competitive prices. Our manufacturing process begins with 5/16 copper rod so we can control all tolerances to the highest standards in our state-of-the-art facility, located in Lake Zurich, IL.

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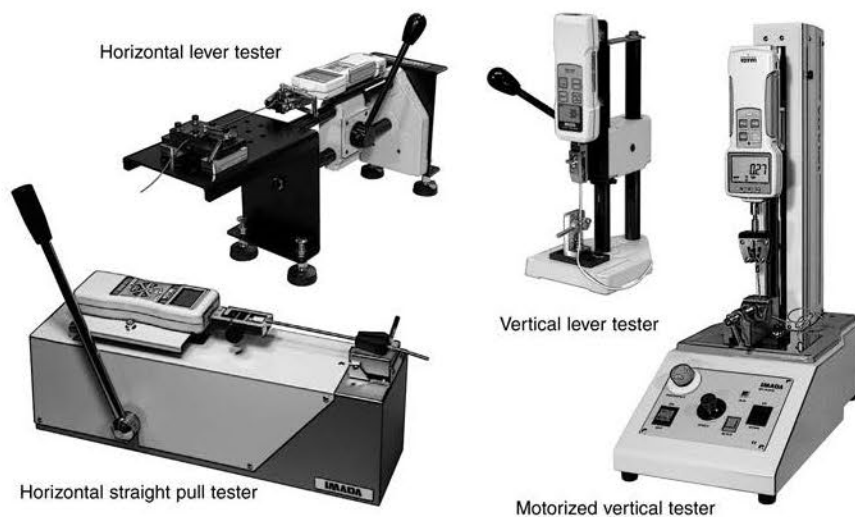
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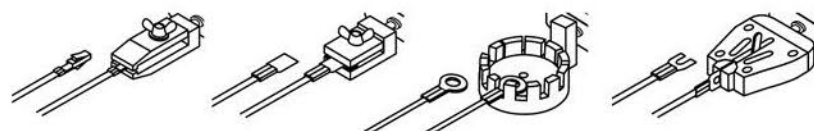
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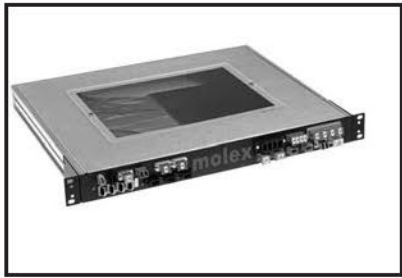


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### Molex OptoConnect™ Custom Optical Enclosures Integrate Sophisticated Fiber Circuitry

Molex Incorporated recently launched its OptoConnect™ Custom Optical Enclosures. Designed to simplify complex fiber optic mapping issues, OptoConnect fiber routing



**OptoConnect™ Custom Optical Enclosures**

ing system using integrated FlexPlane™ optical circuitry provides a complete end-to-end optical management system that interfaces with various manufacturers of high density telecom and datacom equipment used in communications systems.

"Advanced network architectures are driving complex fiber optic interconnection topologies, which are nearly impossible to implement with patch cord based connections," states Tom Marrapode, director of marketing, Molex.

Fully tested and NEBS compliant, OptoConnect custom fiber optic enclosures handle the most complex routing schemes to greatly reduce intra-system cabling footprints and increase system reliability. By integrating high density fiber optic circuits, interconnects and optional passive components, the sophisticated OptoConnect enclosure system can streamline complex ingress and egress fiber port mapping for interconnect intensive technologies, including mesh networks, wavelength selective switching, and software defined networking / network function virtualization topologies.

Complementary products such as MPO and LC loopback connectors and MTP/MPO LC cable assemblies fill out the offering to provide a complete optical interconnect solution set. Customers also have the option to have Molex design an enclosure to meet their product specifications or use their own internal design that complements their equipment styles.

For additional information about OptoConnect Custom Optical Enclosures with FlexPlane circuitry please visit [www.molex.com/link/optoconnect.html](http://www.molex.com/link/optoconnect.html) and [www.molex.com/fiber/flexplane.html](http://www.molex.com/fiber/flexplane.html). Please sign

up to receive the Molex e-announcement newsletter at [www.molex.com/link/register](http://www.molex.com/link/register).

### Portable Wiring Tool Kit Cuts Cable Jacket, Insulation and Strips Wire

An upgraded tool kit with three essential hand tools that store in a handy trifold canvas pouch for all types of wire and cable preparation and repairs is being introduced by Xuron Corp. of Saco, Maine.

The Xuron® TK2300 Wire Harness Tool Kit features the three tools used most for assembly and field service wiring applications all packed into a handy trifold canvas pouch that fits into a tool kit or pocket. Included is the Model 440 precision scissor for slitting coaxial cable jacketing and cutting foil insulation, Model 2175 Maxi-Shear™ flush cutter for wire up

to 12 AWG, and the Model 501 thumb adjustable wire stripper-cutter for 10 to 26 AWG.

Suited for professionals who need to assemble, install, or repair wire and cable in a facility or in the field, each tool in the Xuron® TK2300 Wire Harness Tool Kit is ergonomically designed with soft rubber hand grips, no finger loops, a Light Touch™ return spring, and a non-glare black finish. The canvas pouch has pockets for each tool and a hook & loop closure.

For further information contact Xuron Corporation, 62 Industrial Park Rd. Saco, ME 04072-1840. Phone (207) 283-1401 or Fax (207) 283-0594. Visit [www.xuron.com](http://www.xuron.com)

**January 2015  
Electronic Components International Inc.  
Acquired  
Global Harness Systems Inc.**

**Blue Valley Capital llc  
Acted as an advisor to  
Global Harness Systems Inc.  
in the transaction**



**Blue Valley Capital llc**  
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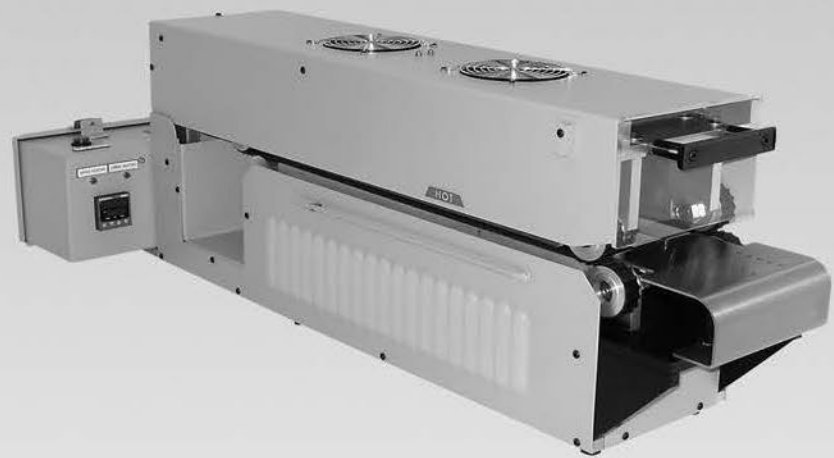
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## HEAT SHRINK APPLICATION TOOLING

### Belt Heater for Heat-Shrinkable Tubing Products

#### Product Facts:

- Closed-loop speed and temperature control
- Continuous controlled process
- Adaptable for different applications
- Heater operation and over-temperature alarm lights
- Benchtop Design



## RAYCHEM MODEL 16B TABLETOP BELT HEATER

### Applications

The Model 16B is our smallest (tabletop) conveyor type processor which provides a controlled process for a wide variety of heat-shrinkable tubing products.

Double-sided timing belts on the top and bottom of the processing chamber draw the assemblies through a thermally controlled infrared heat zone and then through a fan-cooled cooling zone before depositing them into the unloading bin.

### Controlled Heating Zone

The Model 16B processor has two stamped foil heating elements that are manufactured to a strict wattage specification. Consistent temperatures (ambient to 650° C) are controlled by a thermocouple embedded into the upper heating element connected to a closedloop temperature controller. An alarm light illuminates whenever the actual heating element temperature varies from the set point temperature.

### Speed Control

The belt speed is selected using a 3-digit thumbwheel via a closed-loop motor controller and DC gear motor.

### Minimal Skill Requirements

There are clearly marked guides for aligning the assembly as well as the tubing or device. The operator only has to center the assembly then the tubing and slide it into the belts. The belts carry the assembly through the heating and cooling zone, depositing them into the bin.

Labor costs are reduced significantly because once an operator loads an assembly, that operator can begin preparing another assembly. The throughput rate is usually limited by the rate at which the operator can load assemblies into the process.

### Versatility

The processor is designed to process a broad range of heat-shrinkable products up to 19 mm [0.75"] in diameter and 90 mm [3.5"] in length. Heat output can be controlled to accommodate a wide variety of products and substrates.



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# 15th Annual Electrical Wire Processing Technology Expo

Continued from page 1

## 10:30am - The Current Impact of Conflict Mineral Compliance

Presented by: Michael Wurzman, President and Founder of RSJ Technical Consulting

The Conflict Minerals Session will cover a brief overview of the legislation and the current impact it is having, while focusing on the 2015 data collection and reporting requirements for public companies and their supply chains. Of special interest will be the discussion of turning conflict mineral reporting into a value proposition for your company and leveraging it to improve profitability.

Michael Wurzman, is a leading expert in substance based compliance reporting and turning "compliance" into a

value proposition. For the past twelve years, he has focused on ELV, RoHS, REACH, and most recently, Conflict Minerals legislation compliance reporting. His company provides consulting, compliance program implementation and managed reporting services. Michael has a BSE from Purdue and an MBA from Indiana University.

## 12:30pm - Optimizing the High Mix, Low Volume Manufacturing Environment

Presented by: Patrick Boyer, Special Applications Project Manager of Komax

As manufacturing is beginning to re-shore in the United States, contract manufacturing is on the rise. Nevertheless, contract manufacturing faces its own daily challenges such as unpredictable sales forecasting, challenging lead times,

and inventory pricing pressures. 20-year Applications Specialist, Patrick Boyer will tackle the most challenging problems and present innovative production processes for the high mix, low volume manufacturing environment.

Topic highlights will include measuring overall equipment effectiveness, networking multiple work orders through software networking, and reducing unnecessary inventory leads.

**Thursday, May 14, 2015**

## 8:30am - Understanding the New UL 486F Certification for Bare and Covered Ferrules

Presented by: Vince Barone, Product Manager of Panduit Corp

Ferrules are increasingly being specified to facilitate the connection of

stranded wire to devices in control panels and industrial machines where high-quality terminations are required. This presentation will review the new UL listing for Ferrules as well as the standard testing method, beyond just pull force. Vince will discuss Bare and Covered Ferrules intended for field wiring and factory wiring for use in accordance with UL 486F and Canadian Electrical Code, CSA-C22.2 No. 291-14.

Vincent Barone has led teams that focused on developing automated tooling solutions and wiring components at Panduit. He holds various patents and has authored articles on increasing productivity with quick termination tools and other solutions. Currently, Vince is responsible for the continued development and growth of the Panduit terminal product offering, and continues to drive key partner relations within the industry.

## 10:30am - The Latest Advancements in Comprehensive Quality for Wire Processing

Presented by: Rob Boyd, Senior Product Manager of Schleuniger Inc

Quality pertains to many facets of production, including in-process checks to the quality of the data that goes into and comes from the production floor. This presentation will review the current quality trends and solutions that are available today in the wire processing industry. Boyd will discuss the importance of quality in every area from bench-top processing to production with automatic termination machines.

## 12:30pm - Electrical Test—A Competitive Advantage?

Presented by: Kevin Ellsworth, Product Manager of Cirris Systems

Testing is often seen as a necessary evil—something that slows down your process but has to be done. Building tests into your process and using the right equipment however, can result not just in productivity gains, but also in an attractive selling point for your company to earn more business. Learn some of the best practices and techniques in electrical test that will change testing from a burden to a benefit.

For exhibitor or attendee registration information, please visit [ElectricalWireShow.com](http://ElectricalWireShow.com) or call 262-367-5500.

## AMP-O-LECTRIC MODEL G II TERMINATOR

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

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

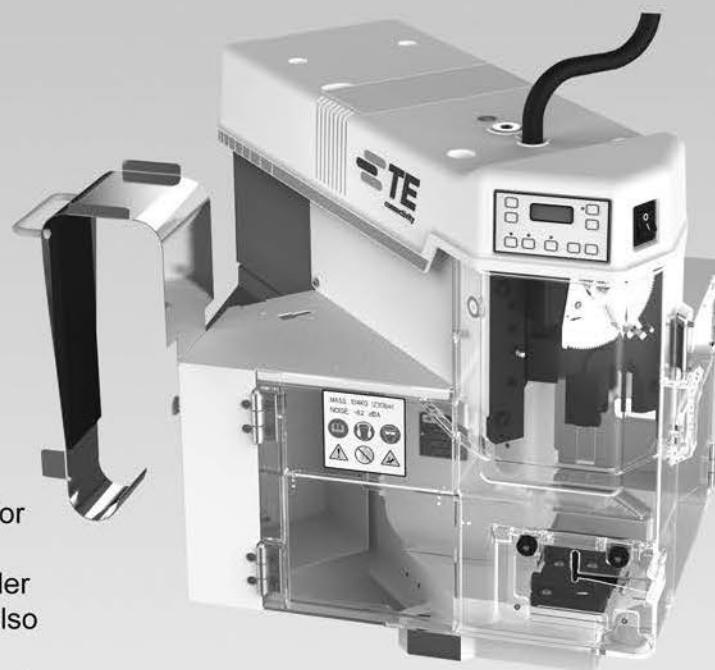
The Model G II terminator is one of the quietest machines available and the improved guarding meets applicable CE and domestic safety requirements. The improved guarding also creates open access for quick and smooth installation of both end-feed and side-feed applicator style.

### User Friendly

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

### Product Features

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



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**90**

More customers choose Cablesan Series 90 Continuity Analyzers with our unique TestRite software than any other continuity test system of its kind. Series 90 circuit analyzers provide exceptional speed, versatility, and accuracy in the testing of wire harnesses, backplanes, and other interconnects. Results are 200 times faster than hand buzzing and shorts are tested in the process. The testers provide resistance and capacitance measurements, diode testing, and guided harness assembly. You can locate wires by touch and verify terminations.

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



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**NEWS PLUGS** continued**Flexible Flat Cables for Automated Medical Diagnostics**

Cicoil's Highly Flexible Flat Cables provide absolute reliability and uninterrupted operation when utilized in Automated Medical Diagnostic Applications. In addition, these Class 1 Clean Room Rated cables are 100% contaminant free and the unique crystal-clear, Flexx-Sil™ rubber jacket allows for quick, easy and safe inspection of the entire flat cable.

Cicoil's solid, one-piece design can incorporate any variety of data, power and video conductors in a single, compact flat cable profile. In addition to every type of electrical conductor, the cables can also include single and multi-lumen

tubing for air or liquid transfer, all in the same cable, making them an ideal solution for Automated Clinical Diagnostics, Blood Screening, Microbiology Specimen Transfer, DNA Sequencing, Cell Imaging and Immunoassay Analyzing Systems.

Cicoil's patented computer-controlled extrusion process allows each individual component to be placed in a flat parallel formation, precisely controlling the overall shape, insulation thickness and inner component spacing. This ensures that each of the inner elements do not rub against each other and wear during a lifetime of more than 10 million cycles, even under high speed flexing and tight bending radius conditions.

The proprietary Flexx-Sil™ jacket is also self-healing from small punctures and is impervious to long term exposure to de-ionized water, alcohol, steam, UV light, radiation, humidity, temperature extremes (-65°C to +260°C), autoclave and many

chemicals.

Standard "off the shelf" Cables are available for immediate delivery and cable assemblies, complete with connectors are offered in 3 foot, 6 foot and 12 foot lengths. Custom designs, including assemblies with connectors of your choice, 100% tested and inspected, are also available with minimum lead times. In addition, Cicoil offers anti-friction coatings, torsion and custom shape designs by request.

Cicoil's light-weight, Flexible Flat Cables are UL & CSA Recognized, CE Conforming, RoHS & REACH Compliant and are manufactured in an automated, climate controlled environment, with strict quality and inspection controls.

Cicoil has been a leader in designing and manufacturing high performance cable assemblies for over fifty years. The company's Patented Flexx-Sil™ Flat Cable Technology provides high flexibility,

extremely long life, and they can withstand temperature extremes from -65 degrees to +260 degrees Celsius. Cicoil's flat cables are used in thousands of demanding applications; including aircraft fuel control cells, semiconductor automation, and the Space Shuttle. Cicoil designs and manufactures its Flexx-Sil™ jacketed cables and cable assemblies in an automated facility in Valencia, California. Cicoil's quality assurance system is certified to the ISO 9001 (AS9100) standard. Visit [www.cicoil.com](http://www.cicoil.com) for more information, or call 661-295-1295 to speak to an application engineer.

**BURNDY Adds 100 Ft Open Spool Reel for Static Discharge Applications**

BURNDY® is offering a new 100 foot Open Spool Reel for static discharge applications. The 100 foot reel includes spring rewind, centrifugal brake and ratchet lock. The product offering also includes three different models of 50 foot reels, for suitable applications. These reels are often used to dissipate static charge buildup developed while filling or dispensing fuel or other combustible liquids from fuel trucks or railcars.

The BSD20100 has a rugged steel construction and comes with 100 foot cable of 7 x 7 stranded stainless steel with yellow polyester elastomer cover. All the reels are heavy duty and supplied with a 100 amp universal jaw-type grounding clamp and spring rewind and centrifugal brake. The BSD20100 reel has a permanent ratchet lock; the other enclosed reels have a positive ratchet lock with a ratchet on/off switch. The reels are commonly used in the petroleum industry but applicable in any area where static discharge creates potential hazards.

For further information contact BURNDY at 47 E. Industrial Park Drive, Manchester, New Hampshire, 03109, call Customer Service at 1-800-346-417

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# WIREwisdom™ ANIXTER®

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

## THERMOCOUPLE AND RTD WIRE

A thermocouple is composed of two wires made from dissimilar metals. These two wires are joined to form a temperature measurement junction. Each wire is made of a specific metal or metal alloy. For example, the positive (+) conductor of a type K thermocouple is made of a chromium/nickel alloy called chromel and the negative (-) conductor is made of an aluminum/

nickel alloy called alumel. Wire used to make a thermocouple junction is called thermocouple wire.

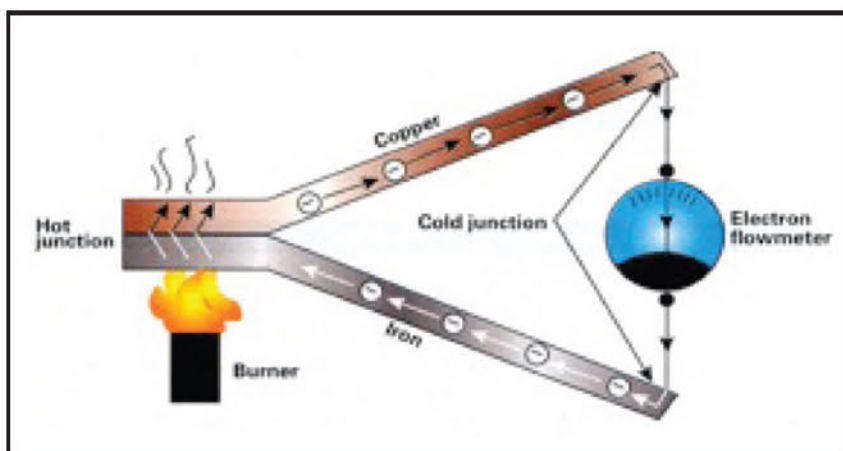
### THERMOELECTRICITY

As shown below, when the measuring (hot) junction is at a different temperature than the reference (cold) junction, a voltage is produced in a thermocouple circuit due to the so-called Seebeck, or thermoelectric effect. This effect can be thought of as a small battery whose output voltage is proportional to the temperature of the

measuring junction. The voltage produced is in the millivolt (mV) range and is different for each thermocouple type. This voltage is measured by electronic equipment that converts it to a temperature reading.

### MEASURING JUNCTIONS

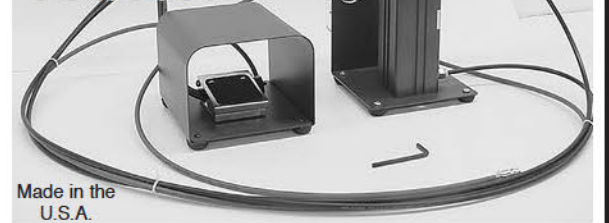
There are three main types of measuring junctions. An exposed junction has no protective sheath. A grounded junction has a protective metallic sheath such as stainless steel, which encloses the conductors and insulation. This junction type is more physically durable and more resistant to corrosion than an exposed junction. An ungrounded junction is similar to a grounded junction except the thermocouple wires do not connect electrically to the metallic sheath. This junction type is better protected from electromagnetic interference.



Continued on page 58

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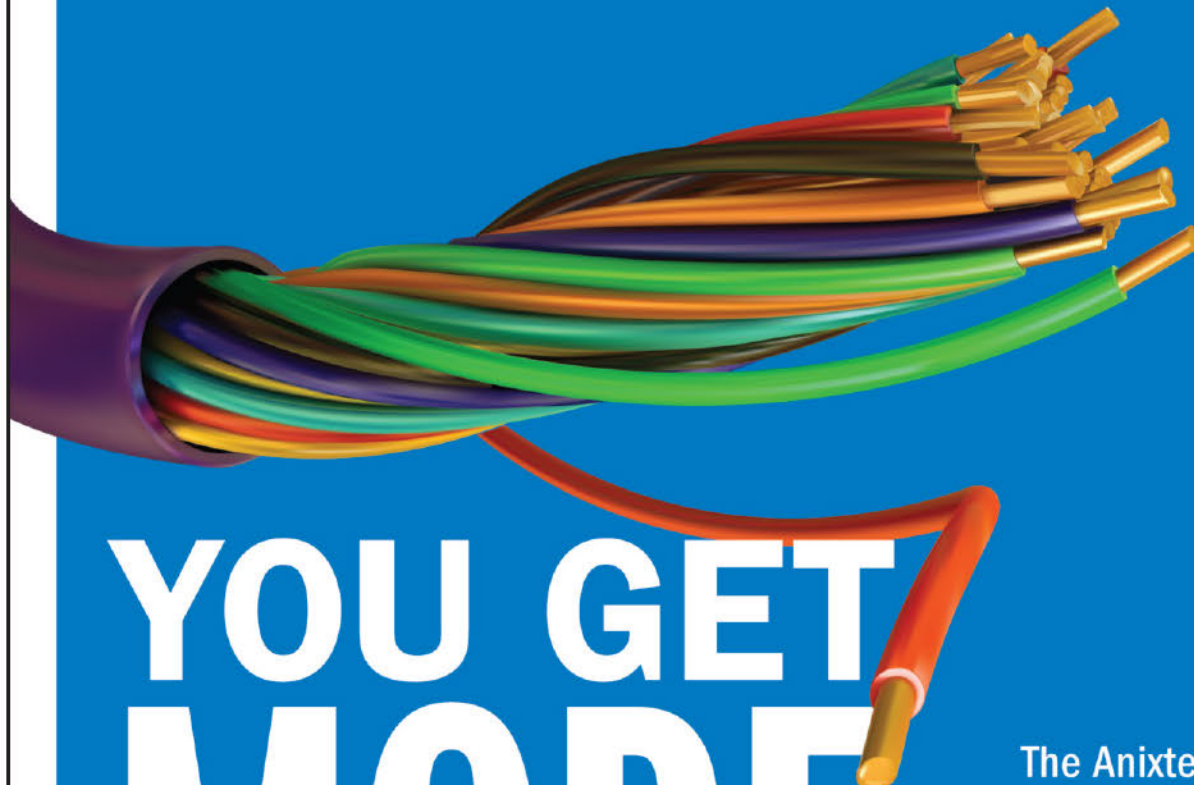
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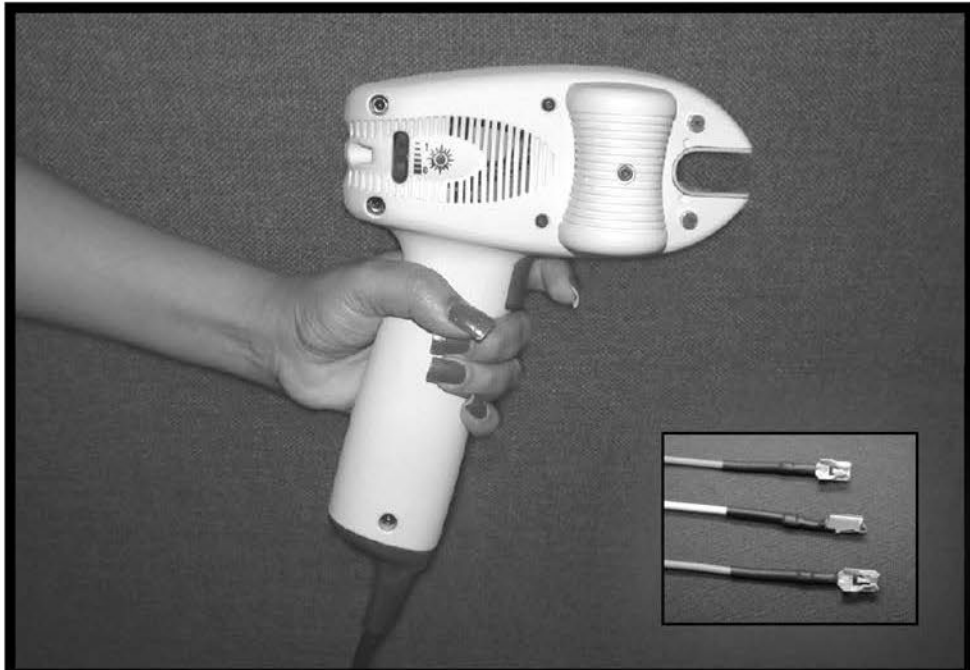
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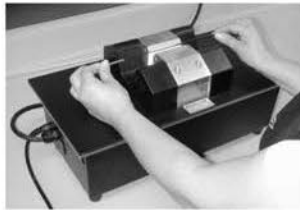
\*polyolefin, 5" length

The Focus-Lite™ FLG3™ by Judco Manufacturing, Inc., is the solution to all your heat-shrink operations. You can say goodbye to the high labor cost, excessive heat, and inefficiencies of other methods. The Focus-Lite™ **reduces the time** necessary to shrink most types of heat shrink tubing. It also **improves the process** control and **overall quality** of your shrink operation. The FLG3™ can be used for **high volume** benchtop applications and is completely **portable and mobile** for board mounted harnesses and tight space assemblies.

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**Focus-Lite™**  
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# WIREwisdom™

Continued from page 57

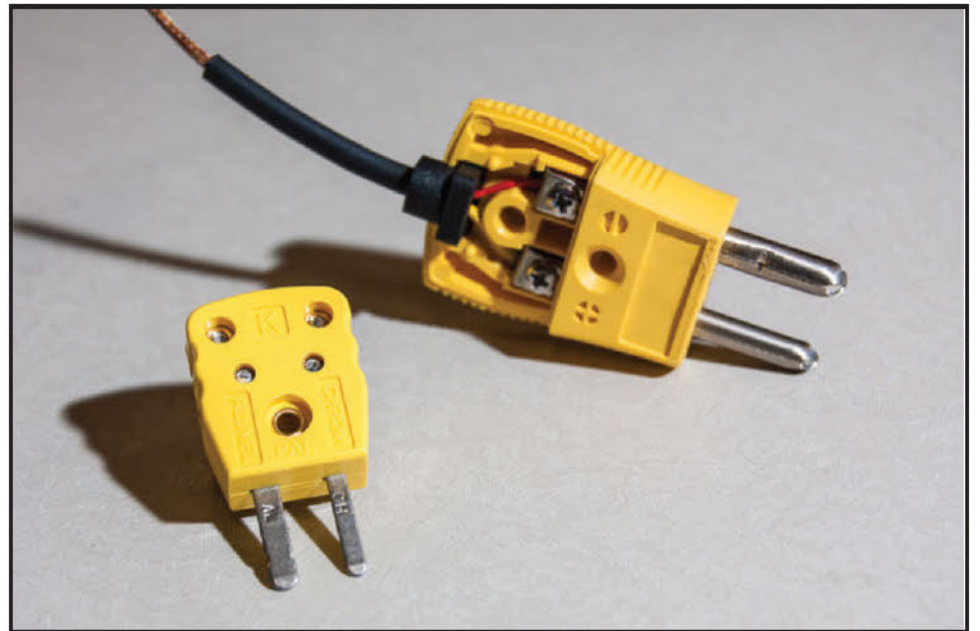
### REFERENCE JUNCTIONS

As noted earlier, a reference (cold) junction is also required in a thermocouple circuit. Because the voltage read by the instrumentation is actually proportional to the difference in temperature between the measuring junction and the reference junction, it is necessary to know the temperature of the reference junction to determine the temperature at the measuring junction. In practice,

the reference junction is frequently built into the temperature recording or process control instrumentation. As a result, the reference junction is often "invisible" to the user. The thermocouple is connected to the extension wire and the extension wire is connected to the process control instrumentation.

### THERMOCOUPLE TYPES

Industry specifications recognize dif-



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ferent types of thermocouples and thermocouple wires with a letter designating each type. Some common types are K, J, T and E. Different thermocouple types have different temperature ranges over which they can be used successfully. The chemical make-up of each thermocouple alloy, the temperature error limits allowed, and the color codes for each thermocouple type are specified in ISA/ANSI standard MC96.1. The important thing to remember from an application standpoint is that the thermocouple wire type must match the thermocouple type.

**EXTENSION WIRE**

Thermocouple extension wire types such as KX, JX, TX and EX are used to connect the measuring junction to the temperature recording or process control instrumentation. This can be hundreds or even thousands of feet away. Extension wire is normally exposed to temperatures and other environmental conditions that are less extreme than those encountered by the measuring junction. As a result, "extension" grade wire is not calibrated above 400° F (204° C) and is typically insulated and jacketed with materials with lower tem-

perature ratings. Since low voltage instrumentation signals are being carried thermocouple extension wire is often shielded.

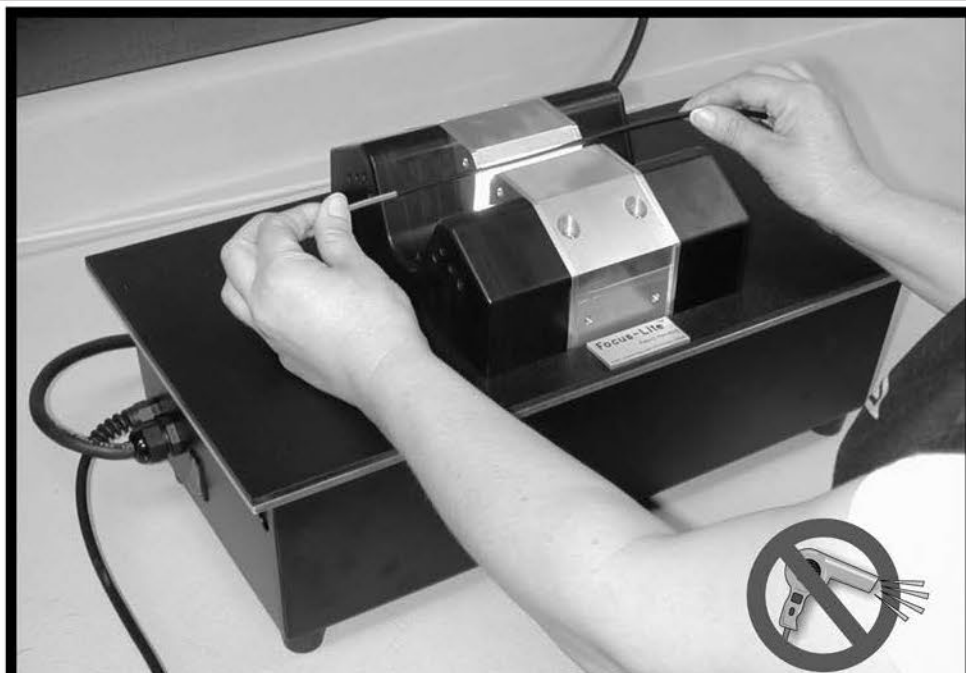
**RTDS**

There are other temperature measurement technologies than the thermocouple such as RTDs (resistance temperature detector). In applications with temperatures above 1,200° F (650° C) thermocouple is used. At lower temperatures RTDs are used for their simpler operation and greater sensitivity and stability. Thermocouples have a better response time. RTDs are special resistors whose resistance value changes with temperature in a known way. RTDs are connected to the temperature recording or process control instrumentation using ordinary copper instrumentation cable. Thermocouple wire is not required to connect an RTD.

Typical RTD cable is standard instrumentation cable in two, three, or four conductors or possibly groups of pairs/triads/quads depending on the type of RTD being used and number of devices being monitored. Individual or overall shielding is often used for noise immunity.

ANSI Code	Thermocouple Grade		Conductor Colors				Alloys		Temperature Range
	Jacket Color	Extension Grade	Positive	Negative	Positive	Negative			
J	Brown	Black	White	Red	Iron	Constantan	Copper-Nickel	-210° to 1,200° C / -346° to 2,193° F	
K	Brown	Yellow	Yellow	Red	Nickel-Chromium	Nickel-Aluminum	Nickel-Copper-Nickel	-270° to 1,372° C / -454° to 2,501° F	
T	Brown	Blue	Blue	Red	Copper	Constantan	Copper-Nickel	-270° to 400° C / -454° to 752° F	
E	Brown	Purple	Purple	Red	Nickel-Chromium	Constantan	Copper-Nickel	-270° to 1,000° C / -454° to 1,832° F	

Table 1: Thermocouple Wire and Thermocouple Extension Wire Types



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The Focus-Lite™ is equipped with an adjustable timer for repeatable shrinking, time after time. It also has a dimmer switch that controls the power for sensitive components. Visit our website at [www.judco.net](http://www.judco.net) and see our full line of Focus-Lite™ products.



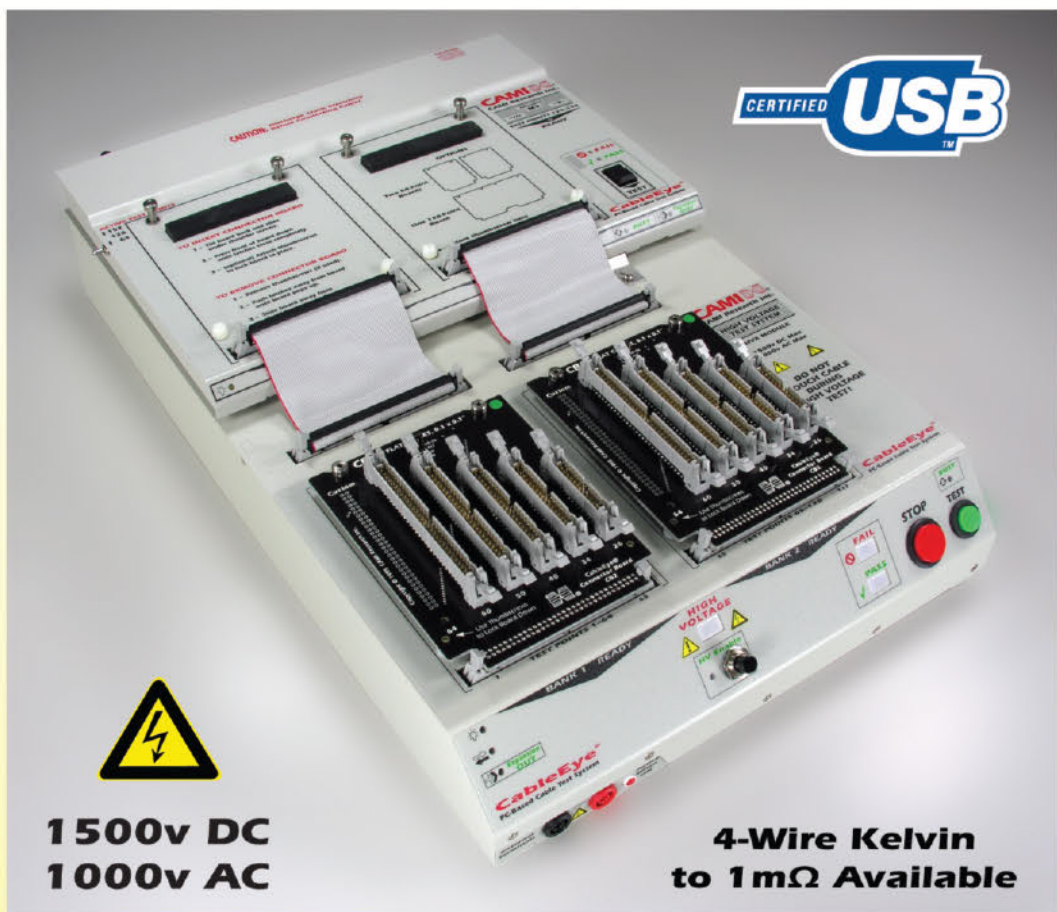
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Line	HDR-64 B1	HDR-64 B2	Value	HiPot Results	DC Current	DC Voltage	DC Isolation	AC Current	AC Voltage	AC Isolation
1	1	65	↔ 0.1 Ω	✓	< 1 µA	1200 V	> 1 GΩ	0.064 mA	818 V	13 MΩ
2	2	66	↔ 0.3 Ω	✓	< 1 µA	1200 V	> 1 GΩ	0.067 mA	818 V	12 MΩ
3	3	67	↔ 0.1 Ω	✓	< 1 µA	1200 V	> 1 GΩ	0.071 mA	820 V	12 MΩ



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# Interwire 2015 and WAI's 85th Annual Convention

The Wire Association International (WAI), Inc. will return to the Georgia World Congress Center, Atlanta, Georgia, USA, for the 18th staging of its biennial Interwire exposition and its 85th Annual Convention, to be held April 28-30, 2015.

In 2013 the wire and cable event—which remains the largest of its kind in the Americas—attracted visitors from 59 countries.

WAI has the support of more than 400 exhibiting companies for the upcoming exposition. At Interwire information is exchanged, and wire and cable making supplies and machinery are debuted, reviewed, and sold.

Remarking on the event, exhibitor Tony DeRosa, General Manager, Frigeco, Inc. said, "The globalization of production, markets, and competition is reshaping the way we do business. Interwire gives us the opportunity to meet industry professionals and engage in an open exchange of ideas and discuss innovations resulting from our collective knowledge and experience. Furthermore, the technical program provides a

conduit to pass the stewardship of our industry to the next generation of professionals to prepare them for the challenges of tomorrow."

Other highlights include an opening reception & networking gala, production solutions demonstrations, a plant tour to Southwire Company's Copper Rod Mill, a "Fundamentals of Wire Manufacturing" course, presentation of WAI's Mordica and Donnellan Memorial awards, a new manufacturing management workshop, committee and leadership meetings, WAI member rewards activities, and a concurrent Global Continuous Casting Forum on both copper and aluminum.

Developing program content and convention-related activities will be posted online at [www.wirenet.org](http://www.wirenet.org). All other inquiries are directed to WAI at Tel.: (001)203-453-2777.

The Wire Association International, Inc., founded in 1930, is a worldwide technical society for wire and cable industry professionals. WAI is dedicated to the promotion, collection, and dissemination of technical, manufacturing,

and general business information and trends in the industry. It organizes events such as the Interwire and WAI Operations Summit & Wire Expo trade shows, technical workshops, and annual International Technical Conferences.

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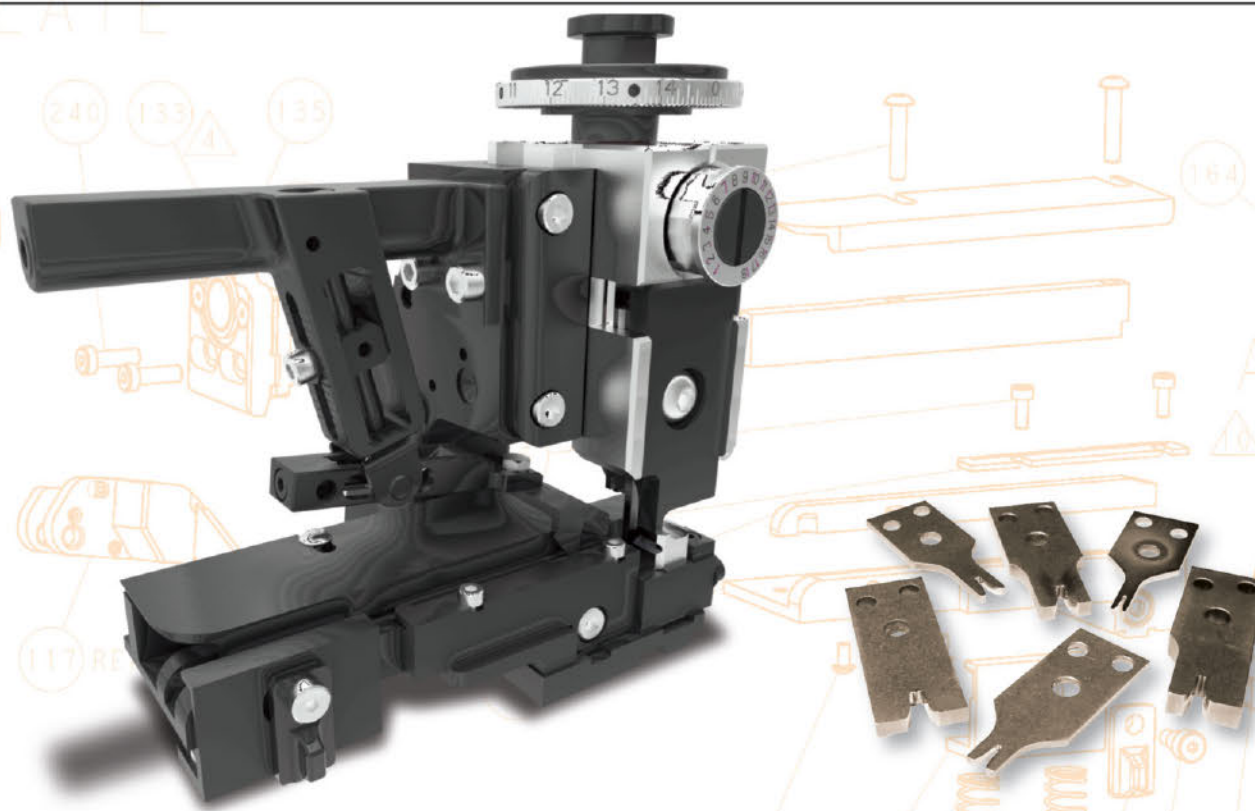
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