

## This Issue Features:

- Wire Wisdom
- The ABCs of the IIoT
- Hand Shake or Contract
- Crimp Monitor Limitations
- The Heart of Quality
- The Power Women of the Wire Harness Industry
- Market Changes Drive Innovation at Stapla Ultrasonics Corporation



# ISC Engineering

## Providing Expertise in Overmolded Assemblies

By Joe Tito  
Wiring Harness News

ISC Engineering specializes in custom molded cable assemblies and the technology that surrounds them. With quick turnaround times, they are geared for low volume, high mix assemblies

in the audio, automotive, industrial, medical and military industries. What is unusual about ISC is that they are also heavily involved in transferring this technology to OEMs and other cable assembly suppliers.

Given this unique business model, one can see why it was fascinating to have a conversation with its founder and President, Steve Burk. The man-



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agement team at ISC wanted to use their experiences to expand the utilization of molded cable assembly technology within the industry so Steve co-founded the company in 1999 after having successfully owned and operated Inland Empire Interconnects where they were a world leader in PCMCIA cable assemblies and the overmolding of PCBA's. "IEI was later sold to ARROW Electronics (Richey Electronics). "The year my contract was up I started this company with a unique philosophy of being a cable assembly company designed to sell its "Know How". Steve recounted, "The decision to focus ISC's business model was based solely on the desire to utilize our strengths in solution oriented development in the interconnect industry and at the same time provide specialty products that would make it easier to gain the benefits afforded by molded cable assembly solutions."

ISC will custom tool to produce molded solutions for connectors or cable assemblies, but their customers are often other harness manufacturers. Steve detailed, "If we have a harness assembly company that wants to do their own molding, we will assist them in vertical integration by recommending the machines, designing and building the molds, and training them in how to injection mold the parts."

ISC will provide information on molding equipment, compounds, tooling and all other levels of expertise to get a cable assembly over molding capability up and running. They bring a different level of service to the market where customers can have ISC design a custom molding solution. The companies can terminate the assemblies themselves, and then send to ISC for molding, until such time as it makes sense for

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# Market Changes Drive Innovation at Stapla Ultrasonics Corporation

By Joe Tito  
Wiring Harness News

The proliferation of Hybrid Electric and Electric Vehicles has created quite a boon for many equipment suppliers to the wire harness industry. This has been especially true for manufacturers of ultrasonic welding equipment. The folks at Stapla Ultrasonics Corporation contacted WHN and asked to tell readers how they are set up to meet these and other industry challenges.

Stapla is located in Wilmington, MA, and was founded in 1986. They are a subsidiary of Schunk Sonosystems, a member of the Schunk Group, headquartered in Heucheleim, Germany.

Stapla and Schunk Sonosystems, combined, are the largest manufacturer of ultrasonic metal welding products worldwide. Stapla offers products, engineering and support services to industry segments including: automotive, appliance (large, small and HVAC), battery (Lithium Ion and others), solar and other electrical segments.



New equipment setup.

As I settled in for the interview, I was struck by the level of excitement and commitment to the meeting. Present in the room were representatives from upper management, sales, engineering development, production, and quality.

Since my initial point of contact was Jeff Roman, he kicked things off by talking about how their market

and customers have changed, and how they are addressing the new challenges. "The main way the market has changed for us is with the insurgence of hybrid (HV) and electric vehicles (EV), and that's driving us towards much larger systems," he said. Ten years ago, Stapla's typical

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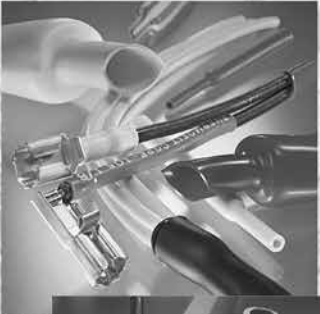
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# The Power Women of the Wire Harness Industry

## Spotlight on Araceli Tarango Martinez

This edition of the Power Women of the Wire Harness Industry features Araceli Tarango Martinez, the eldest of 6 successful sisters. Araceli has worked at Delphi for over 30 years. She held various positions including: Industrial Engineer, Methods Engineer, Sales Engineer, Quality Superintendent, Manufacturing Engineering Superintendent, Manager of Lean Operations in Mexico, and Plant Manager. She is currently working in Human Resources as the Mexico Training Manager.

In asking Araceli about her STEM influences, she told me that she was not introduced to STEM in elementary or middle school in Delicias, Chihuahua, Mexico, where she was raised. Instead, her father was the greatest influence on her decision to attend engineering school as he advised her of the many opportunities in engineering, especially near the USA/Mexico border. She also credits her parents with being excellent role models. To best create opportunities for their girls, they uprooted their family and moved them from a smaller city with fewer opportunities to Juarez, where Araceli attended college and graduated with a degree in Industrial Engineering.

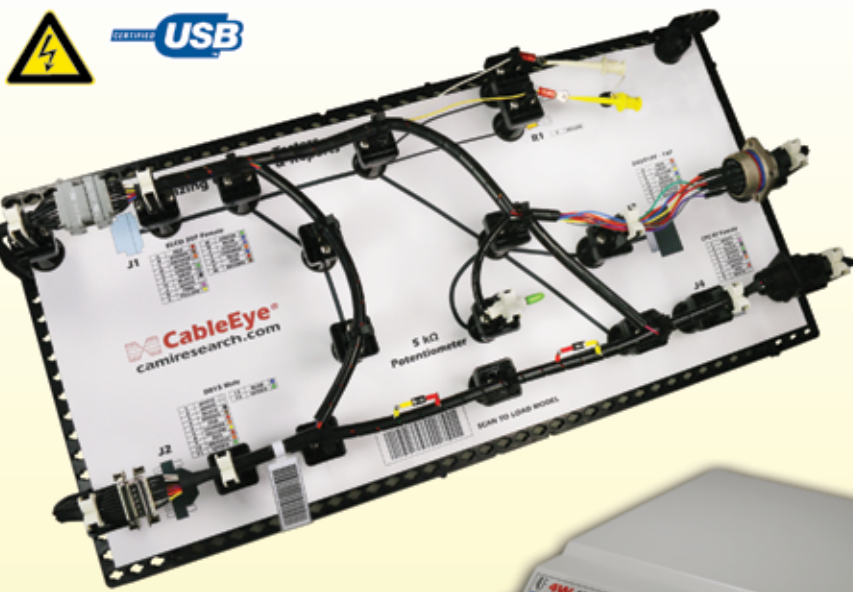
When I queried Araceli about her experiences in engineering school,



**Melissa Femia**

she remembers class ratios at about 2-3 females to 20 males (in 1982). She did not feel intimidated by being outnumbered, but rather focused on maintaining her academic standing. In terms of her workforce experiences, she feels as respected as her male counterparts. While well regarded, her viewpoint is that there are few women in very high positions in the wire harness industry. During her tenure as a plant manager in Mexico, she was the only female at Delphi Mexico who managed a wire harness

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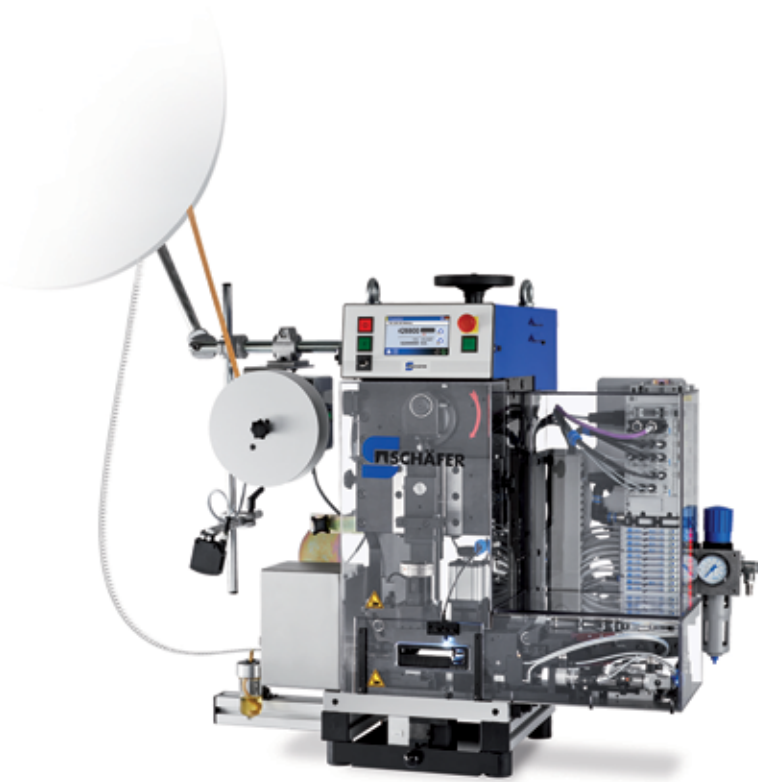
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# The Power Women of the Wire Harness Industry

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**Araceli Tarango Martinez,**

production facility. However, she believes that opportunities are more prevalent for women now than in previous decades. In her opinion, female engineers are just as professional and responsible as the men, and they often offer a more sympathetic approach and detailed focus.

Araceli recommends that high school students take as many math and physics courses as are available to them. By doing so and making efforts to speak to experienced field engineers, potential engineering candidates can preliminarily determine whether engineering is a fit for them. For female engineering students who are in their first years of university, she strongly encourages a focus on learning basic skills because the competition in industry can be fierce.

Araceli truly has a passion for success as expressed by her positive energy and her 30-year, advancing progression career with Delphi. She personifies corporate pride using words such as teamwork and loyalty and phrases like “we seek the best work conditions and safest environment for our line operators”. Her attitude is commendable and sincere and she is quick to point out that her success is dependent on the support of her family, especially her husband. She is also thrilled that her daughter has chosen to follow her mother’s footsteps as a student in mechanical engineering. Thank you, Araceli, for taking the time to share your insightful experiences.

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




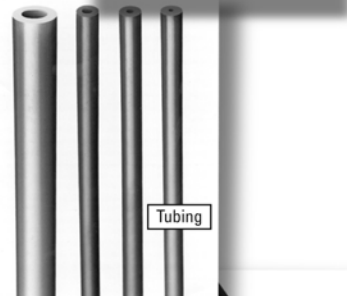

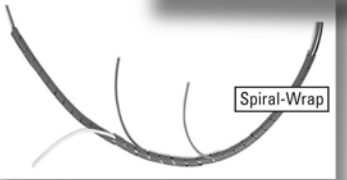
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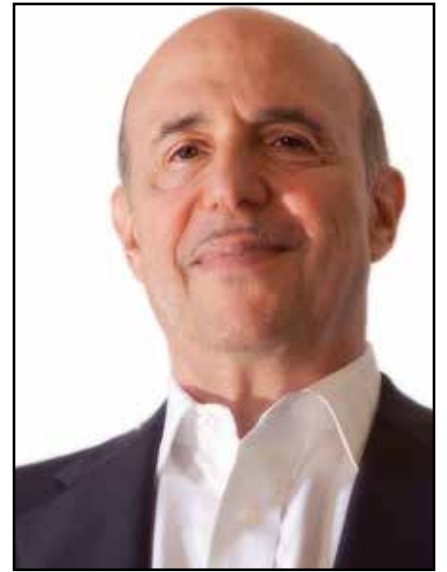
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# Handshake or Contract?

By Loren Smith



Loren Smith CEO  
Blue Valley Capital

It's no surprise that I've been asked many times whether some business agreements can be sealed by shaking hands, rather than going to the trouble and expense of putting the deal terms in writing. After all, the idealistic, friendly side of our natures draws us toward informality. But, sadly, I advise against the appeal of demonstrating an unnecessary level of trust--and I have the personal anecdote to reinforce my point.

The story pertains to an inflection point in my career. I had long yearned to run my own company, and suddenly an opportunity presented itself. Two gentlemen in NE Iowa were interested in my acquiring their small wire harness company (Monona Wire Corporation) and paying them off over the next few of years while I turned around the firm's sagging performance.

This seemed like destiny. Here I was on the East Coast, newly married with custody of two sons, and a chance to demonstrate my turnaround skills and soon become the owner of a troubled wire harness company. Moving from one of the

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# Handshake or Contract?

*Continued from page 8*

country's population centers to a town of 1,000 residents seemed an ideal plan for my new blended family. Swept away by excitement and optimism--and the sellers' confidence in me and their sense of urgency--I affirmed the agreement on a handshake.

Once installed as CEO, I discovered that the company's problems were more severe than I had perceived from afar. The firm's employees, suppliers, and customers were all

unhappy. And most distressing, the company had no cash. With a damaged bank relationship, owners who were unable to provide any financing and no capital from me, keeping the company alive and developing a turnaround plan was a 24/7 job. Nevertheless, believing that I could turn straw into gold, I aimed to formalize the handshake agreement I had made with the company's owners to acquire total ownership.

Meanwhile, one of the partners asked me to entertain a friend of his who owned a com-

pany in Chicago, although I was unclear about the purpose of the meeting. Once the individual arrived with his team, however, I realized that despite my handshake agreement the two owners had invited the individual to look at the possibility of acquiring their company. When I confronted the owners and expressed that this was in violation of my agreement, they responded that they had a strong preference for an all-cash deal vs. getting paid over time.

The owners were not bad guys. But feeling the vise of deep financial trouble, they had been willing to put their welfare ahead of their handshake with me. In the end, however, I did not find myself out in the cold. Although the suitor was just as keenly interested in the small harness company after his visit, He backed off pursuing a sale. Good thing, because otherwise, I'd have become an unhappy employee of people I had had no intention of working for or a jobless would-be owner.

Fortunately, this chapter had a happy ending; I was able to formalize my handshake deal to buy the company, and, 23 years later, when I exited the business our revenue was \$85 Million and we were the leading supplier to the Construction Equipment Industry.

My cautionary tale demonstrates how attitudes about an oral agreement can change and how even good guys can disappoint us.

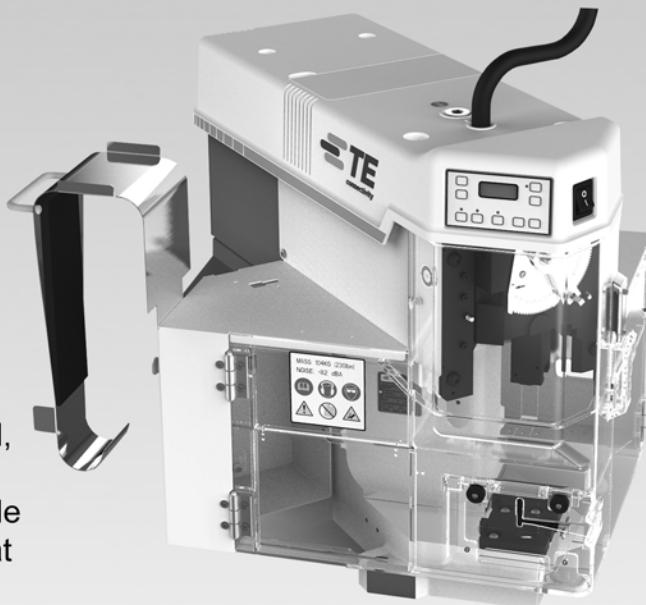
Today, as an adviser to many sellers and buyers, I am a huge fan of contracts and other formal agreements. They may not create chumminess, but they do provide outstanding security for everyone involved.

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

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

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



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

### User Friendly

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

### Product Features

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

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# The ABCs of the IIoT: Keeping things simple and catching up

By Paul Hogendoorn

By now you've probably heard something about the next big thing that's projected to come to manufacturing: the "Industrial Internet of Things", or, the "IIoT" for short. New technology 'geeks' seem to like to create acronyms and terms that mean something to them, but leave the rest of us in a fog. (Think B2B, Y2K, B2C, M2M, IoT and now IIoT. The list goes on.)

The manufacturing industry has traditionally been a slow adopter of new technologies, and the wire harness industry is among the slowest of the major sectors, largely because of its persistent strategy (or need) to operate in lower cost regions.

There are always exceptions - most companies have a few new machines - but by and large, if a machine is working reasonably well, it is left in place to do its job for a long, long time. I often ask plant managers how many times they have replaced their photocopy machine. Every 5 to 8 years seems a reasonable answer, but their manufacturing equipment stays in use a lot longer. Similarly, look at the computers being used in the engineering, administration and executive offices, and compare them to the computers on the floor. Indeed the majority of PCs I see in use on the plant floor are operating Windows 7.

I don't see this necessarily as a problem - not in most cases anyway. The reason that equipment is still in place on the factory floor is that it works - it continues to do its job effectively, and, everyone knows how to use it. The cost of replacing it is often very high, and the benefit is often not big enough to warrant the expense and time to replace it. On top of that is the relentless production demand - there's simply no time to be lost taking something that is working out and taking a

chance on something new. The result is that many plants run a mix of older, proven equipment, augmented by new technology equipment that gets installed when they start a new product or operation. This is true for all the major segments in the manufacturing industry, including this one.

The IIoT however, is the manufacturing industry's op-



Paul Hogendoorn

Continued on page 14

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# The ABCs of the IIoT

Continued from page 13 \_\_\_\_\_

portunity to catch up, especially wire harness manufacturers. At its core, the IIoT is intended to connect “things” to the Internet, and to do it cost effectively. It’s intended to be integrated into common household devices and as such, it should be easily adaptable for a wide variety of possible uses. It should also be available at “commodity prices”.


It’s when solution providers start adding other new acronyms and terms, such as “Industry 4.0”, “smart manufacturing” and “big data”, that the price starts to rise quickly. The IIoT in and of itself is aimed at connecting devices, ubiquitously and cost effectively, to the internet. And there’s no reason that an older piece of equipment can’t be easily and cost effectively connected.

In my opinion, there is no manufacturing industry sector that has more to gain from this new technology than wire harness manufacturers. Most plants I’m in produce products at parts per second speeds and pennies per part prices. The tolerance for defects is effectively zero, and the requirement for accountability and traceability is ever increasing. Tier 1 suppliers have to keep track of the raw material and components that went into each harness, the equipment it was run on, the tooling that was used, and even when that tooling was last serviced or refurbished. In process and end of process test results often have

to be associated not just with the batch, but with the specific product produced. IIoT technologies do not by themselves solve all these problems, but what the IIoT should do is provide solution providers simple, ubiquitous, cost effective ways to connect all the devices.

The rapid emergence of this new technology is our industry’s chance to build “data bridges”, and not data fences and silos. In previous IT evolutions, equipment and solution providers have scurried to align themselves with a half dozen or dozen other providers and claim an implied superior compatibility. Although it is often promoted as being to the customer’s benefit, this kind of data fence is primarily to the compatibility group’s benefit. If the IIoT movement is allowed to sweep across the manufacturing floor the way that internet technologies have swept through our banking, entertainment and communications industries, the change to our industry will be dramatic - and that’s not something we should fear. The IIoT is not just the next new thing coming to manufacturing, it’s our industry’s opportunity to catch up.

Paul Hogendoorn co-founded FreePoint Technologies. “Measure. Analyze. Share. Don’t forget to share”. He can be reached at paul.hogendoorn@getfreepoint.com or www.getfreepoint.com



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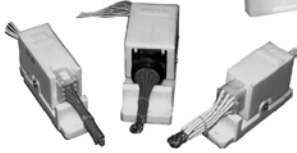
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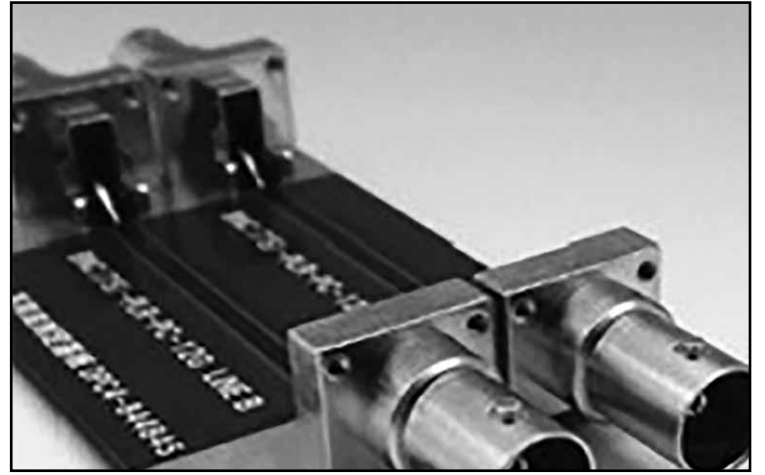
## NEWS PLUGS



### Heilind Electronics Now Stocking Hirose Electric's BNC75 Series Connectors

The BNC75 Series is a miniature, quick connect/disconnect RF connector used for coaxial cable assemblies.

Heilind Electronics, a leading global distributor of electronic components and authorized distributor for Hirose Electric, has expanded its selection of interconnect solutions with the Hirose BNC75 Series connector. The serial digital interface (SDI) compliant connectors support



**Hirose Electric's BNC75 Series Connectors**

high transmission speeds up to 12 Gbps.

Hirose's BNC75 Series features an easy-on, easy-off bayonet lock system and is rated for 75Ω, but

can be mated with 50Ω-based BNC connectors. The miniature BNC75 series radio frequency (RF) connector features an optimized center contact design that simplifies PCB layout and supports SMT processing – ultimately decreasing labor and assembly time.

The BNC75 Series is reliable at high frequencies (up to 12 GHz) and offers 150 Vrms AC rated voltage. This connector series helps reduce the size of broadcasting cameras, FA/commercial cameras, security cameras, medical equipment and more.

Visit Heilind's website for more information about Hirose Electric BNC75 Series.

## WINTOTAL V6 IDENTIFICATION LABEL PRINTING SOFTWARE FOR RAIL, MASS TRANSIT AND INDUSTRIAL EQUIPMENT MARKET

TE Connectivity's WinTotal Version 6 is the new version of WinTotal software, supporting high quality wire and harness identification and basic label printing applications. WinTotal v6 software has a number of new user benefits like auto font sizing and comes with 2,500 standard TE Connectivity Identification products pre-installed. This makes the creation and printing of Identification sleeves or labels a quick and simple task.

### Double Sided Print

WinTotal v6 allows both sides of a product to be viewed at the same time. This enables the user to see how the product will be printed and, with the active updating of the print preview screen, it is also possible to make orientation and order changes.

### Key Benefits:

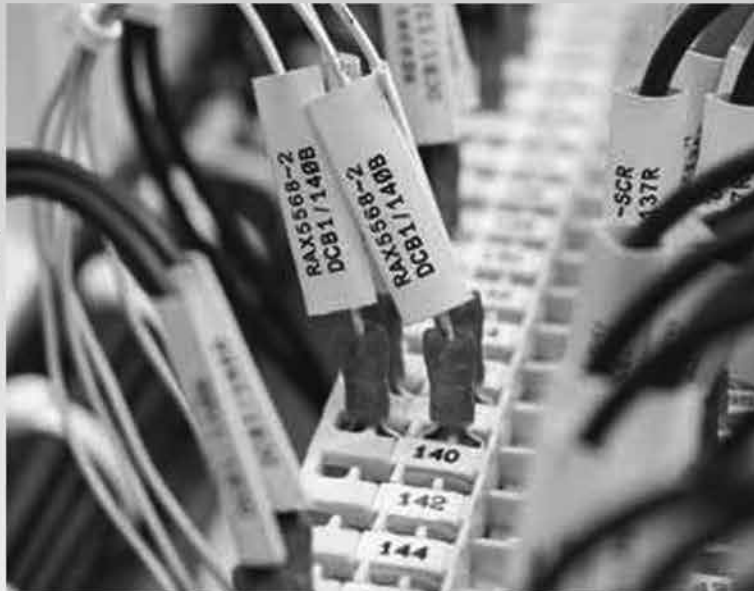
- Enable faster set up with the ability to view prior to printing
- Provide greater print accuracy with the ability to position text on TE product templates
- Improve efficiency with multiple label sizes with auto font sizing
- Enable printing in any language with Unicode support
- Enable ease of use with ribbon control for all functions
- Improve efficiency with new customizable quick access toolbar

### Target Markets:

- Rail & Mass Transit
- Industrial Equipment
- Infrastructure
- Aerospace/Defense
- Offshore/Marine

### Applications:

- Wire & Cable harness identification - Office environment & Industrial environment



### Fairview Microwave Debuts New Low Pass and Bandpass SMA Coaxial Filters

Fairview Microwave Inc., a supplier of on-demand microwave and RF components, has introduced a new series of low pass and bandpass filters for use with multiple popular frequency bands.

Fairview's 13 new SMA coaxial filters consist of seven bandpass filters and six low pass filters. The bandpass filters were developed for use in various applications including GPS, ISM, RFID and Wi-Fi systems and operate in several bands, some as low as 824 MHz and some as high as 5.875 GHz.

The new low pass filters allow for tailoring of the test setup for a specific application and support upper band edges of 100, 225, 400, 1000, 2000 and 3000 MHz. All of these new RF filters are available off-the-shelf and feature SMA female connectors.



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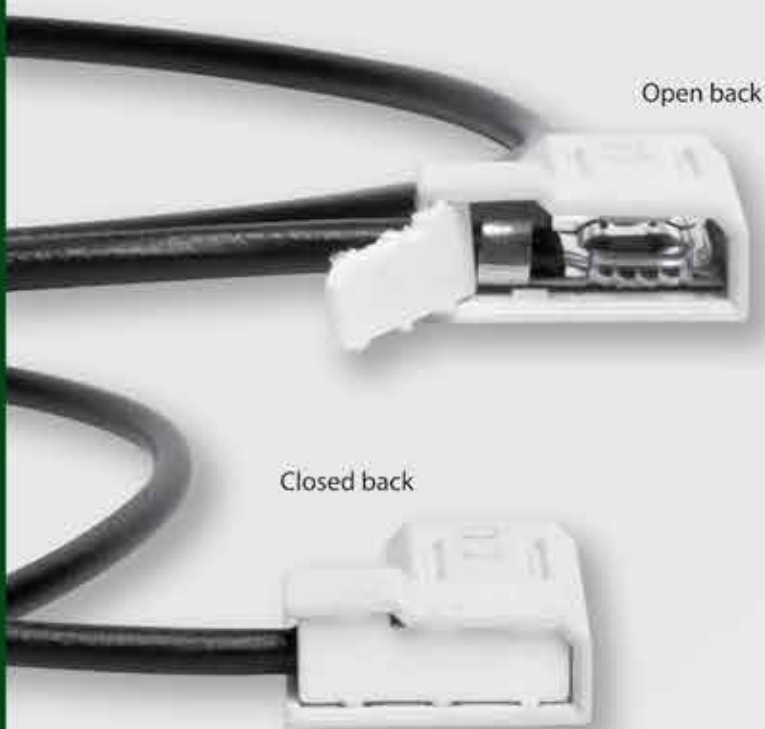
Continued on page 29



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# Crimp Monitor Limitations - when to consider alternative and complimentary technologies for assurance of part quality

By Michael Reeve  
VP Business Development  
OES Technologies

Crimp monitors have proven to be a highly effective technology for discriminating crimp defects during the manufacturing process. Automotive companies have mandated crimp monitors, and manufacturers have readily adopted this technology with a high level of confidence knowing crimp monitors will prevent crimp defects from reaching their customer.

However it is important to recognize that crimp monitors have certain limitations with regard to detecting the many different types of wire end defects that can occur during the manufacturing process. Realistic performance expectations should be established, and in some cases alternative sensing technologies should be considered as manufacturers strive for zero quality defects.

The first step in recognizing crimp monitor limitations is to understand

fundamentally how they work;

The crimp monitor captures a characteristic force signature as the terminal wings form around the conductor strands. The resulting crimp signature is then analyzed for variation or error when compared to a reference signature sample average of good crimps. Crimp process variation error that exceeds the tolerance limits will result in a FAIL decision. The crimp monitor's capability to discriminate a PASS/FAIL decision is entirely based on the sensing of force or strain predominantly on the conductor core crimp. Figure 1 shows a photograph of a typical crimp and the resulting crimp force signature.

There are certain wire end defects that have minimum or no influence on the crimp signature, and as a result, will not be detected by the crimp monitor. Let's review some of these examples:

1. Pulled conductor strands - all of the conductor strands are present in the conductor core crimp but one or more strands are pulled forward. The

*Continued on page 54*

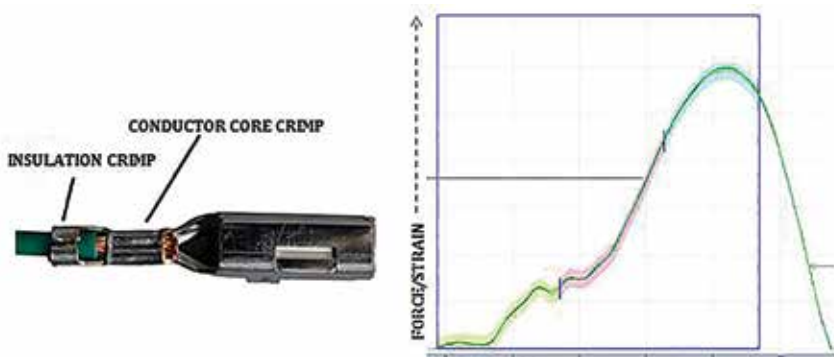



Figure 1

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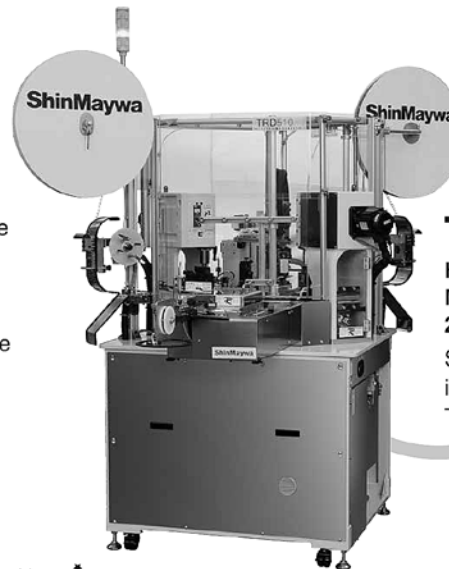
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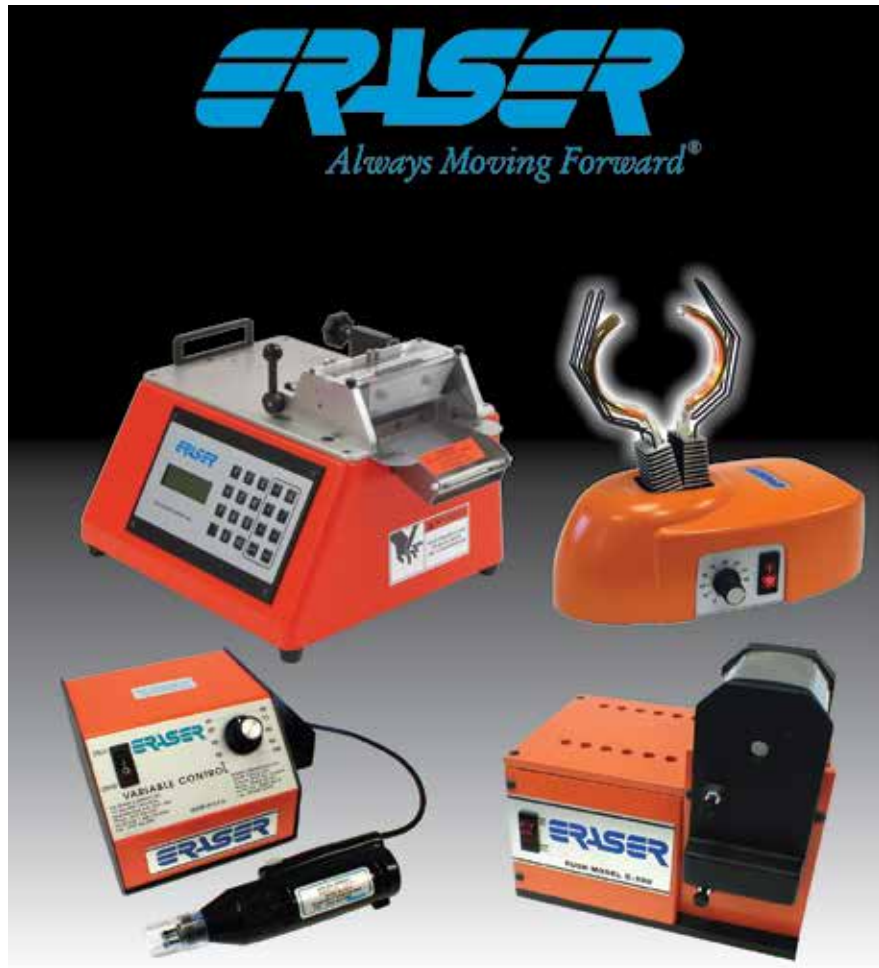


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**UNDERSTANDING AND IDENTIFYING UL AWM STYLES**

Appliance wiring material (AWM) is a large category of wire and cable that spans over different constructions. Underwriters Laboratory (UL) categorizes AWM as a Recognized Component used in Listed or Classified products. AWM is commonly used in a variety of applications such as general purpose wiring circuits, control circuits and internal wiring of appliances.

**WHAT ARE UL STYLES?**

Underwriters Laboratory (UL) is a third-party testing laboratory that certifies and tests products. UL assigns a different style number for each approved AWM construction and creates a style page that lists a few specifications, such as gauge size range, insulation material, temperature rating and voltage rating. Each style specifies the product's general use as determined by UL's evaluation of the product. Figure 1 is an example of a style page for UL Style 1015.

**UL HISTORY**

Over the years, many different wire constructions were developed and certified as UL AWM due to the high demand from various applications and industries. The large number of AWM styles lead to different interpretations of desired performance and evaluation methods.

UL Standard 758 *Appliance Wiring Materials* was developed to consolidate general requirements for AWM, and standardize methods of evaluation. The standard includes performance requirements and methods for testing tensile strength and elongation, spark testing and dielectric voltage with-

APPLIANCE WIRING MATERIAL		UL	
Subj. 758	Section 1 Page 1015	Issued: 1959-05-01	Revised: 2013-02-22
Style 1015	Single conductor with extruded insulation		
<b>Rating</b>	80, 90 or 105 deg C, 600 Vac or 750 Vdc, Horizontal flame. Optional - 60 or 80 deg C Oil.		
<b>Conductor</b>	30 AWG - 2000 kcmil, Solid or Stranded.		
<b>Insulation</b>	Extruded PVC		
	<b>Conductor Size</b>	<b>Minimum average thickness</b>	<b>Minimum thickness at any point</b>
	30-9 AWG	30 mils	27 mils
	8-7 AWG	45 mils	40 mils
	6-2 AWG	60 mils	54 mils
	1-4/0 AWG	80 mils	72 mils
	250-500 kcmil	95 mils	86 mils
	550-1000 kcmil	110 mils	99 mils
	1100-2000 kcmil	125 mils	112 mils
<b>Standard</b>	Appliance Wiring Material UL 758.		
<b>Marking</b>	General		
<b>Use</b>	Internal Wiring of Appliances. Tags may also indicate the following: 2,500 V peak - for electronic use only.		
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Figure 1: UL Style page for UL Style 1015



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Appliance Wiring Material Style Number Designations	
Style Designations	Type/Use
1000-1999 and 10000- 19999	Single conductor, thermoplastic-insulated wire
2000-2999 and 20000- 29999	Multiconductor, thermoplastic-insulated and -jacketed wire
3000-3999	Single conductor, thermosetting-insulated wire
4000-4999	Multiconductor, thermosetting-insulated and -jacketed wire
5000-5999	Single and multiple conductor specialty items

Table 1: Appliance Wiring Material Style Number Designations

stand. UL 758 also regulates marking and labeling of AWM products.

**HOW DOES UL CATEGORIZE THE STYLES?**

There are five sections of AWM wire. The different categorizations are based on the following criteria:

- Single conductor or multi-conductor
- Thermoplastic or thermoset jacket
- Manufacturing method used to apply insulation, jacket or outer covering

UL has published a document that explains the different terminologies and associated numbers that are assigned to the different styles. For convenience, a reproduction of the table that addresses the style numbers and their use is listed in Table 1.

**HOW TO FIND A UL STYLE?**

UL has a useful tool available on its “iQ™” website (iq.ul.com/awm) that allows an user to access information about AWM wires.

A parametric search is one of the most helpful features when looking for a wire that meets specific application requirements. The search form allows the user to input the temperature, AWG size, material type as well as many other requirements, and it returns a list of styles that meet the input criteria. The site also allows users to search for companies that make a particular style, and it provides visibility to the style page itself.

**COMMON UL STYLES**

According to UL, iQ there are over 7,000 different UL Styles. Some of the more common constructions are listed in Table 2 along with basic details about the style.

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

Common Types	Size Range (AWG/kcmil)	Insulation Type	Shield	Jacket Type	Voltage Rating (V)	Temperature Rating (° C)
1007	32-16	PVC	None	None	300	80
1015	30-2000	PVC	None	None	600	80/90/105
1283	8-2	PVC	None	None	600	105
2464	Not Specified	Not Specified	Optional	PVC	300	80
2919	Not Specified	Not Specified	Optional	PVC	300	80
3173	26-9	XLPE	None	None	600	125
3266	32-10	XLPE	None	None	300	125
4511	Not Specified	Not Specified	Optional	Silicone Rubber	600	200
4535	Not Specified	Not Specified	Optional	Silicone Rubber	600	150

Table 2: Common UL Styles

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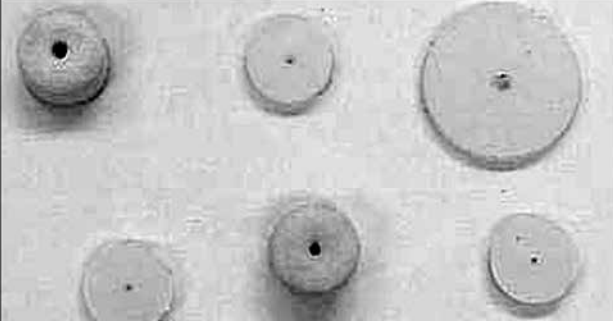
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# The Heart of Quality

By Wes Garner  
SureTech Assembly

Some moments in life are written with indelible ink. Carved deep, our minds and memories are shaped, perhaps scarred, forever. Such was a distressing December day some many years ago. At the time, our company produced a cable assembly for a local pharmaceutical company. We had walked with this customer from their earliest startup days. With diligence, patience, and persistence, we produced documentation, prototypes and ultimately, production for their cable needs. In time, they grew and we grew with them. One of their cables was a small harness containing both

connectors and electrical components. For its meager size, it was a pricey piece. On this pre-Christmas morn, I journeyed to our second location to check on the status of the current order. As I entered the building, the production line before me contained hundreds of these little pearls in process. Upon a casual inspection, I noticed a deformity in the insulation of one assembly. It was small but bothersome. A second look at a separate cable revealed a pattern. Quickly I realized the defect was duplicated and had affected every assembly in the line.

Pause for a moment and insert your own story. Everyone reading can attest to that deep down, sick feeling when there is a problem in manufacturing. Knowing the magnitude of the defect, I called the president and owner; both

arrived minutes later. There we stood in a manufacturing facility, before a production line, at a point of decision. Realizing the severity of the situation, I chimed in: "There's a lot of money on the table." Unhesitatingly, the owner of our company responded: "I don't care about the money, I care about our name." Perhaps that last quote is worth reading again. His response was grounded in an essential business principle: "A good name is more desirable than great riches; to be esteemed is better than silver or gold." With that thought in mind, let's examine the correct perspective, procedures, and possibilities when dealing with mistakes in manufacturing.

## Perspective

Perspective is "a particular attitude toward or way of regarding something; a point of view." Normally, our perspective is shaped by values, commitments, and goals. We discern and lead from this sturdy foundation of objectivity. For example, consider how our perspective guides us through a typical production meeting. As customers, jobs, quotes, and staff are discussed, our perspective provides the lens by which we discern. Each subject and corresponding choice is viewed through a sound matrix. As such, any inconsistencies between our values and choic-

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es are quickly seen and corrected. That is what perspective brings.

However, in a moment of crisis emotions quickly rise and threaten our perspective. Pride and passion wrestle their way to usurp the values, commitments, and goals that guide us in cooler moments. The result is often a catastrophic, emotional response. The United States military understands this trap and trains young cadets in the Civil Air Patrol Program not to turn one problem into two. In their leadership manual they call it the “ethical trap”. An initial bad decision cannot be solved with a second bad decision. Good choices are not made with bad tempers.

In moments of manufacturing crisis, the first corrective step is to regain the proper perspective. A clear head is more important than strong hands or strong words. How can you reset? First, buy yourself time because emotions never endure. Every second that passes naturally diffuses the situation as thoughtfulness returns. Could you ask the other parties for a moment to think? An hour to evaluate? Could you close the office door? Step out of the building? The second step is to buy yourself space. Ironically, staring at the problem rarely brings a solution. Our minds often solve difficult issues when not deliberately thinking about them. Over the years, I have experienced this principle with mechanical repair. On countless

occasions, I have reached a roadblock with a machine. Even though the line was on hold and pressure was mounting, I found that solutions often came only when I stepped away. The same can be said of virtually every situation.


**Procedures**

Once the proper perspective is achieved, it's time to actually address the defect. Keep in mind that the problem is not the problem. The problem is how we handle the problem. The following guide is a principle based framework.

1. Gather all of the facts. People love drama. Often assumptions are made that exaggerate the problem or extrapolations are made that enlarge the problem. A wise leader sees past the personalities and finds the truth. What are we really dealing with here and what is the root cause? The truth will set us free.

2. Assess the impact. Cables appear to be insignificant assemblies of no consequence. However peoples' lives depend on the equipment that those same cables support. Personally, our company provides cables to the pharmaceutical, transportation and medical industries. We believe that one assembly made it on a space

*Continued on page 24*



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# The Heart of Quality

Continued from page 23

shuttle flight! With such weighty results, we must be honest about the impact any defect may have on others.

3. Own the mistake. Suppose we won the vendor of the year award from a customer and were asked to fly to receive it. How would respond? I suspect a flight would be immediately booked and the plaque proudly displayed. We must have the same zeal for our mistakes as our victories. If we have erred, we must claim it.

4. Inform the parties. A good rule of thumb is to inform the parties to the extent they have been impacted. For example, if the product has not shipped and there is time to rebuild,

the customer does not need notification. However, the purchasing department needs to be informed. The production manager needs to be informed. The owner needs to be informed. Why? Because it impacts them!

5. Make it right. Whatever it takes, make it right. Even if cost money, make it right. Even if you lose the customer, make it right. It is never wrong to do the right thing, even if it hurts.

### Possibilities

This leads us to a final consideration. Failures are often doors to opportunities. People observe us intently when we are under duress. As you formulate a solution, consider how this moment might end in victory. Years ago, SureTech Assembly shipped a cable assembly that was blocked

incorrectly. Yes, we are ISO certified. Yes, we have a robust quality system. Yes, every cable assembly is inspected. But somehow it got through. Our customer found the defect and called angrily on a Friday afternoon. We felt sure that we would lose the account over such a blatant error. Nonetheless, we gathered a small team of employees and over the weekend remade leads for the assembly. We didn't have connectors to complete the order, so we showed up at our customer's door at 8am Monday morning. We admitted our error and took full responsibility. We asked if we could sit in their breakroom and deblock and replace the mistaken leads. It was embarrassing, but it was our very best. The customer agreed and within hours the job was done. In the weeks to come, our orders increased from this customer. They later explained that while they did not like the defect, they loved the response. Honesty and integrity had won the day.

Wes Garner is the director of marketing and sales at SureTech Assembly. He has worked for a number of contract manufacturers including Flextronics International.

You can reach him at [Wes.garner@suretechassembly.com](mailto:Wes.garner@suretechassembly.com)



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# ISC Engineering

## Providing Expertise in Overmolded Assemblies

Continued from page 1

them to either bring production in-house, or find a high volume supplier.

ISC's management team is unique with over 100 years of industry experience including extensive experience in wire harness assembly and custom overmolded cable assembly. Ryan Jenner, Chief Technology Officer, was an outsource customer of ISC's and was very interested in overmolding technology and joined ISC to lead their technical efforts. Recently ISC became IPC QML and continues to expand its technical reach with the addition of alternative methods such as thermoset overmolding and low pressure molding techniques.

ISC management team stays current with technology as it carves out



### Circular Connector Overmolded Spin Coupling

a Blue Chip customer base. A good example of this occurred about four years ago when Tesla came to ISC seeking help in building the first charging cables for the S Series. "We had the knowledge and overmolding technology, and they didn't," Steve mentioned, "and we ended up supporting their requirements building the early years requirements until they could get a high volume production vendor up and running." In this regard, Steve asserts that they are not really selling labor as much as the know-how in custom molded assemblies.

Having had a recent conversation with the folks at Stapla about the necessity of over molding dissimilar metal welds, I asked Steve if he has encountered this need. "As a matter of fact they have had experience with Stapla and had a couple of Sta-



Cable Clamp Strain Relief Exploded

Continued on page 26

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# ISC Engineering

Continued from page 25

pla machines running for a few years. Stapla was helpful working with us," he replied.

Steve explained that there are really three different disciplines that go into an over molded part. "First is the cable assembly, and you need to assemble it in such a way that it will survive the molding process," he instructed. "Next, you have the tooling design which is its own unique process, then finally the actual injection molding." The expertise, he explained, comes in combining these three distinct disciplines into one orchestrated process. "I tell people we're not an expert in assembly, or tooling, or injection molding; but rather an expert in the combination of those three disciplines."

The companies that find ISC are glad they

did. As Steve pointed out, "The only people that do over molding on cable assemblies are other cable assembly companies, and they're not going to support their competitors." He noted there are many companies that do general injection molding, but are unfamiliar with the complexities of molding a cable assembly. "We're open in what we do and they can come here and get whatever they need."

Steve also revealed that it's difficult, if not impossible, to find a high-volume manufacturer who will help on the front-end development of an over-molded assembly. "That's not how they're structured as companies," he advised "but in our case, you can get the design, the prototype and initial development, and get all that pretty quickly." ISC will then help their customers transition to high volume production houses.

Although ISC Engineering advertises themselves as a low volume, high mix company, they have an impressive, vertically integrated facility. They operate a 15,000 sq ft manufacturing space, with sixty-five employees running two shifts. They have fourteen injection molding machines, five Haas CNC's, and a couple of Gromax EDMs. They are ISO 9001: 2008 certified and their operators are certified to IPC/WHMA A-620 and the company was recently Certified by IPC for QML class 1,2 and 3 per IPC/WHMA-A-620. With over 400,000 ft. of wire and cable in stock, they carry over 500 different options. ISC stocks over 200 different resins, and has 3D printing for rapid prototyping.

Since their inception 18 years ago, the company has completed over 70 outsourcing programs where companies have added injection molding equipment to overmold cable assemblies that ISC has designed for them. "And those 70 plus companies have purchased over 90 molding machines and most of those machines are operating in North America," Steve was proud to say. "We've helped bring some of this activity back to the US, and I think we're going to see more of this as NAFTA rules change and as some of the trade barriers improve."

He is confident about the future of ISC, and of manufacturing in general in the US saying, "Most of the people working today have nev-

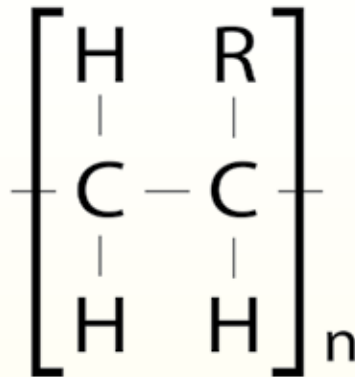


## TAKING THE QUIZ?

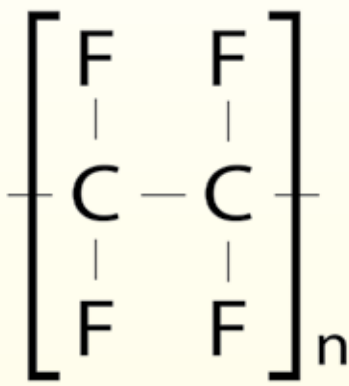
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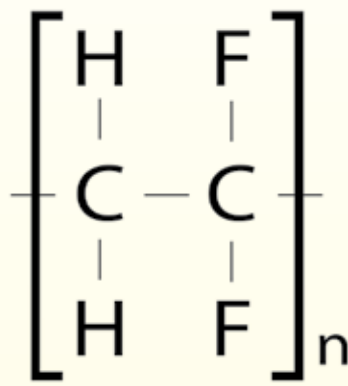
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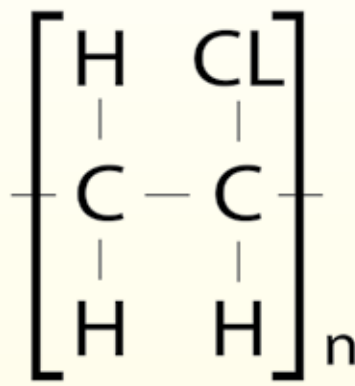
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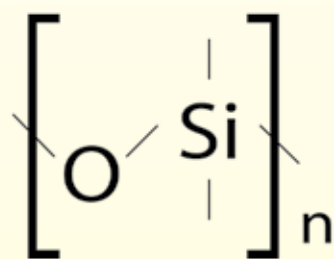
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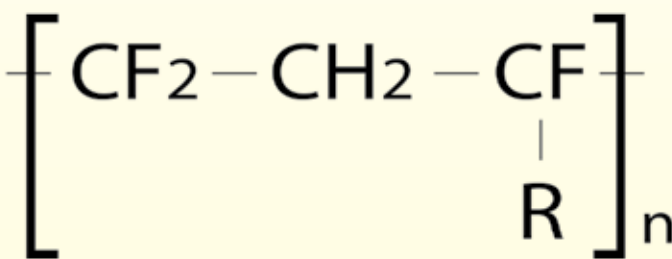
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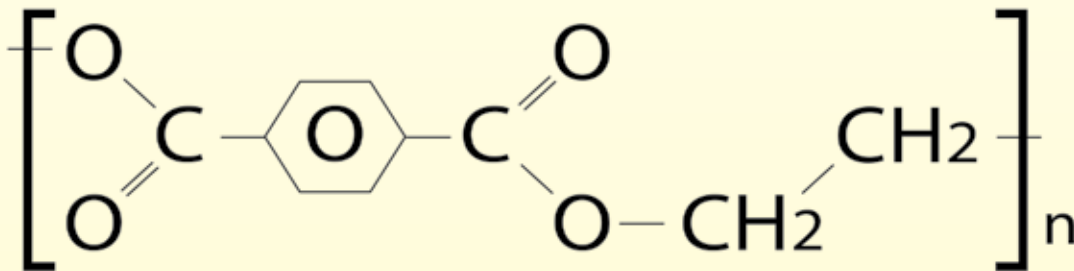
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er been in an economy where we've had growth, and I think we are going to see growth that we haven't seen since the 70's and 80's." Steve sees ISC as an integral part in fostering that growth by expanding custom molding capabilities so that OEM's and Tier 1's have a domestic choice.

**Overview:**

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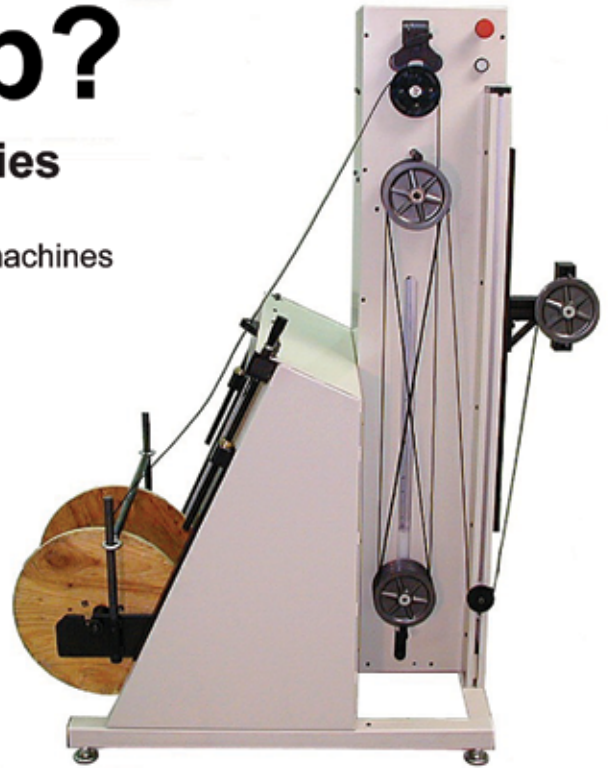
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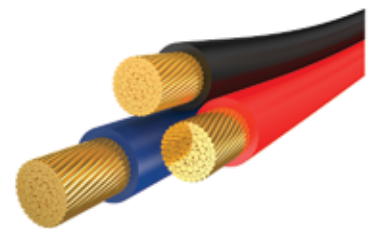
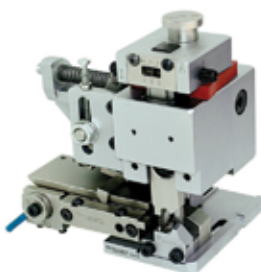
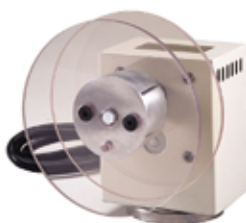
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Continued from page 16



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18<sup>th</sup> ANNUAL

Where the *Electrical Wire Processing Industry*  
meets each *May* in *Milwaukee*

**MAY MKE** @ THE  
9 & 10, 2018 WISCONSIN WISCONSIN CENTER

## SEE THE FUTURE

### OF THE WIRE AND CABLE PROCESSING INDUSTRY

This is the show for decision-makers who design, purchase, sell, install, and maintain electrical manufacturing equipment for the wire and cable processing industry. What new technologies should you consider to increase your future productivity? How can you better use your existing resources to become more efficient and competitive? You'll find all the answers here to grow your business.

Just an hour from Chicago O'Hare International Airport, the Expo has the latest technologies available from industry leaders. See the machinery up and running and ask the experts all your questions.

#### ATTENDEE PROFILE



FREE ADMISSION ONLINE • [ELECTRICALWIRESHOW.COM](http://ELECTRICALWIRESHOW.COM)

**18<sup>th</sup> ANNUAL**


**ELECTRICAL**  
*wire*  
**PROCESSING TECHNOLOGY EXPO**

## INNOVATIONS

The 2018 Wire Processing Technology Expo is the single best resource for discovering how to take your business to the next level. Meet industry experts you can trust and learn from, and gain valuable information including a look at the newest technologies just introduced at Productronica in Germany. Whether you're a supplier, manufacturer, or small shop owner, this is the best place to **evaluate and embrace new opportunities!**



## CONNECTIONS

- Businesses come to this show to see and be seen. Networking opportunities are available throughout the show, including sponsored food and beverage breaks and the VIP party on Wednesday night, creating a comfortable, collaborative environment for all.
- Free technical seminars led by industry experts provide insights into the future and help you with your toughest challenges, and the must-attend A-620 session outlines new and updated regulations.
- Attending every year allows you to continually strengthen partnerships and establish new alliances to grow your business.



### The Latest Products and Technologies

See products from over 180 world-class suppliers and service companies in person. Machinery will be under power, allowing attendees to use and compare product performance before purchasing.

Assembly Boards  
Automated Assembly Equipment  
Battery Accessories  
Braiders  
Caps and Covers  
Circuit Analyzers  
Circuit Boards  
Coilers and Respoolers  
Connectors, Terminals,  
and Switches  
Crimping, Presses, and Applicators  
Cutting  
Dereelers

Electrical Tools and Supplies  
Fasteners  
Hand Tools  
Heat Guns  
Heat Shrink Applications  
Identification Products  
Injection Molding  
Marking  
Measuring  
Molding  
Printers and Equipment  
Soldering and Equipment  
Stripping

Tape and Label Dispensers  
Terminal Blocks  
Terminal Insulators  
Testing Equipment  
Tubing and Sleeving  
Twisters and Braiders  
Ultrasonic Welding  
Wire and Cable  
Wire and Cable Processing  
Wire Harnesses, Components,  
and Equipment  
Wire Marking Systems  
Wire Stripping Equipment

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# SOLUTIONS

This Expo brings buyers and sellers under the same roof to do some serious business, including offering solutions to very small or extremely large wire issues with regard to harness needs. Attending can impact your success in a variety of ways—by helping you stay competitive, gain industry-specific education, and meet tomorrow's challenges today. Don't miss out—REGISTER NOW!

VISIT OUR WEBSITE AT  
**ELECTRICALWIRESHOW.COM**

- \$15 admission fee is waived when you register online!
- Receive your badge in the mail.
- See the full show schedule and floor plan.
- Check out current exhibitors and their websites.
- Find travel information.

## OUR 2017 SHOW FEATURED:

2,900 ATTENDEES



175+ EXHIBITORS



124,000 SQUARE FEET



# PLAN NOW!

## OUR 2018 EXHIBITORS

3M Electrical Markets Division  
AES USA Corp  
Amerline Enterprises Co  
AMTI  
Anixter  
Appitek Technologies Corp  
Artos Engineering Co  
Assembly Magazine  
Assembly Resources  
Atkins & Pearce Inc  
Atlas Wire LLC  
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Cadonix Ltd  
Cajo Technologies  
CAMI Research Inc  
Carpenter Manufacturing Co Inc  
Cembre Inc  
Cetec ERP  
Chief Enterprises Inc  
Cirrus Systems  
CK Technologies Inc  
Cobra Braiding Machinery Ltd  
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DuPage Tying Solutions Inc  
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Entrada Group  
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Gem Grayure  
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Guang Dong Xiongrun Electrical  
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## Wisconsin Center

The Wisconsin Center is conveniently located near several major hotels and restaurants, and minutes from the airport.

400 W. Wisconsin Ave.  
Milwaukee, WI 53203

## More Questions?

Call Cheryl Luck at 262-367-5500  
or email [Cheryl@epishows.com](mailto:Cheryl@epishows.com)

## Free Admission Online!

[www.ElectricalWireShow.com](http://www.ElectricalWireShow.com)

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18<sup>th</sup> ANNUAL



ELECTRICAL  
*wire*  
PROCESSING  
TECHNOLOGY  
E X P O

**MAY**  
9 & 10, 2018

# REGISTRATION FORM

Electrical Wire Processing Technology Expo  
 May 9 & 10, 2018  
 Wisconsin Center • Milwaukee, WI

**REGISTER BY APRIL 18, 2018 • SAVE \$15**

NOTE: ONE COMPLETED FORM PER PERSON, PLEASE.  
 THIS FORM MAY BE REPRODUCED AS NEEDED.

Choose one of four ways to register to get your FREE badge:



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 ElectricalWireShow.com



**SCAN & EMAIL**  
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 c/o Expo Productions, Inc.  
 510 Hartbrook Drive  
 Hartland, WI 53029

## FREE ADMISSION

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For more information, call:

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No one under the age of 16 admitted.

Register online, scan and email, fax, or mail ONE completed form per person by April 18, 2018 to receive your free two-day Expo badge by mail.

**All credentials will be mailed after April 19.**

You can also register in person for a \$15 two-day admission fee at the door. Avoid the registration and badge-printing lines by registering before the deadline!

**PLEASE USE A PEN ONLY & PRINT CLEARLY. ALL QUESTIONS MUST BE ANSWERED FOR REGISTRATION TO BE PROCESSED.**

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The fields in red are mandatory and must be completed in order to receive your badge.

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 Wire Harness Software  
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Check box if you do NOT want your email distributed to anyone other than Show Management.

YOUR BADGE WILL BE HONORED BOTH DAYS. **STUDENTS:** Do not register—student badges will be available on site.

**Register online, by fax, email, or mail TODAY for FREE Expo Admission!**



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## EcoStrip 9380

### Welcome to the Future of Entry Level Cut & Strip

The EcoStrip 9380 offers the most complete feature set at an economical price point. This flexible machine can be configured with rollers or belt feeding unit capable of short mode processing and is easily operated via the 5.7" color touchscreen and underlying Schleuniger S.ON software. Turn the EcoStrip 9380 into a fully automatic processing line with a wide range of accessories for prefeeding, marking, stacking, coiling and tying.

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To Be Precise.

# St. Claire Technologies Featured on Manufacturing Marvels

*You Expect More From Coastel*



Made in the U.S.A.

## The CT4 Coastelmatic Pneumatic Tool Holder

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

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**M**anufacturing Marvels recently aired on the Fox Business Network featuring St. Clair Technologies Inc. (www.stclairtech.com) in a spotlight of long-standing North American manufacturers. The program is produced by Bob & Jerry May, directed by award-winning director Bryan McCullough, and narrated by nationally acclaimed voice talent John Criswell. The segment focused on St. Clair's products as well as lean manufacturing processes, innovative technology, and proactive commitment to customers.

The program was shot on location at two ISO/TS certified manufacturing facilities in Guaymas, Sonora, Mexico. St. Clair is a family-owned, and professionally managed, wire harness manufacturer based in Ontario, Canada, with support services in Michigan and Arizona.

For 66 years, St. Clair has been a cutting-edge leader in the electrical wiring industry. Utilizing ERP and KanBan



systems to minimize inventory and waste, St. Clair specializes in proactive cost reductions for strategic partners, through innovative solutions for electrical systems. The global

markets served by St. Clair include: Tier 1 & 2 Automotive, Bus, Con/Ag, Industrial, Military, RV, Alternative Energy & Electric Vehicles, Heavy Truck, Marine, & Aerospace.

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**HOT**

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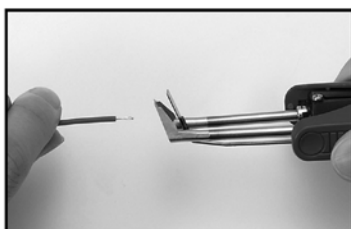
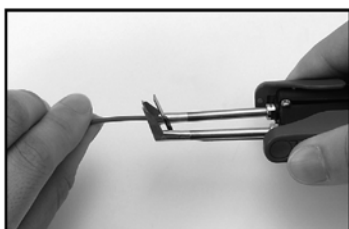
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## FT-801

THERMAL WIRE STRIPPER

*Cuts insulation like a hot knife through butter!*

- Eliminate wire nicks
- Strips fine wire gauge easily
- Digital power display
- Lock in a set power level with a password
- Ergonomic hand piece
- Continuous stripping without hand fatigue
- Adjustable wire stopper for repeatable wire stripping length
- Replace the blades without replacing the hand piece!
- Special tool removes hot blades safely and easily
- Holder with protective cover
- Flexible 4mm diameter cord for working comfort
- Part Number: FT801-02

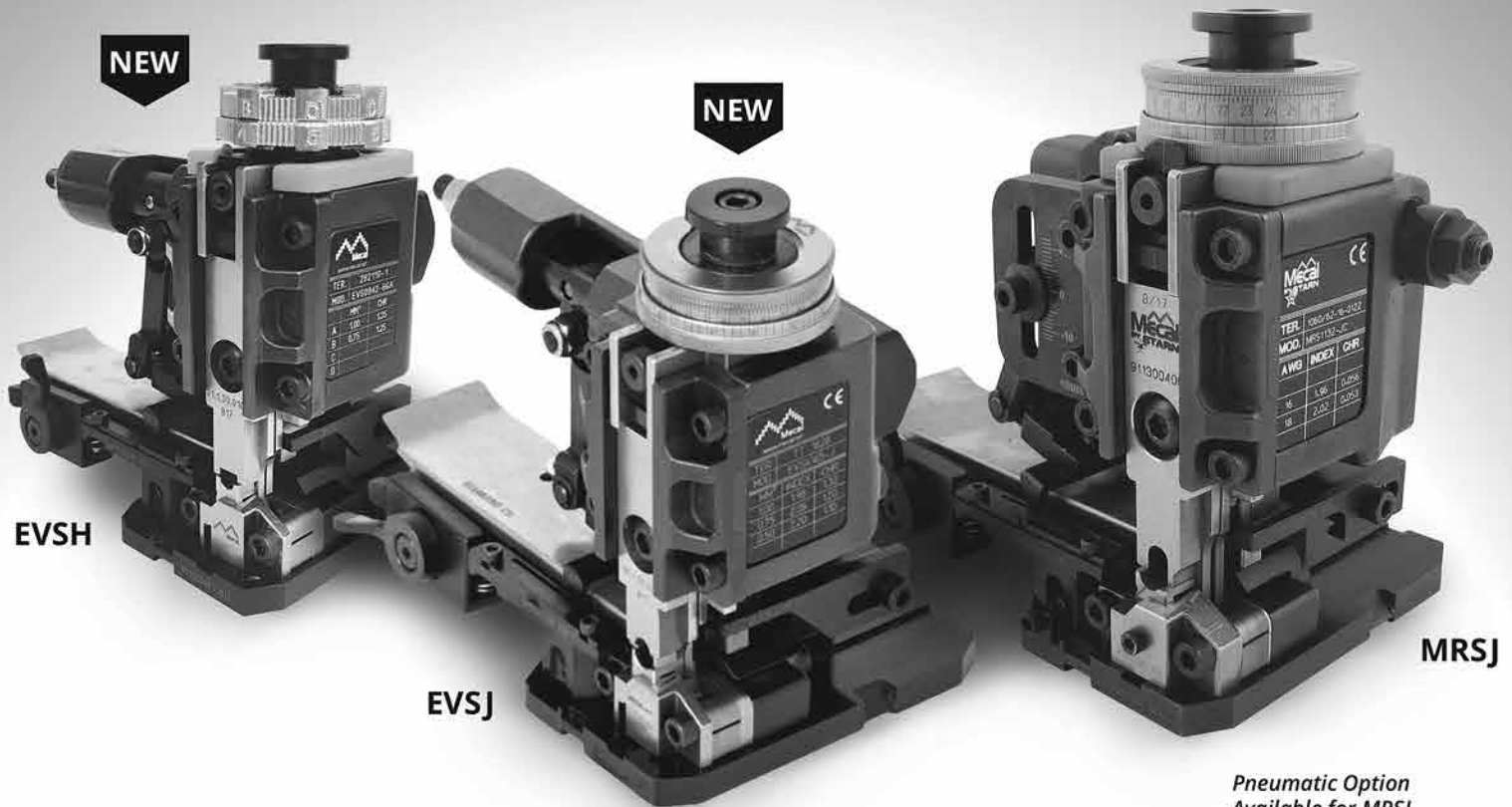


For complete information, visit [HakkoUSA.com/wire](http://HakkoUSA.com/wire)



# The EVOLUTION STARTS HERE

CUSTOMIZED TO BEST FIT YOUR NEEDS



## MECAL Mini-Applicator Models

### FEATURES

- US Based Support
- Side and End Feed terminals
- Standard Stroke Length & Base Plates
- 4 Position Head
- Fine Adjusting Head
- In Press Bellmouth Adjustment
- Custom Specs (Non Mecal)
- Cross Section Micrograph
- 3-4 Week Lead Time

### SPECIFICATIONS

- Wire Size
- Terminal Thickness Max
- Terminal Pitch Max
- Terminal Length Max

\*STARTING PRICE

	EVSH	EVSJ	MRSJ
US Based Support	✓	✓	✓
Side and End Feed terminals	✓	✓	✓
Standard Stroke Length & Base Plates	✓	✓	✓
4 Position Head	✓		
Fine Adjusting Head		✓	✓
In Press Bellmouth Adjustment			✓
Custom Specs (Non Mecal)			✓
Cross Section Micrograph			✓
3-4 Week Lead Time			✓
Wire Size	10-24 AWG	10-32 AWG	6-32 AWG
Terminal Thickness Max	0.023" (0.6mm)	0.023" (0.6mm)	0.047" (1.2mm)
Terminal Pitch Max	1.10" (28mm)	1.10" (28mm)	1.06" (27mm)
Terminal Length Max	1.85" (46.5mm)	1.85" (46.5mm)	1.97" (50mm)
*STARTING PRICE	\$1,895*	\$2,145*	\$2,495*

Pneumatic Option Available for MRSJ

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**NEWS PLUGS** continued



**Sleek, New 4U Frame Takes Data Connectivity Out of Rack**

Simple solution returns valuable data center rack space.

HellermannTyton announces its Out of Rack connectivity solution, which adds 4U of space above cabinets and racks to accommodate patch panels or additional active hardware to maximize data center floor space as well as telecommunications rooms.

Moving the connectivity and interconnect equipment out of the rack or cabinet frees additional space, which



**Out of Rack connectivity solution**

can then be used to increase server counts per rack, maximizing the return on valuable data center real estate. Managing the patching and horizontal cabling outside of the rack or cabinet helps improve critical airflow across the active equipment.

The system includes universal mounting brackets to provide simple, flexible mounting options for a ladder rack or overhead cable tray. Also

included are cable rings to route bundles.

The standard 19" rack mount accepts traditional copper and fiber panels as well as RapidNet® pre-terminated solutions for swift deployment. Each unit is rated for a maximum 100-pound load.

HellermannTyton is a global leader in cable management and protection products, identification systems and

network connectivity solutions. Its systems and solutions are specified by major manufacturers and contractors in the OEM, data communications, automotive, heavy equipment, renewable energy and related industries. The company's engineered solutions and innovative products are designed and constructed to meet the strictest quality standards while delivering reliable implementation at the lowest cost. HellermannTyton operates in 37 countries, with North American headquarters in Milwaukee, Wisconsin. [www.hellermann.tyton.com](http://www.hellermann.tyton.com)

**New from Weidmuller – An End-to-End Energy Condition Monitoring Solution**

Weidmuller introduces a new portfolio of selected energy monitoring components for energy consumption measurement, monitoring and integrated quality analysis of electrical supply networks. Designed for production facilities both large and small, Weidmuller's modular and scalable solution provides energy monitoring at all levels from the grid connection to production lines and machines, down to the individual machine modules. The product portfolio includes the Energy Logger D550, Energy Analysers Series and the Energy Meters Series, all fully integrated with Weidmuller's ecoEx-

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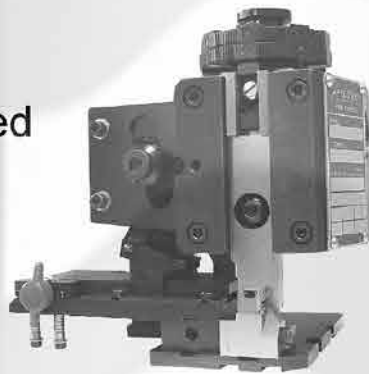


**Applitek**  
TECHNOLOGIES CORPORATION

## Crimping Applicators

Applitek and all of its employees are proud of the fact that we are one of the oldest independent applicator manufacturers in the United States. Our Company was founded on designing and manufacturing quality products using our in-house capabilities. To this day the tradition continues and we are prouder than ever to say “Still made in the USA”

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

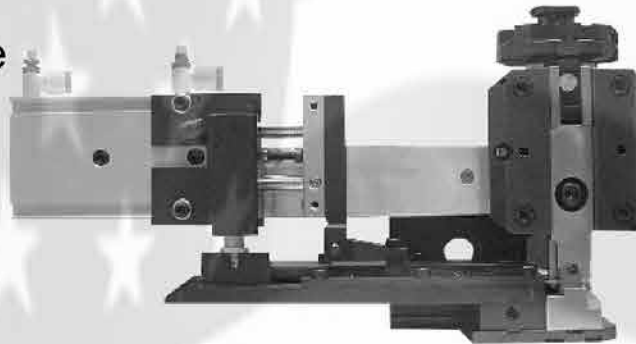


Model 1700

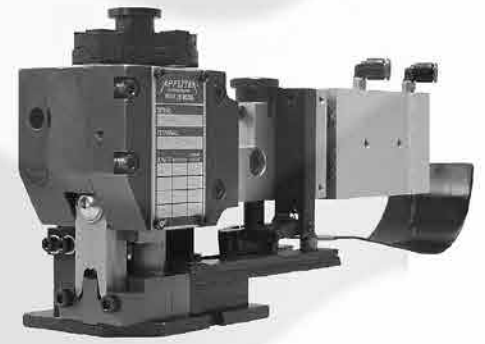


Model 2000

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

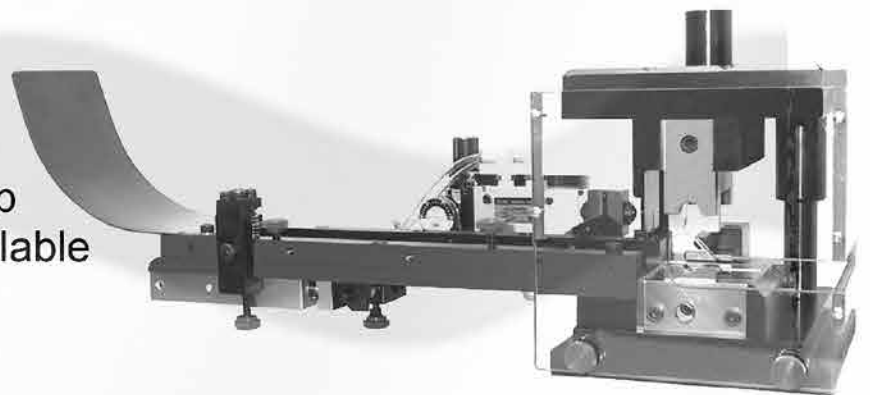


Model 1500



Model 2100

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



DSA Series

Applitek has a solution for all your termination requirements. That's why many major wire harnessing companies and Original Equipment Manufacturers use and specify Applitek applicators. Our base applicator frame designs have proven themselves over the years with their reliability and have been able to accommodate over 3000 different types of terminals.

Give us a call at (401) 467-0007. Our business is applicators, not terminals, not wire, not connectors, etc., etc. It's our only business.

Visit our web site: [www.applitek-usa.com](http://www.applitek-usa.com)

Applitek Technologies Corporation, 174 Georgia Avenue, Providence, RI 02905 Tel: 401-467-0007 Fax: 401-467-5525

# DMC to Exhibit Twist-Strip at WHMA Conference

At this year's WHMA Conference DMC will be featuring the new Twist-Strip™ tool for stripping the outer jacket of multiconductor cable. It is a lightweight system that is portable, self-contained, affordable, and ergonomic. The precise blade adjustment, zero friction ball bearing design, articulating/locking arms, and adjustable dies make the Twist-Strip™ very user-friendly.

## Imprecise Methods

Stripping multi-conductor wire cable is often done by hand with a razor blade. (Fig 1) This is a dangerous and difficult way to remove the jacket from any type of electrical cable. A razor blade offers no method of controlling the depth of cut which will result in a poor-quality strip, and cuts or scrapes on the shielding which lead to poor electrical bond and a likely place for corrosion (Fig 2).

## Safe, Accurate, and Repeatable

### The Problem

It is common for high-speed data cable to utilize two or more shielded twisted conductors. This type of cable is common in all digital electronic networks, and it requires new tooling disciplines. The challenge in designing a wire prep system of this type is the non-circular configuration of the cable, and the many types, variations, and stripping nuances of shielded, twisted, multi-wire cable.



Fig. 2 - Shield Damage

### Risk of Injury

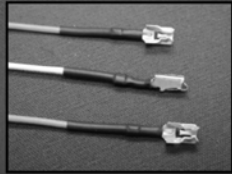
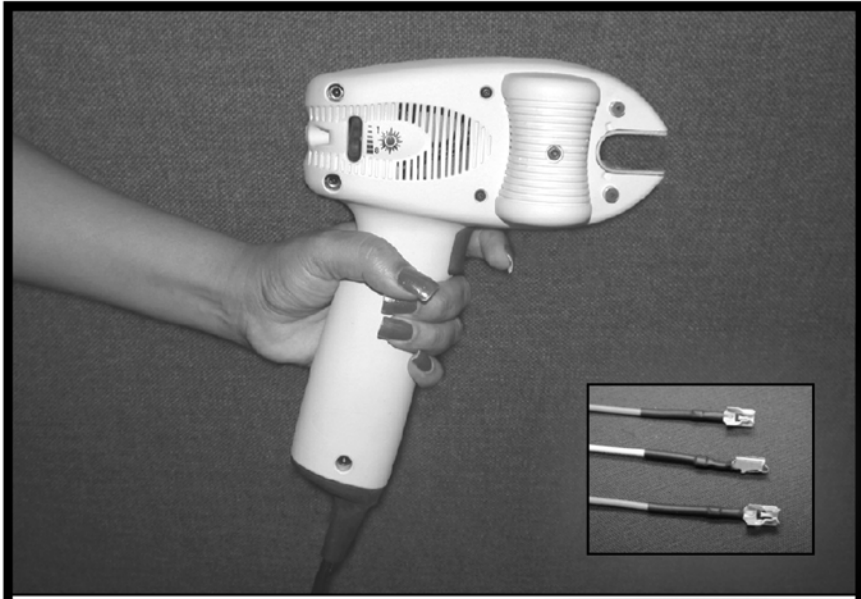
Using a razor blade increases the probability of injury to the operator and constant tugging to remove the outer jacket which causes operator fatigue. Other methods for removal of the jacket like laser or thermal stripping produce hazardous work environments.

### Time Consuming

The conventional "ring and slit" method for stripping shielded twisted cable is very time consuming and requires a highly skilled operator



Fig. 1 - Blade Cutting Jacket



## Our Gun out-shrinks the competition 5 seconds vs. 12 seconds\*

\*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.

Focus-Lite™ technology uses radiant energy to shrink heat-shrink tubing in a fraction of the time of traditional methods.

Here's why it works: Dual Quartz Halogen bulbs are focused to direct all of the usable radiant energy to the cable/wire diameter covered by shrink tube. This allows for 10 times the average energy expended by the bulbs to be delivered to the target zone. What you will see is an amazing difference in shrink time!

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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**Focus-Lite™**  
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Nu-Tech is a turn-key electrical assembly manufacturer. We specialize in cables, harnesses, box and panel builds. Our target markets include road paving, military, medical, as well as commercial/consumer markets. We are fully automated; shortening your time to market while offering overall cost reductions. Let us show you how our extensive expertise can benefit your company.

Now Offering  
Wire Harness Solutions!





to successfully perform. The DMC Twist-Strip product line gives the user a system with the maximum capabilities, while keeping the system portable, self-contained, affordable, and ergonomic. The precise blade adjustment, zero friction ball bearing design, articulating/locking arms, and changeable dies makes the Twist-Strip very user-friendly and efficient when performing the difficult task of cable preparation.



Fig. 3 - Twisted-Strip Tool With Processed Cable

**The Solution**

**Adjustable**

The TSK8000 has adjustable blades that allow the tool to accommodate variances in the cable. Varying jacket thickness and cable diameter are two examples of common differences you may see in different lots of the same cable. Simple adjustments allow the user to set the cutting blades for a deeper or shallower score of the cable jacket.

**Precise**

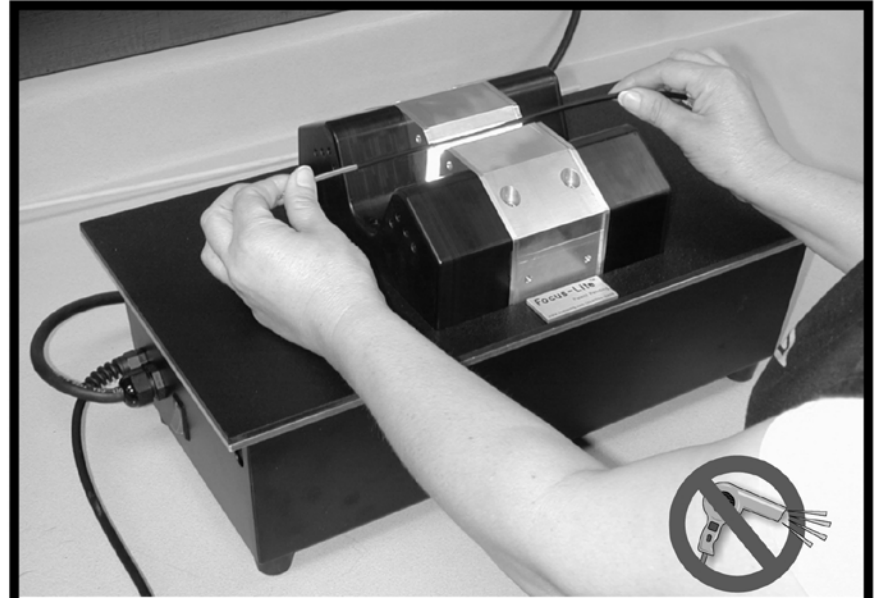
A cable track precisely machined into each die set creates a controlled rotation of the dies/blades as the cable is moved along the cable. A simple 90° bend of the cable results in the jacket halves separating for removal, reducing the amount of force needed to remove the jacket (Fig 3).

**Consistent**

The repeatable function of the tool reduces operator error and is up to 3 to 5 times faster than conventional methods.

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# Market Changes Drive Innovation

Continued from page 1 \_\_\_\_\_

system was a three kilowatt system doing up to 40 sq mm welds. “Now we’re building these monster systems at nine plus kilowatts welding up to 220 sq mm.

As indicated earlier, it’s really the development of larger power cables for EV and HV vehicles that is causing the shift. Jeff explained, “They need to get the power out of the batteries efficiently, and one of the reasons they go with ultrasonics is there is very low resistance at the point of contact, whether it’s wire to wire, or wire to a terminal.”

Not only has there been this shift to larger cables, but the customers need for front end development from

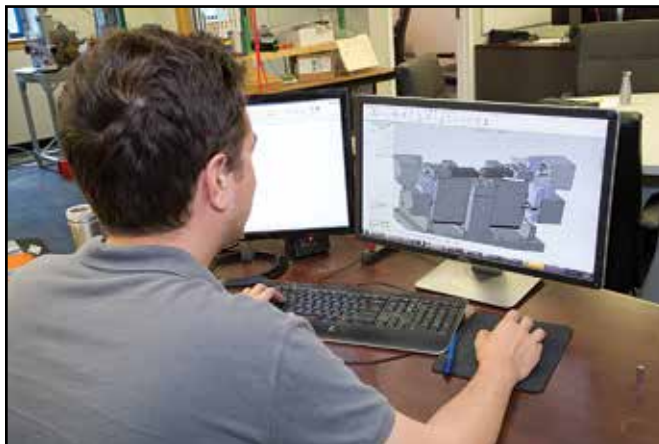
equipment manufacturers has also increased dramatically. Pete Woboril, Vice President of Stapla, explained, saying “What’s interesting from a supplier point of view, when comparing some of our customers of today versus the past, we see a lot more pressure for additional services.” In previous years, Stapla’s customers had a lot of in-house support to the processes they brought into their facilities. “But today,” Pete explained, “the customer is outsourcing so many of those formerly internal processes, and they’re looking to their suppliers for engineering services and ideation.”

Globalization and customer feedback have also had an effect on the way Stapla has

structured its business. “We’re competing in a global market and doing business in the different market segments of the world; this really changes a lot of the variables you have to face,” And timing time itself has changed dramatically. “Years ago, you could talk to your customer to find out what’s coming, and you could really rely on the info,” Pete informed, “Today it is much harder to know what’s coming and you have to react, so the pressure is enormous.”

The increase in the pace of technology change is another factor the team faces. Pete explained, “For a new car to go to market it used to take three years; now it’s 18 months or less.” The quick changes they are seeing in wire, cable, connectors and connector systems means Stapla’s reaction time to create a new process and bring it to market has been greatly reduced.

This has caused change in the business structure at Stapla, most notably in the role of the lab, and this is where Kevin Gordon, Lab Manager at Stapla, chimed in. “Typically what would happen is we would work with sales reps, materials would get submitted, we would process them and provide a de-



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tailed report, and Sales would take over," he explained. "Now, everything is so fluid and designs change on the fly." Their Tier 1 suppliers are reluctant to make the capital investment in the specific equipment and tooling platforms until the program actually kicks off. The new role of the lab is now in prototyping in many cases. "They are relying on us to make these prototype harnesses for these EV and HV builds and they are willing to pay for that service." Kevin indicated it is cheaper for them to pay Stapla to process these short runs than it is to make a capital investment in a program that may never get off the ground, or that might change in two months.

There has also been a lot of development with the terminal manufacturers as auto makers transition to aluminum wire. These need to be mated to the existing copper terminals and Kevin's lab has addressed some of the issues with galvanic corrosion and resistance. He clarified that Stapla doesn't do the molds "but we'll play around with different welds until they get the molding process dialed in."

Another area of concern in mating aluminum to copper terminals is with resistance. Copper cable would typically be crimped into copper terminals. But as Kevin noted, "If you replace a copper wire with an aluminum wire and crimp it as is, the only strands that would pass current would be the outer strands that come in contact with the terminal," added, "and during the crimping process the oxidation layer is disrupted." In response to this issue, Stapla has developed a technique to weld the aluminum wire into an elliptical shape which matches the inside radius of the terminal. During the ultrasonic weld process, the oxidation is removed from all the strands and when

crimped in a secondary process, the results are superior. "Another advantage is that the customer can switch from copper wire to aluminum wire using the same terminals," he added.

In his 20 years of service at Stapla, Kevin has established a huge library of application specific tools. They have a lending program so existing owners of Stapla equipment can do their own development to show customers their capabilities in a short time frame, or while their own tool is being machined. Kevin is very proud of his extensive work in establishing this library, saying "I know there's no other player in the industry that

offers such a service."

Jeff jumped back into the conversation saying, "Once Kevin approves the materials and processes, it goes back to Sales and we work with the customer to quote the materials, the delivery times and even where the equipment goes." And that could be

worldwide, Jeff explained, "As part of Schunk Sonosystems, we have access to facilities worldwide. It may be bought in Michigan but it may end up in Shanghai and we have people on the ground to service and support

Continued on page 44

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# Market Changes Drive Innovation

Continued from page 43

that equipment.”

Next the order goes to Rob Saulnier the Production Manager who oversees the manufacture and even installation of the equipment. Rob also handles the creation of tooling for Kevin’s lab and for production units. He has a fully equipped in-house machine shop with five machin-

ists. Rob has six technicians on the floor who assemble the equipment and have gone through an extensive cross training program. Often times, machines come back for retooling for new applications or for recertification and Rob oversees this as well. “It’s really a one stop shop here as far as design, application, manufacturing, testing and eventual refurbishment or recalibration.”

Stapla offers the calibration procedures to customers who wish to re-certify the equipment. “There’s not a lot of calibration needed as long as they can validate the current calibrations, and that’s usually determined by their own in-house quality standards.” Rob added.

All of this has to be done in accordance with Stapla’s strict quality requirements and guidelines, and that’s where Karla David, Quality Manager comes in. “At Stapla, our quality system is extremely important and with our customers outsourcing more and more, it’s important for us to constantly review what our objectives are, and to enhance our system internally,” she said. With all the changes that happen so rapidly on the shop floor, Karla is always updating procedures to produce the high level

of consistent quality Stapla is known for. “We will not close any nonconformance issue until we are sure that all of our corrective actions are indeed verified,” she assured. Stapla is currently ISO 9001: 2008 and will be updating to the 2015 version in 2018.

Stapla seems committed to staying on the cutting edge of ultrasonic technology and to meeting the quickly changing needs of their customers. If you would like more information about the company and their products, go to [staplaultrasonics.com](http://staplaultrasonics.com). You can contact Stapla at 978-658-9400 and Jeff can handle any sales requests at [jroman@staplausa.com](mailto:jroman@staplausa.com).

*Many thanks to the Stapla team for assembling in such a fashion for this article!*



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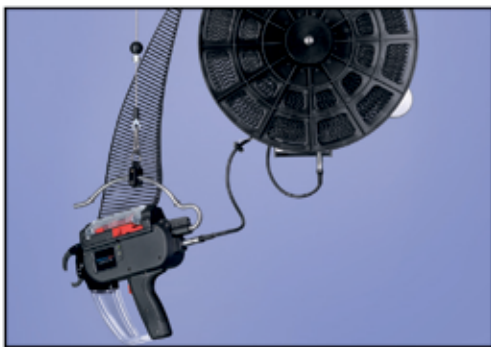
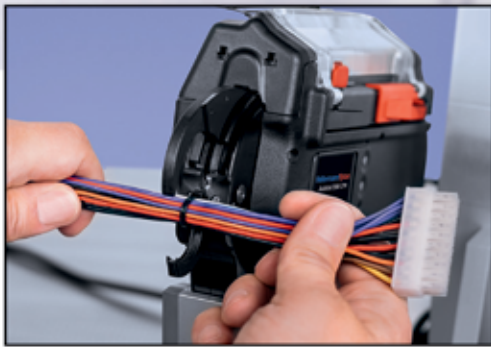
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NEWS PLUGS **continued**

Continued from page 38

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Weidmuller's Energy Meters offer detailed measurement of energy consumption for production facilities. Many of the Energy Meters feature an integrated display for immediate access to the measurement data that include voltage, current, power and energy demand. Models 610, 750 and D650 feature flash memory for data storage.

Weidmuller's energy monitoring software applications, ecoExplorer and ecoExplorer go provide simple and convenient device configuration and real-time monitoring. ecoExplorer offers users the ability to record and analyze energy data and generate automated status reports and process-related evaluations. ecoExplorer go, a PC-based software with an intuitive user interface, offers simple connection and configuration for measurement devices, and a straightforward display of measured data for quick insight and initial analysis.

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### Schleuniger, Inc. to Demonstrate New Wire Processing Equipment at 2018 WHMA Annual Wire Harness Conference

Schleuniger, Inc., a leading international manufacturer of high-precision wire processing machines and member of the Wire Harness Manufacturer's Association (WHMA), will exhibit at the 25th Annual WHMA Wire Harness Conference at The Scott's Resort in Scottsdale, AZ, February 13 – 15th, 2018. The conference features a number of timely presentations on topics important to wire harness manufacturers, OEM's and suppliers. It also includes peer-to-peer networking, best-practice roundtables and a tradeshow of industry leading suppliers. During the trade show, Schleuniger will be demonstrating select equipment, including a new concept machine, from its comprehensive line of wire processing equipment.



**EcoStrip 9380**

New for 2018, Schleuniger will be exhibiting a new concept machine for laser wire and cable stripping, the Mercury-5. This new concept machine can strip wires and cables ranging in diameter from 1 mm – 20 mm (0.12 – 0.79") O.D. Using the color touchscreen, the operator programs the cable diameter, strip length and power level and the machine is ready for operation. The operator inserts the wire or cable to be stripped into the Mercury-5 and presses the foot pedal to begin the stripping cycle. The cable is automatically centered and gripped while the laser performs the stripping process. The

Mercury-5 strips all types of polymer insulation materials. It can also perform an axial slit, making it easier to remove the insulation after the stripping process. The Mercury-5 is non-contact, does not have any wear parts and offers guaranteed nick-free stripping for the most demanding applications.

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



**UniStrip 2300**

Attendees will also have the opportunity to experience hands-on demonstrations of two of Schleuniger's benchtop cable stripping machines, the CoaxStrip 5200 and UniStrip 2300. The CoaxStrip 5200 is a multi-step stripping machine for coaxial, multi-conductor cable and single conductor wire. Thanks to the universally

Continued on page 48

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## NEWS PLUGS continued



Continued from page 46

designed blades, centralizers, and clamping jaws, the machine can process a full range of cables without the need for mechanical adjustments, saving the user valuable time and increasing output when switching between applications. The UniStrip 2300 features a pre-programmed cable library and a highly responsive trigger sensor that is great for small, flexible wires. In addition, the machine is also able to strip different wire sizes without requiring mechanical adjustments. Both the CoaxStrip 5200 and UniStrip 2300

feature user-friendly, high-resolution color touchscreen interfaces and intuitive programming.

Additional machines to be shown include the easy to use UniCrimp 100 crimping machine and ShieldCut 8100, which provides unrivaled flexibility for cable shield cutting.

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

The Schleuniger Group in Thun is a globally active technology company and a leading supplier to the wire processing industry. With its wholly-owned and independently managed company, DiIT, Schleuniger is in addition a leading player in digitalization and industrial IoT. Most of the Schleuniger Group's customers are suppliers

to the automotive, entertainment and information industries as well as for the communications sector. Schleuniger's products are used wherever precise connections and highest productivity are required. The company has development and production locations in Switzerland, Germany and China. Due to its sales and service companies in North America, Europe and Asia and more than 40 distribution partners worldwide, Schleuniger is always close to its customers.

## Gladding Knows Braiding Machines

Gladding Braided Products is one of the largest braiding manufacturing operations in the United States, operating over 1,500 braiding machines in a 100,000 sq. ft. facility. It is safe to say, "Gladding Knows Braiding Machines".



Harness Braiding Machine

**Braiding Machines:** Over the company's 200-year history, Gladding has become a key supplier of braid, raw materials, and braiding machines to

many WHMA members. Using their experience is easy, and a quick phone call to Gladding can help you determine the best machine for your specific project. Gladding will design and build machines to your specific needs, or available off the shelf are standard units in stock for quick delivery situations.

The harness braiding machinery is typically based off a New England Butt Machine body, stripped down to the deck and uprights, upon which Gladding then rebuilds from there with all new carriers, motors, controls, electronics, potentiometers, and frames to make a versatile adjustable speed machine.

**Durable:** the result is a machine that will last for decades with support from Gladding's factory. Parts are a phone call away from their upstate NY State location, along with all electrical components which are USA based for quick turnaround, however rarely needed.

The machines can be designed and sized to handle small diameter harnesses from 1/8" up to 1" diameter branches using a 16, 24 or 32 carrier braiding machine. But Gladding does not stop there, they also supply large machines to the industrial and utility cable markets with machines that are over 6 feet in diameter and will cover cables from up to 3 inches in diameter, weighing thousands of pounds.

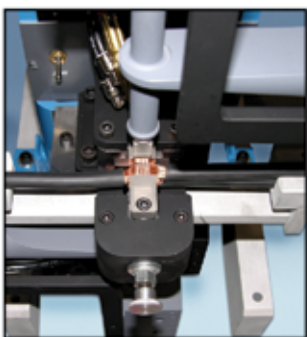
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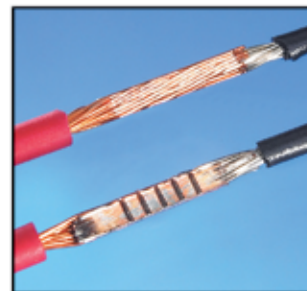


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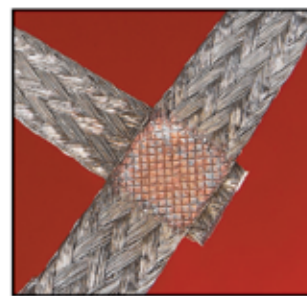


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## NEWS PLUGS continued



Continued from page 48

**Training:** With the purchase of a machine, Gladding includes a day of training for your personnel at their NY State Factory, including time spent with the machine fabricators and the production experts.

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The company's two distinct divisions; Fiber Division which uses Nomex, Kevlar, Fiberglass, Ceramic, Polyester, Nylon, etc. and the Wire Division using Tinned Copper, Silver, Stainless Steel, Nickel, etc. allows for vast experience and inventory of most raw materials. Gladding will supply them on the bobbin of the customer's choice.

If interested in expanding into braiding opportunities, contact Gladding. They will help in any way possible: phone Gladding at 315-653-7211 or email [sparky@gladdingbraid.com](mailto:sparky@gladdingbraid.com) with your requests.

### Fasten Sensors to Thin-Wall Technology Bumpers with Torsional Welding Technology

Lightweight construction is an important trend in the automotive indus-



try. As well as cutting down on weight, it enables significant cost savings. However, traditional welding methods struggle to meet requirements in applications which involve wall thicknesses of less than 3 mm and demand high-

quality Class A surfaces. It is against this background that torsional ultrasonic technology, often also referred to as high-frequency friction welding, is gaining increasing acceptance as a joining process of the future.

The SONIQTWIST® technology developed by Telsonic is now being used in series production in the automotive industry: Magna Exteriors, a multinational tier 1 supplier of exterior products and systems, has been using SONIQTWIST® to produce bumpers in thin-wall technology since the middle of 2017.

Telsonic's ultrasonic technology creates a tensile fastening between the sensor mounts and the front bumper of the Skoda Octavia, leaving behind no marks on the already finished paintwork.

SONIQTWIST® has been designed to achieve joint strengths way in excess of 400 newtons. It can be relied upon to meet strength requirements with certainty and will not leave any marks behind on the sensitive Class A paint surfaces. Furthermore, at between 200 and 300 milliseconds, the welding time is incredibly quick and the method can be integrated seamlessly into the automation system.

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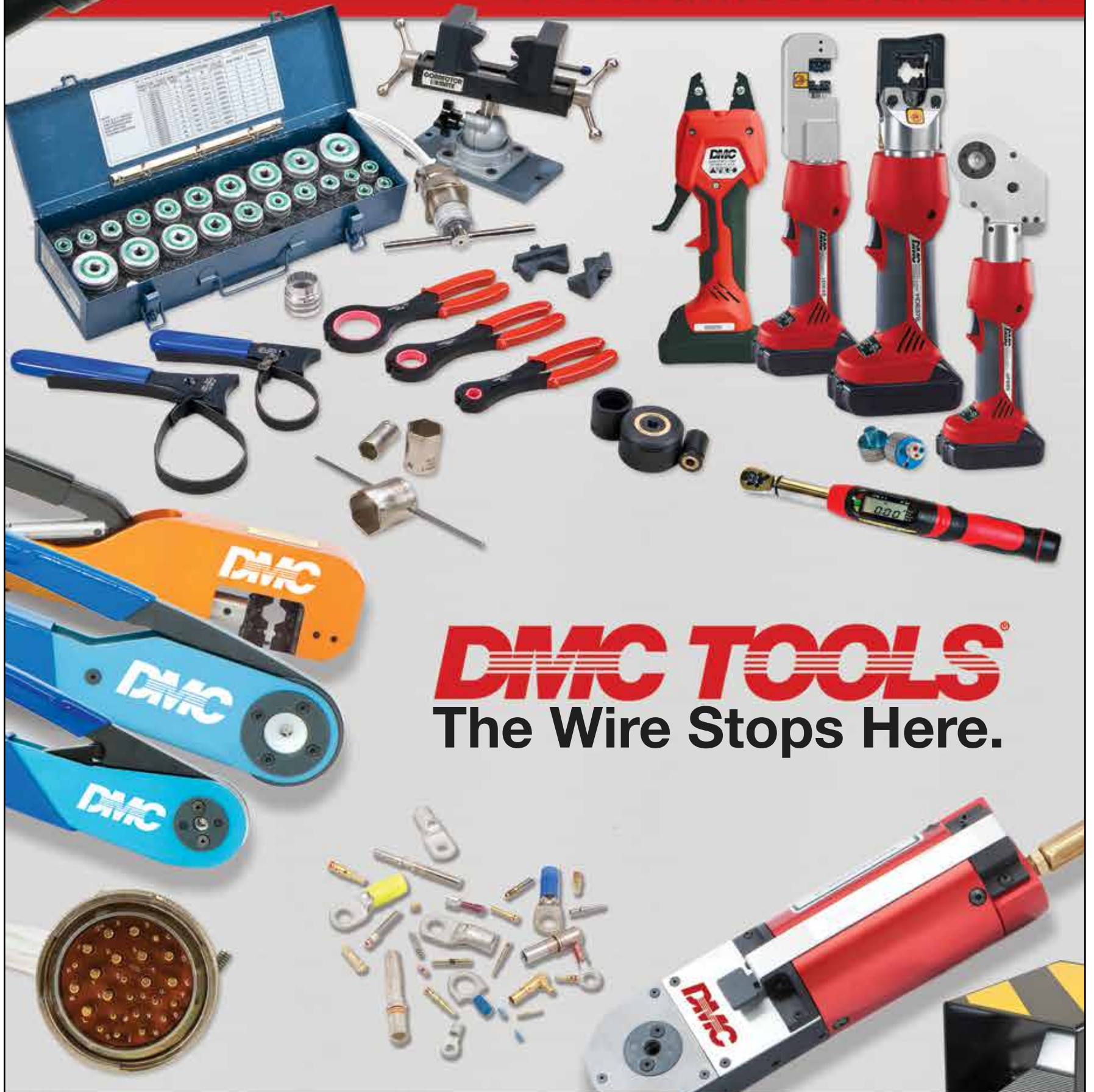
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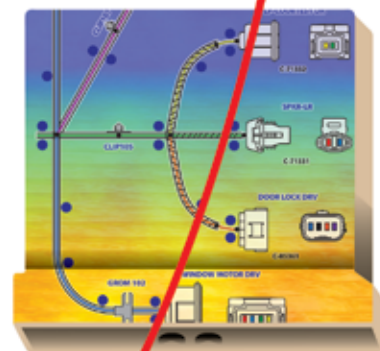
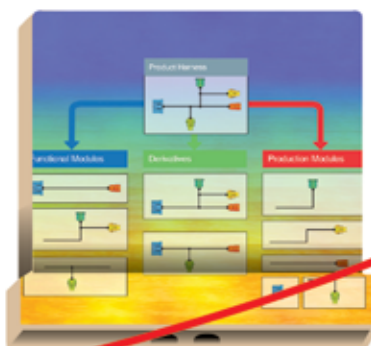
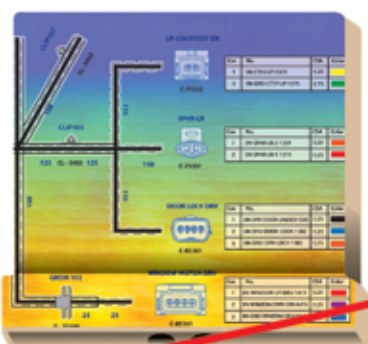
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# Crimp Monitor Limitations

Continued from page 19

material mass has not changed and therefore there will be no change in the crimp force.

2. Nicked or scraped conductor strands - the strands are present in the conductor core crimp, but the strands have been damaged from the wire stripping blades touching the conductor strands during the insulation slug removal. There will be no detectable change in the crimp force signature.

3. Conductor strand(s) missing

combined with low Headroom\* - One missing conductor strand will result in reduced conductor mass in the core crimp; two missing conductor strands will further reduce the mass in the core crimp. This change in mass in the core crimp will normally result in a noticeable variation in the crimp force signature for effective defect detection. However if the headroom is very low (<20%) as a result of crimping a hard terminal, and/or abnormally high crimp compression force, then there will be little to no change in the crimp

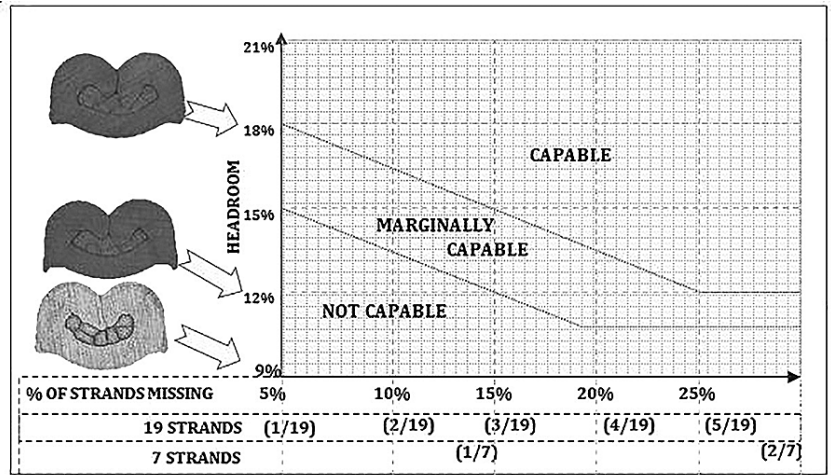


Figure 2

force signature. The chart (Figure 2) illustrates the effect of headroom on the crimp monitor sensitivity as it relates to the detection of missing strands.

\*Headroom is a benchmark indicator of the crimp monitor sensitivity, and its capability to detect crimp defects. Headroom is influenced by materials (terminal hardness, terminal/wire material combinations), and even the magnitude of the crimp compression force. The headroom is a % computation of the terminal peak force with all of the conductor strands present in the core crimp, and the peak force of an empty crimp (no conductor present).

4. Conductor strand(s) crimped on the outside of the conductor core crimp - is an occurrence where all of the conductor strands are present in the crimp die, but with strand(s) crimped on the outside of the conductor crimp as illustrated in

Figure 3. There is no change in the crimp material mass and therefore, there is little, to no change in the crimp force signature.

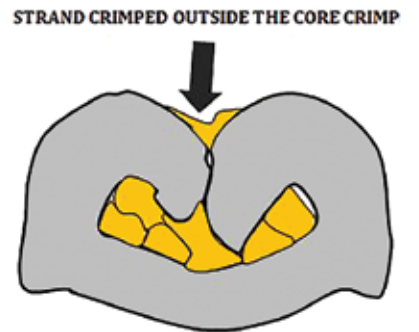


Figure 3

5. Change in the insulation shoulder position - the insulation shoulder is normally positioned with the conductor strands visible between the insulation shoulder and the "bell-mouth" or terminal window as shown in Figure 4. This insulation

Continued on page 56

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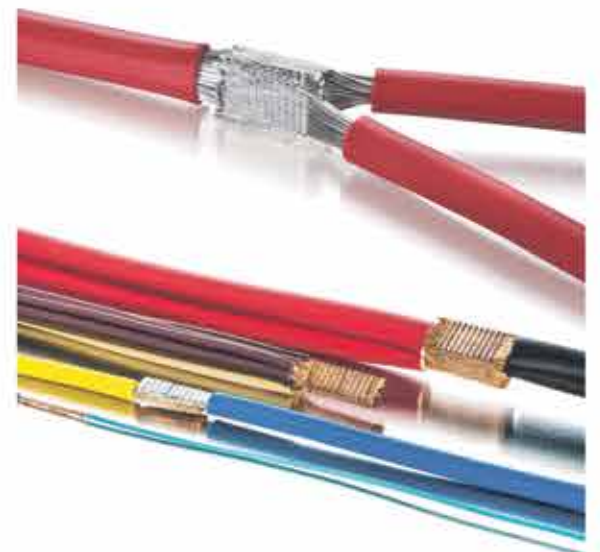
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# Crimp Monitor Limitations

Continued from page 54

shoulder position can change during production for various reasons. The crimp monitor is only able to detect the incorrect insulation shoulder position if the insulation material enters the conductor core crimp as shown in Figure 5.

6. Seal insertion defects - the crimp monitor is not able to detect seal insertion defects such as seal position, reverse seal, skewed seal, or missing seal conditions. Some examples of these seal loading defects are shown in Figure 6.

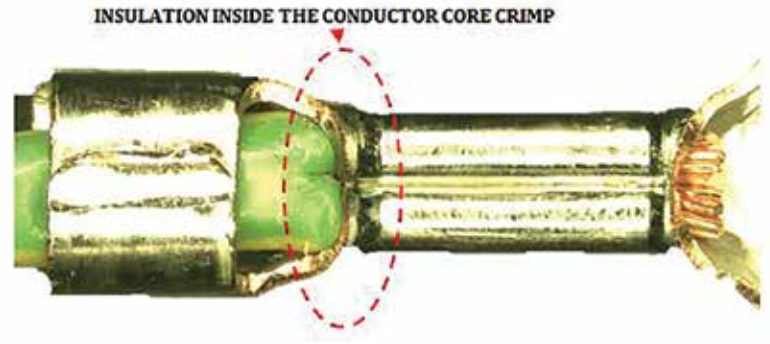


Figure 5

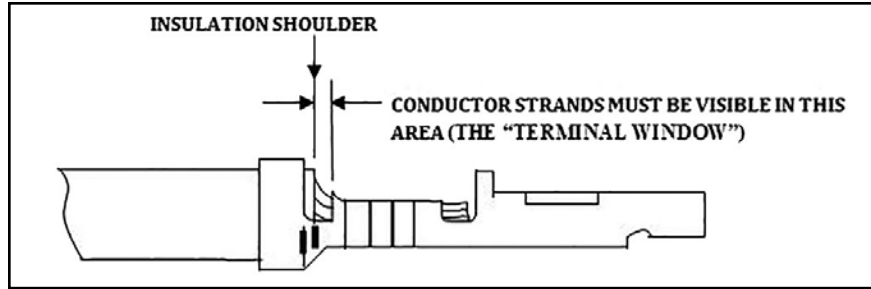


Figure 4

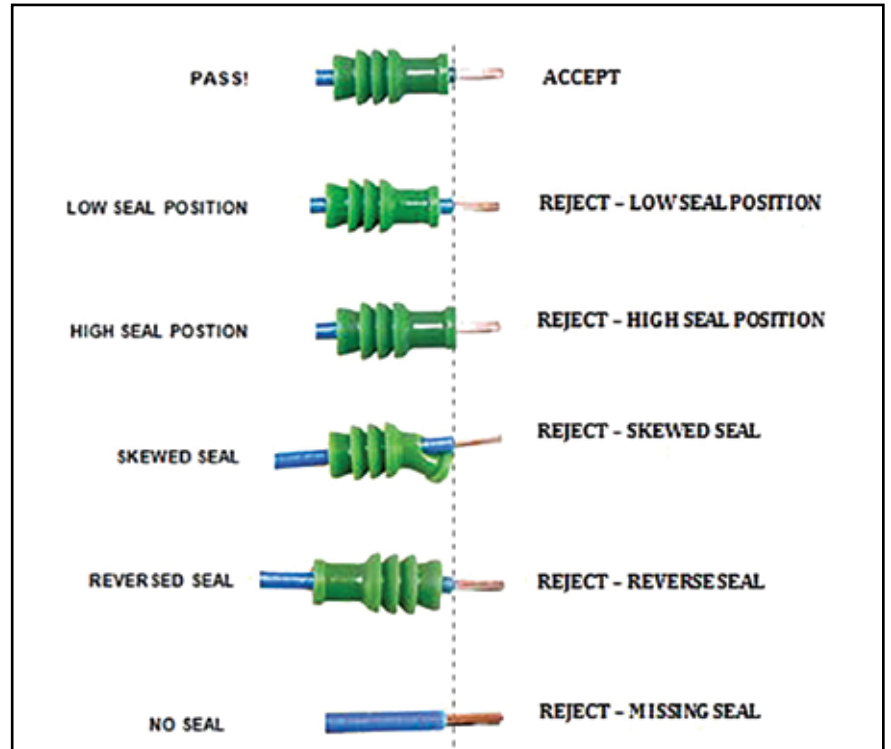
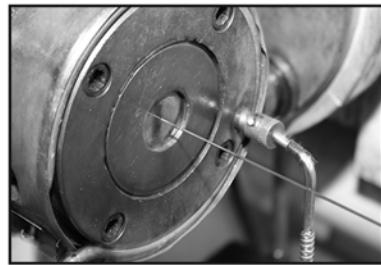


Figure 6

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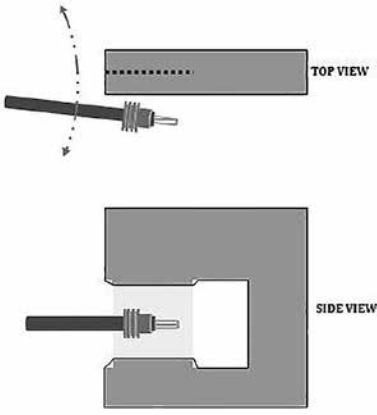


Figure 7

Alternative and complimentary sensor technologies should be considered for detection of wire processing defects that cannot be reliably detected by crimp monitors. For example strip and seal inspection sensors are an effective sensing technology for inspecting each wire processed for strip and seal insertion defects.

Conductor touch is very new sensor technology developed to detect wire processing conditions that contribute to nicked, torn, cut, and/or pulled conductor strands. A deeper review of these two

alternative and complimentary sensor technologies with respect to methodology, capability, and benefits is as follows:

Wire strip and seal inspection sensors - are commonly implemented on automatic wire processing machines to inspect for common wire stripping and weather seal insertion defects. This non-contact optical inspection sensor technology captures and analyzes the image profile of the end of the wire as it is conveyed from the wire stripping station to the crimp station as illustrated in Figure 7.

Figure 8 is a typical image profile dynamically captured as the wire end passes through the sensing window. This image is then inspected for wire strip length, wire position, wire splay, pulled strands, seal presence, seal position and seal orientation.

Figure 9 is a typical illustration of the trend results from multiple inspections relative to the tolerance

Continued on page 58

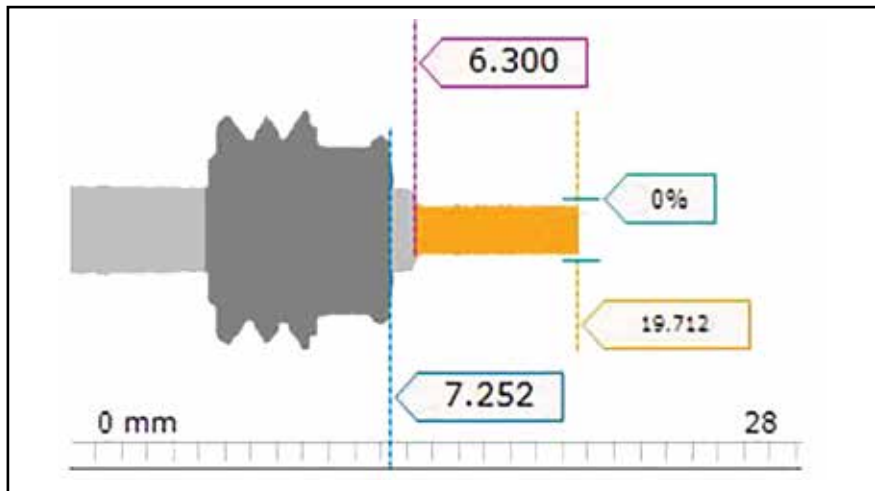


Figure 8

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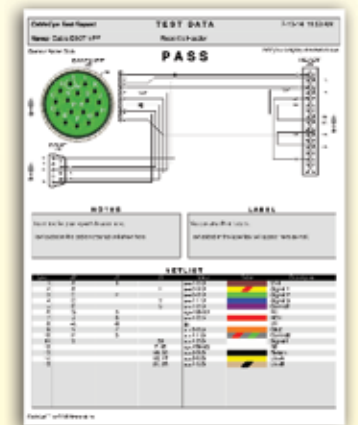
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5	9	10	100 Ω	±5%	Green	100 Ω
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7	13	14	100 Ω	±5%	Green	100 Ω

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# Crimp Monitor Limitations

Continued from page 57

## ANALYSIS TREND RESULTS RELATIVE TO CONTROL TOLERANCES

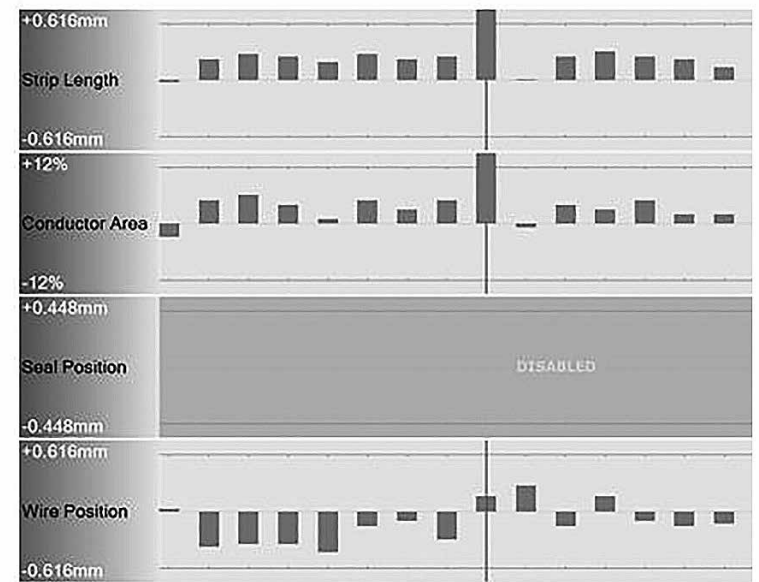


Figure 9

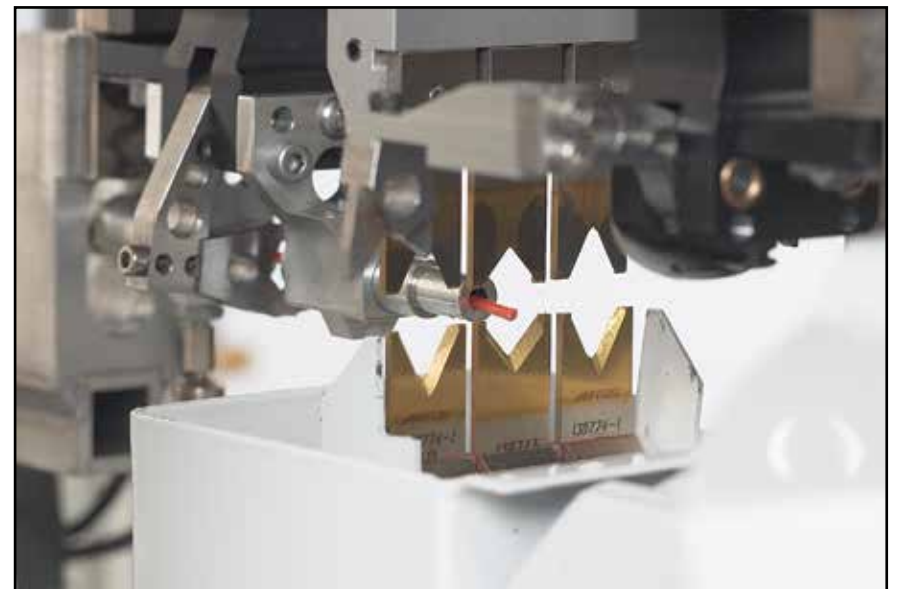


Figure 10

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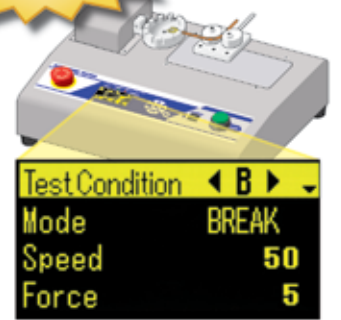
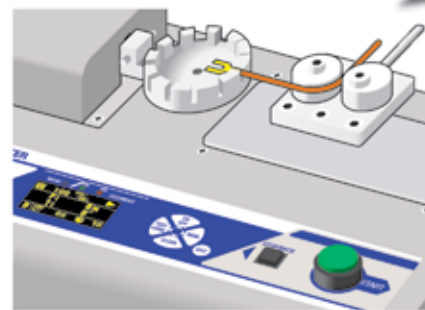
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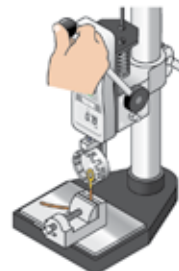
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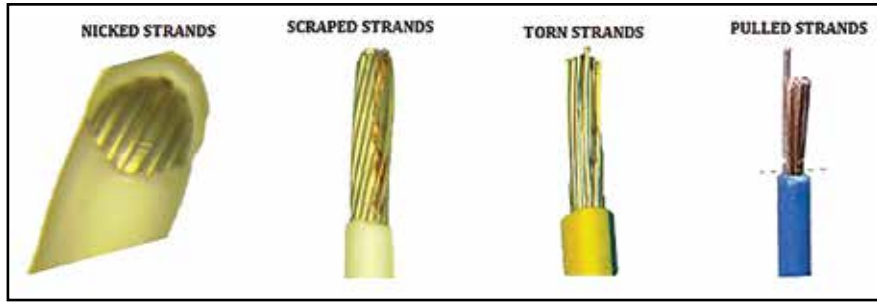


Figure 11

limits for quality control of each of the parameters for every wire produced.

Conductor touch sensor -The wire stripping blades on automatic wire processing machines as shown in Figure 10 are programmed to pierce the insulation to a sufficient depth that will ensure complete removal of the insulation slug without leaving residual insulation material on the wire. This process of piercing the insulation and pulling the insulation slug from the conductor is intended to be performed without the stripping blades touching the conductor, and without stretching or tearing insulation material. The consequence of the strip blades touching the conductor during the wire stripping process can be cut, nicked, scraped, torn, and/or pulled conductor strands.

The conductor touch sensor is designed to monitor the wire stripping blades during the wire stripping sequence for conductor touch occurrences. Each occurrence is analyzed relative to the stages of the wire stripping sequence, for conditions that can damage the conductors, and result in wire strip defects. Several examples of wire strip defects are illustrated in Figure 11.

The chart in Figure 12 lists common wire processing defects, and the appropriate and capable sensor technologies for detection and elimination of these wire end part defects:

Similar to crimp monitors, wire strip and seal inspection, and conductor touch sensors monitor every part produced during the manufacturing process for assurance of

quality. In-process monitoring of each part has proven to not only isolate part defects very effectively, but also detects changing or deteriorating machine conditions that can ultimately lead to defective parts, and inadvertent machine downtime. A combination of these complementary technologies will get manufacturers significantly closer to zero defects for their customers.

Michael Reeve VP Business Development OES Technologies, and is also the author of Crimp Monitors: A technical training and support

Defect Condition	Crimp Monitor	Strip & Seal Sensor	Conductor Touch Sensor
Change in the bell position	✓	✗	✗
Twisted terminal	✓	✗	✗
Foreign material in the conductor crimp	✓	✗	✗
Change in the crimp height	✓	✗	✗
Cut strands	✓	~	✓
Pulled strands	✗	✓	✓
Fanned or "splayed" strands	~	✓	✗
Scraped or nicked strands	✗	✗	✓
Strand(s) crimped outside the core crimp	~	✗	✗
High insulation shoulder position	~	✓	✗
Low insulation shoulder position	~	✓	✗
Insulation inside the conductor crimp	✓	✓	✗
Seal presence	✗	✓	✗
Seal position	✗	✓	✗
Seal orientation	✗	✓	✗
Skewed seal	✗	✓	✗

✓ Capable     
 ~ Marginally Capable     
 ✗ Not Capable

Figure 12

guide. The book is also intended to serve as an educational tool and quick reference guide to help support operations personnel to understand crimp monitor systems,

their application for different crimping equipment and processes, and best practices for their optimum performance on the plant floor.

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

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

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

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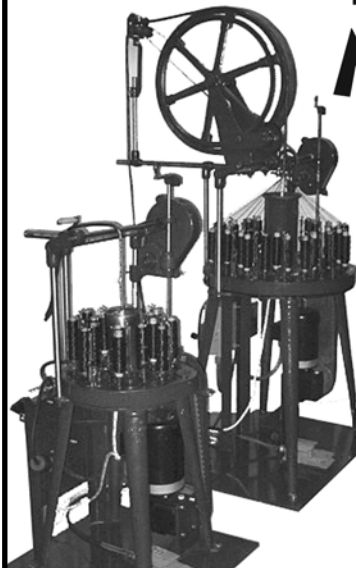
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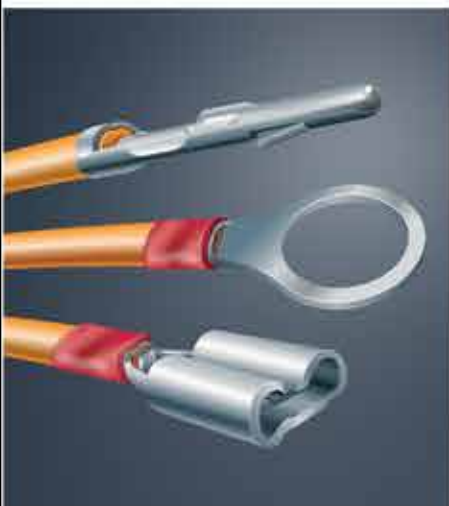
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