Thiste es.

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No Harness Too Complex for SemahTronix

By Joe Tito Wiring Harness News

ince 1977, the company that is now SemahTronix has been producing high complexity harnesses and subassemblies in Flippin, AR. Originally specializing in Military applications, the company builds assemblies to exacting standards in Medical, Security & Defense, Communications, Industrial and Specialized Industries. They are certified to ISO 9001 and AS9100 C.

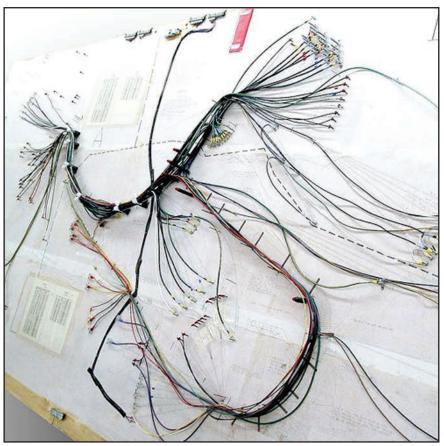
WHN had a recent conversation with Alex Stubenfoll, Director of Marketing and Sales and Travis Atkinson, Vice President of Business Development – Engineer, about the company's history and unique abilities. Alex began noting the company was formed in 1977 in Flippin as a division of LaBarge Electronics. At the time, she revealed, there were some complimentary industrial incentives,

and a high-quality workforce was available at favorable rates. The company was acquired by Avnet, Inc. in 1995 and became Avnet Cable Technologies (ACT). Then in 2000, a group of private investors purchased ACT and changed the name to Actronix.

In 2006, the company began a partnership with the Arkansas Department of Corrections under the Prison Industry Enhancement (PIE) program that allows the company to employ offenders who have volunteered to be a part of the initiative, Alex described. Through this partnership, Actronix opened a second facility in Newport, Arkansas on the grounds of the McPherson Women's Unit.

In April of this year, as Alex cited, the company came under the new ownership of Rusty Hames, and became SemahTronix. Rusty is an entrepreneur with a plethora of success stories across many industries.

Travis talked about the develop-



Complex wire assembly on the board at SemahTronix.

ment of the company over the years, saying, "Traditionally our business is in harness and subassembly manufacture for medical and military & aerospace markets." He noted their expertise has always been in low-volume, high-complexity assemblies that hold high quality and reliability

standards. "All of our engineering development and test capabilities are done in-house with no external dependencies," he noted, "so not only does that make us resourceful, we are also fast to deliver small volumes

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Employing Disabled Workers: A Discussion with the Experts at Chinook Enterprises

By Joe Tito Wiring Harness News

arlier this year, I intercepted an email from Steve Pilipchuck, Vice President and General Manager at Wallace Electronics, on the WHMA Yahoo group listserv (if you're not on it, ask the folks at WHMA if you can be a part of it). Steve asked, "Does anyone have experience working with Disadvantaged Workforce Programs?" Steve had some basic kitting operations he thought would be a great fit for such an organization, but he didn't know

where to start. I followed up with Steve. He got some input from the group, but hit some brick walls.

I dug into this as a research project for Wiring Harness News. Towards the end of this article, I outline some specific resources you might use to find such organizations. Should you wish to consider bringing disabled workers onboard (and I hope you do), there is also plenty of useful information in that regard. But first, I wanted to introduce you to a wonderful gem of an operation I discovered along the way.

Chinook Enterprises

Chinook is a social enterprise, meaning they are a non-profit designed to operate as a business, but with a very specific social mission. Chinook's goal is to support full participation in community life for people with disabilities. They feel strongly that full participation begins with successful employment.

There are many different facets to Chinook Enterprises. They work to find employment for disabled work-

A Primer on Small Wire Crimping

By Matt Houser
Manager, R&D Development
Engineering TE Connectivity,
Application Tooling

Introduction

rends toward miniaturization and electronification, especially in the automotive industry, are driving increased demand for small wire terminations. TE Connectivity (TE) defines small wires as anything that has a wire cross sectional area of 0.35 mm² (22 AWG) and smaller. This article will focus on open-barrel F-crimps. Ap-

proximately 45% of wires in a typical mid-size car are 0.35 mm2 or smaller, and that percentage is expected to increase to 72% in the near future. Harness makers must be prepared to crimp higher volumes of small wires to keep up with these trends (See Fig 1 page 22).

Small wire terminations present unique quality challenges due to their sizes. This article will describe some of these challenges, list common ways to inspect for quality, and outline how to overcome the challenges of small wire terminations.

Continued on page 22



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No Harness Too Complex for SemahTronix

No challenge is too difficult for SemahTronix. Read about the complicated assemblies they make and how they operate one of their facilities at a womens correctional facility.

A Primer on Small Wire Crimping

Matt Houser of TE Connectivity gave a well received seminar on small wire crimping at EWPT Expo in Milwaukee. He has adapted that presentation in this great reference article.

Disabled Workers Programs - Chinook Industries

Learn about a unique company. Learn about employing disabled workers.

The Power Women of the Wire Harness Industry

Melissa Femia speaks with Lisa Whatley about her experience as a woman in the harness industry.

Summer in the Rear View Mirror

Paul Hogendoorn took some time away to reflect on leadership and learning the language of others.

Connect the Shop Floor to the Top Floor for Wire Harness Companies

Connecting the shop floor to management is a challenge for Harness producers. David Oeters explores bridging the gap.

Air Force Research Labs Paves the Way to Lower Cost on Wire Harness Assembly

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The Power Women of the Wire Harness Industry

Spotlight on Lisa Whatley

By Melissa Femia

¶arlier in my career, I was transferred by an automotive supplier to Michigan from Ohio. I was fortunate to have worked with several welcoming and talented people. I particularly recall one female engineer who exuded a warm, yet professional disposition. Now as the Director of Sales for Yazaki's Component Business Unit, Lisa Whatley continues to exemplify a competent female engineer making industry strides. Her career progression demonstrates the possibilities for females with degrees in engineering. As she was an example to me, Lisa is the spotlight female engineer in this edition of the Power Women of the Wire Harness Industry. I recently met with Lisa to learn more about her career as well as her thoughts on females in engineering.

When I asked Lisa how she determined to pursue engineering in college, she advised that she was a good student in math but wanted to do something other than be an accountant like many members of her family. She attended North Carolina State University and attained a Bachelor of Science in Industrial Engineering. Post college, she worked in the



Melissa Femia

defense industry at Martin Marietta in Orlando, Florida. After 2 years, she realized that the industry and the management was not a fit for her. During that time, a faculty member from NC State suggested that she return to college to pursue a Master's Degree, which she achieved in Industrial Engineering. She then landed at the Packard Electric Division of General Motors as a result of a job fair that GM held at NC State.

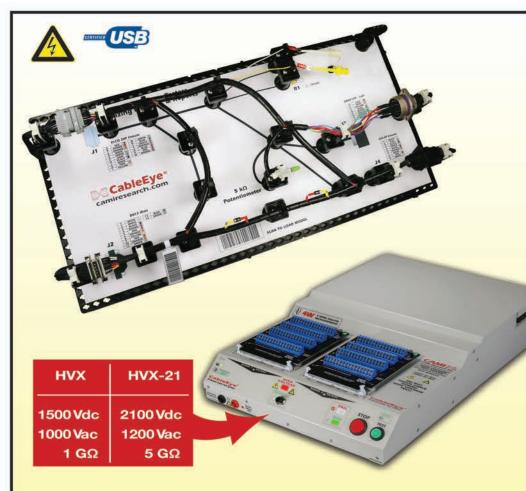
After learning of Lisa's educational

_ Continued on page 6

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The Power Women of the Wire Harness Industry Continued from page 4



Lisa Whatley

accomplishments, I focused on her perceptions of female engineers in both the academic environment as well as in the workplace. In terms of being a female student, she admits to feeling overwhelmed as one of the 2-3 females in her engineering classes (though she managed to excel nonetheless). As for the workplace, her perception from working in and with various automotive companies is that females still remain underrepresented though the market presents many opportunities for them. She likes the flexibility available to engineering females as they may remain in technical areas including design or opt to work in areas such as sales, where they utilize the learned technical expertise without it being the daily focus.

Her advice to new engineers in the area of wiring and components is that 'never' should be excluded from their vocabulary. As Lisa grew up in the South, she vowed to 'never' 1) move to the North, 2) attend graduate school, or 3) work in the automotive industry. She is now a successful student of

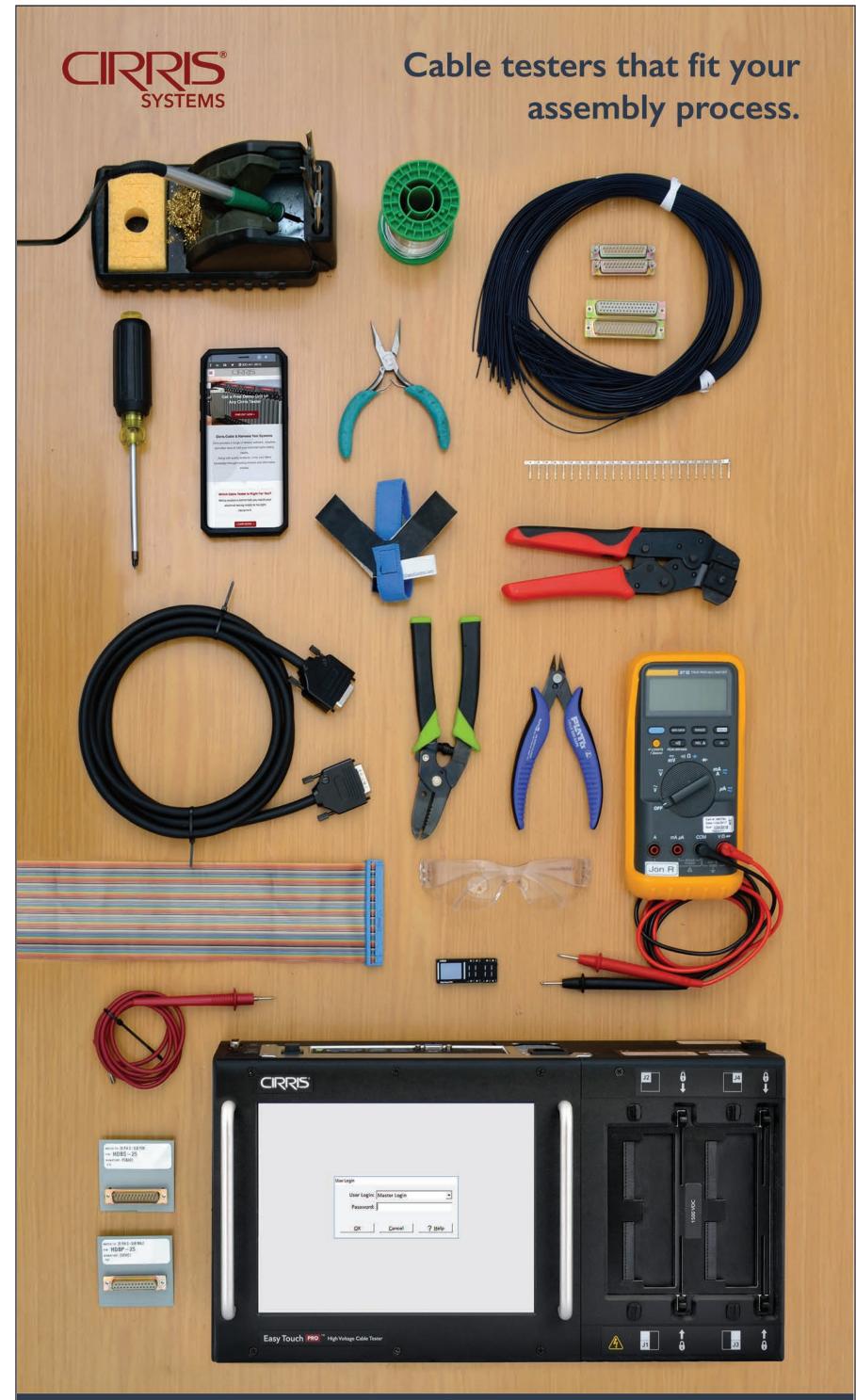
graduate study working at a reputable, leading-edge supplier in the automotive industry in Michigan.

As if Lisa weren't enough of a role model, she is also a breast cancer survivor. is thankful not only for overcoming it, but also for the flexibility and latitude that she was offered by Yazaki during the time that she was fighting the disease. Thank you, Lisa, for your time and effort supporting the initiative to encourage females to pursue engineering and work in the wire harness or related field.

Spotlight story written by Melissa A. Femia, President of Jana Diversity Solutions (J-Di). J-Di is a femaleowned 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 vou 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. 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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"Do you own or do you labor?"

By Loren Smith

hortly after I moved with my wife and three children from Boston to a town of 1000 in northeast Iowa to acquire a small wire harness company, I was sitting in our kitchen with a retired farmer who was helping me with a household repair. Suddenly, he asked, "Do you own or do you labor?"

His question revealed at least two probable suppositions: 1) that owning is preferable to laboring and 2) that owning does not entail as much laboring. While the latter implication, that owners have it easier somehow, is a rich topic for discussion, I didn't go there. I simply replied that, hap-

pily, I owned. The desire to become an owner was the reason I had left the security of a position with a large company and moved to rural Iowa.

Over the years I've been asked many times "what it takes" to join the ranks of those who own their own business, and it is not lost on me that many of the individuals who have posed that question are employed by large corporations. Obviously, I was not an original thinker in wondering how I would fare as an owner.

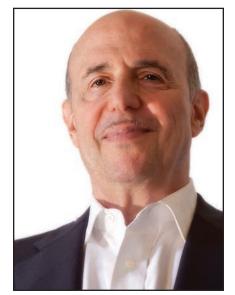
So why did I take such a significant risk? A desire for independence, coupled with a disdain for the politics and dysfunction associated with large organizations, is what motivated me. But although plenty of others share

my attitudes, few do take the plunge. So what is holding them back?

"Owning vs. laboring" is a difficult decision that can't be determined easily, but I do think the obstacle can be identified easily. It's fear, and thank goodness for a healthy dose of fear. That emotion keeps us out of lots of perilous situations.

But individuals who ask me "what it takes" do need to put fear aside while they consider the entire risk-reward picture. And when one considers the opportunities that exist in this country for entrepreneurs, the wire harness industry still presents compelling ownership opportunities.

While there has been some consolidation in the harness industry, all



Loren Smith CEO Blue Valley Capital

of the needs of North American wire harness customers cannot be served by large corporations. Many small (un-

> der \$10 million) wireless companies serving regional markets are providing service levels simply not available from larger organizations, and that will continue. Meanwhile, some of these companies will transition from founders to family, but in many instances a founder does not have family members interested in stepping into an ownership position. This situation can then provide an opportunity for an individual who wants to own a business--and it can provide a retiring owner with an additional prospective buyer.

> Although the customary buyers for harness companies are in businesses strategically aligned with wire harness companies-such as a connector, harness or electrical/ electronic assembly company--these prospective buyers might not be interested in an acquisition at the point when a retiring entrepreneur wants to sell. That clears the path for an outside individual who wants to buy a business.

> As I said, jumping from "labor to ownership" is not a simple matter, and financing is an obvious stumbling block, but a wide variety of capital sources are available for acquisition transactions. Individuals with the know-how to run a business who are motivated to own can often find a way if they are persevering. That's the best answer I can give to "What does it take?"

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

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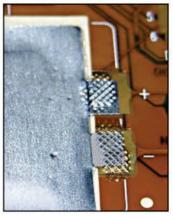
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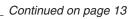
Summer in the Rear View Mirror

By Paul Hogendoorn



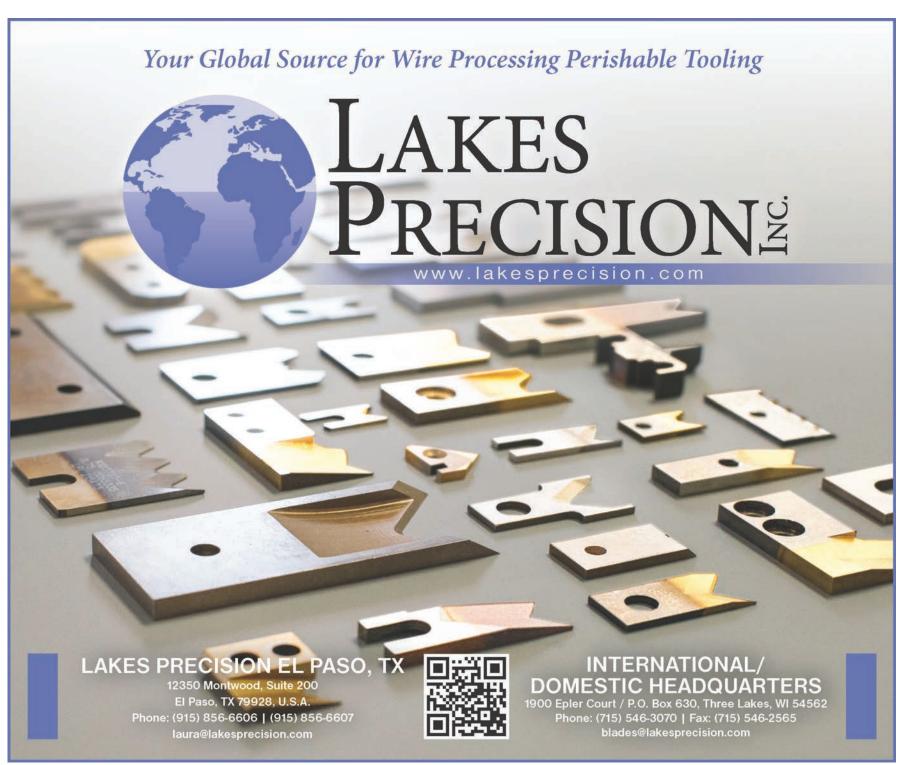
This summer was different for me than my typical summer seasons. I didn't have a single significant vacation, but instead had many small little adventures, the longest of which was 5 days. Some were little excursions on the boat with family or friends on Georgian Bay, and others were on the motorcycle, or on the trail. Each one though was a chance to recharge my batteries, and reflect on the adventures of life and business, and discover a few things that perhaps I should've learned a long time ago. Here are a few of those reflections.

Leadership requires more than just following your internal compass, it requires learning the language of others. Just seeing it yourself and ex-





Paul Hogendoorn







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Summer in the Rear View Mirror

pecting others to accept it and follow is not enough. It is not directing or managing others, it's leading them so that they can see and get to the goal themselves, even when you are not there. This past year I've had to deal with bankers and accountants in ways I never have had to before. I realized that it's not enough for me to understand what we as a company are doing, it's equally important for them to understand it in their own terms, not just mine. Although my internal compass is enough for me to go on, I needed to learn their language so that they could see where we are going too. It's good to lead by example, but that implies that you are always

there in sight of those you are leading, and that's not always the case. It's better to also learn their language, so you can help them see and set their eyes on the destination, and not just on watching you as you lead.

Leadership also requires having an outcome in mind that is greater than what you want to achieve for yourself. It's a journey and not a destination. On one of my trips this summer, I took a couple friends on a motorcycle trip around the Manitoulin Island, stopping to visit some of my favourite places from my past. After the trip was over, I asked one of my friends what his favourite part of the trip was. He said that every place was special, but what he liked the most was that "the price of admission was high". Traveling by motorcycle is not as easy and comfortable as traveling by car, and sleeping in tents is certainly not as convenient as staying in hotels. We had to invest more of ourselves into the travel, and as a result, the entire trip itself was what was most satisfying, and not just one specific destination or place along the way.

Business and entrepreneurship is an adventure. Many years ago I attended a friend's wedding, and in a toast to the couple, his father shared the story of his own life adventure; from

escaping Germany at the outset of the war, only to have to later escape Poland and leave everything behind again and start all over a third time. Just as I was wondering how this story related to his son's wedding day, he summarized it all by saying that "his life had been like climbing a long and steep mountain, and that if the climb was not as long or as steep, or the mountain as high, the view today would not be nearly as beautiful".

That thought was on my mind the day I hiked the Cup and Saucer trail on the Manitoulin. Along with Randy Hess, I began a new adventure four years ago by cofounding FreePoint. I

Continued from page 10

wasn't looking to create a job for myself, nor did I feel the need to start a new career. It was just an idea that both he and I believed was really worth doing, and so we set off on the adventure, with more of a direction in mind than a destination. There were many times along the way when it would've been easier to turn around than to continue, and with each new challenge, the question is asked anew. Do we turn around here, or do we go forward? We kept going forward.

Along the Cup and Saucer trail, my buddies and I encountered a few hikers coming back down. "Keep going" they encouraged, "don't stop until you see it - not the small one, but the big one." There were no specific signs, they said, but "you'll know it when you see it". They were right we knew it when we got there and saw it. It was worth the price of admission.

I hope your summer was equally satisfying, and that you got your batteries recharged and ready for the coming seasons of adventure.

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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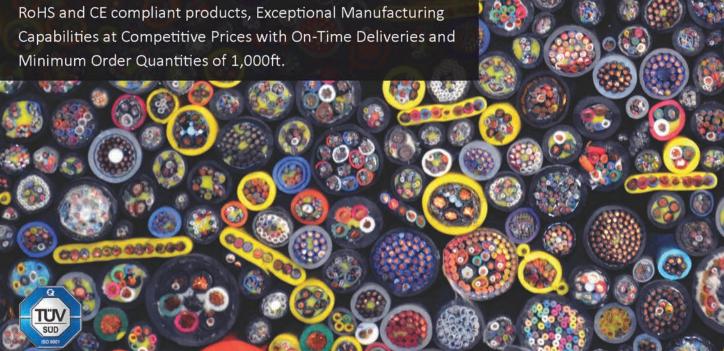
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Employing Disabled Workers: A Discussion with the Experts at Chinook Enterprises

Continued from page 1

ers in and around the Skagit County area in Washington. In doing so, thier Employment Services Staff provides training and follow up tailored to each individual and situation. Chinook also works with employers in their area who wish to hire disadvantaged workers. They provide hiring assistance, employee screening, training, assessment and follow-up services. In this capacity, Chinook

strong understanding of local employers in order to find the right match.

In order to fund these enterprises, Chinook operates a Grounds Maintenance business, as well as a Assembly & Wire Harness division. The later division is fully compliant to ISO 9000, as well as the Boeing version (D1-9000), AS-9100, and builds harnesses in accordance to IPC/WHMA A-620.

Director, Dan Bruce, Production Manager, and Rob Martin, Founder and Executive Director at Chinook. My initial conversation was with Rebecca who gave me some of the history of the enterprise.

Chinook was founded in 1980 by Rob Martin. This was a calling for him as his father was disabled by a stroke when Rob was just a boy. "He had this great job with Seattle City Lights, but after the stroke their lives completely changed," she said. Rob saw

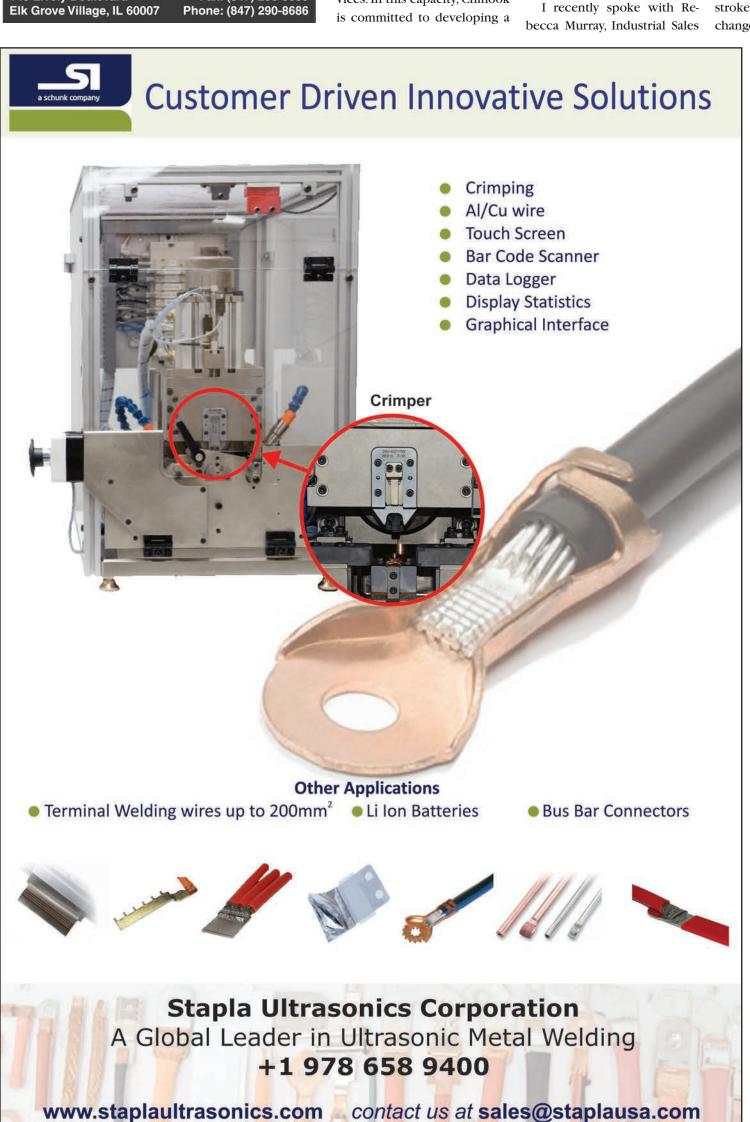
> how losing a job due to a disability can change a generation of lives, so he eventually got a degree in social services. Upon meeting his wife who was disabled herself, the two set out on their endeavor.

They got a tiny grant from the county and Rob scoured businesses in and around Mount Vernon asking if they needed any lawn or landscaping services. "He would load up his Pinto with about six guys, drop them off, then load up some lawn mowers and drop those off; and they would mow the lawns," Rebecca explained. Today, Chinooks Landscaping Division employs 25 and handles 600 acres per week all over Skagit County.

From Cutting Boards to Wire Harnesses

Through another small grant, Chinook started a woodworking business producing unique kitchen cutting boards. County Lake Cutting Boards were so successful that a night shift was added and 18 sales reps were hired. But in 1985, a competitor stole the design patterns and had the boards made in China. The County Lake venture was terminated, and Rob set out to find employment for the displaced workers.

Around that time, Rob was made aware of a Boeing program called Boeing Offload. program designed to enable local small businesses an opportunity to provide goods and services to



the Boeing Company at competitive rates. While Chinook continues to provide services for other companies, its Boeing work generates a good portion of the harness revenue. Without production operating as Chinook's commercial engine, the success in the social services sphere would not be possible.

In 1989, the Boeing Everett Plant presented Chinook its first award for on-time deliveries and superior quality of production. This was the first of many awards to follow, and Chinook's cabinet is full of Boeing awards for quality, on-time deliveries, and superior service. This same success remains today with Chinook building a full range of harnesses for Boeing, as well as many other customers.

I asked the team about what it's like filling positions with the disabled, and Dan indicated it's not unlike a puzzle. "You find out what their strengths are and hopefully you have work in that category." To that, Rob

added, "One of the most important things, and something Dan does a great job with, is establishing a good build plan. Those need be clearly spelled out so that anybody pick that work up and do it." Both Rob and Dan stressed the build plans as key to maintain-Chinook's ing high quality and consistency rates.

Resources

pointed to a rather astonishing statistic during our con-"The versation. current unemployment rate for people with disabilities is between 75 and 80 percent depending on where you look. Fortunately, there are organizations around the country working to find people opportunities and jobs.

If you have some kiting, or assembly work you think might be a good fit for Chinook Enterprises. you can contact Re-Murray becca at rmurray@chinookenterprises. Chinook org handles customers throughout the United States. If, however, you are interested in finding companies who hire predominantly disabled workers in your area, contact the Social Enterprise Alliance. They are a clearing house for these types of enterprises and you can visit their website at socialenterprise.us.

United Cerebral Palsy has some great information on hiring people with disabilities of all kinds. There is a great primer available called Disability Employment 101 For Your Business, and you can download it at ucp.org/resources/employment/employers.

The American Federation for the Blind has an excellent resource page for employers. It is designed to be a practical guide providing useful information about hiring and working with blind or visually impaired workers. It's a long URL, so I've shortened it (case sensitive): bit.ly/AFB12345.



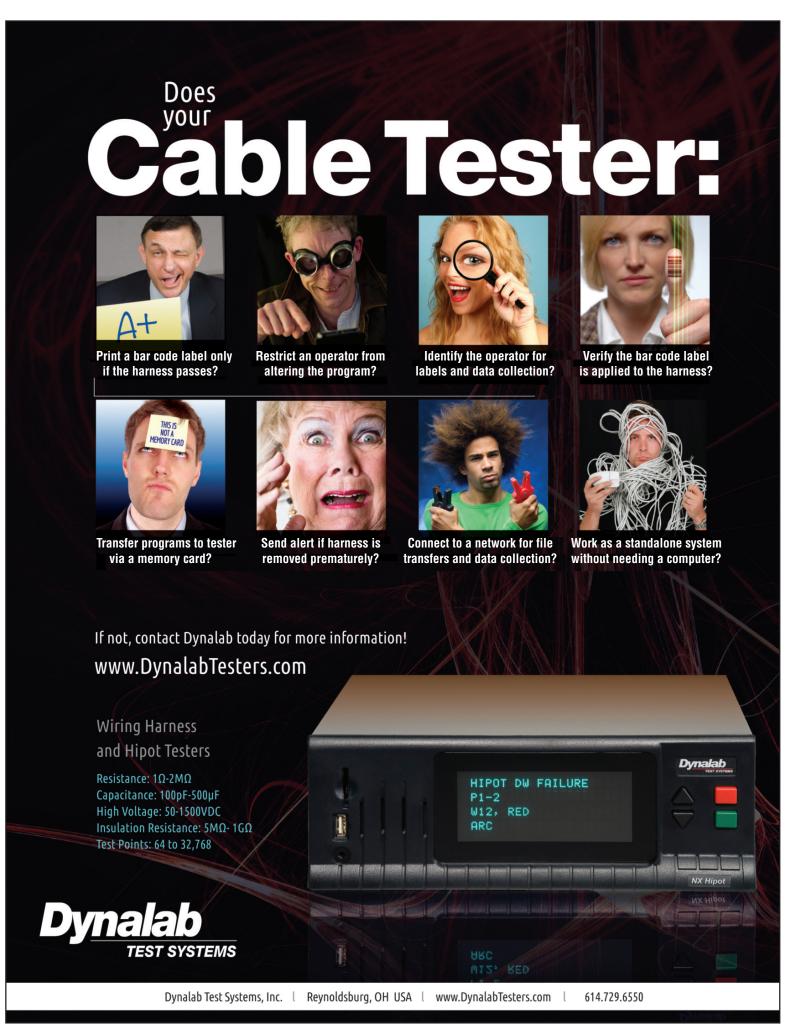
Chinook Enterprises wire shop

The Disability Job Exchange has an excellent site for those with disabilities seeking employment. They also have a tab for employers looking to hire disabled workers with some great information. Check them out at disabilityjobexchange.com.

Tax Benefits

There are tax benefits for hiring disadvantaged workers, but as Rob warned, "A company would be well advised to read [the guidelines] care-

_ Continued on page 16



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Employing Disabled Workers: A Discussion with the Experts at Chinook Enterprises



The production staff at Chinook Enterprises.....

Continued from page 15 __

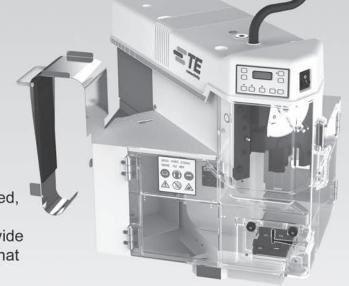
fully, and work with their accountant to make sure they qualify." He indicated many companies neglect a tiny detail that makes them ineligible for the tax credits, and stressed professional guidance.

Here is the link to the IRS page entitled Tax Benefits for Businesses Who Have Employees with Disabilities. It's another long URL, so I shortened it (case sensitive): bit.ly/IRS12345

AMP-O-LECTRIC MODEL G II TERMINATOR

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

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



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

User Friendly

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

Product Features

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

Connectivity

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Concluding Thoughts
and Call to Action
One of the statistics

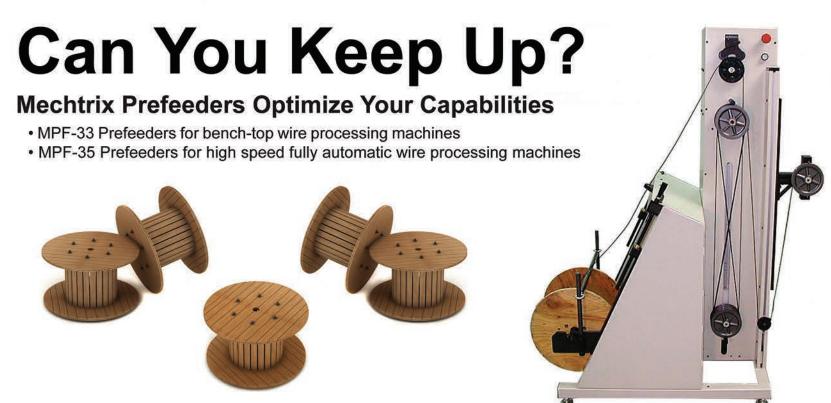
One of the statistics Chinook enjoys sharing with the business community is that their entry-level placements average a retention rate of 6 years - well above the national average. In researching some of the resources Rob outlined, I discovered this is not isolated. Nationally, the retention rates for disabled workers are substantially higher than average.

The average initial accommodation cost for a disabled worker is only about \$600, and most disabled workers require no accommodations. The disability claims rate is lower for disabled workers, and there is no difference in the absentee and sick rates for disabled and nondisabled workers.

It seems that many business owners have discovered that hiring a disabled employment candidates is an efficient and effective business decision. I sincerely hope you will consider this the next time you look to fill any position within your organization.

I would like to thank the folks at Chinook Enterprises and especially Rebecca Murray for making this article possible. I would also like to thank Steve Pilipchuck of Wallace Electronics for getting my gears turning on this subject.





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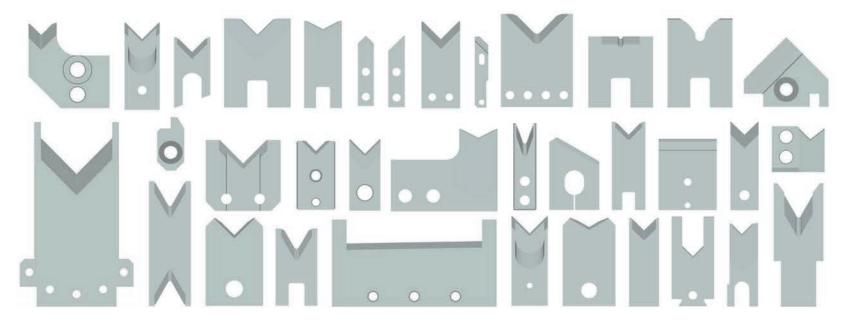
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 and many others...



Mechtrix Equipment

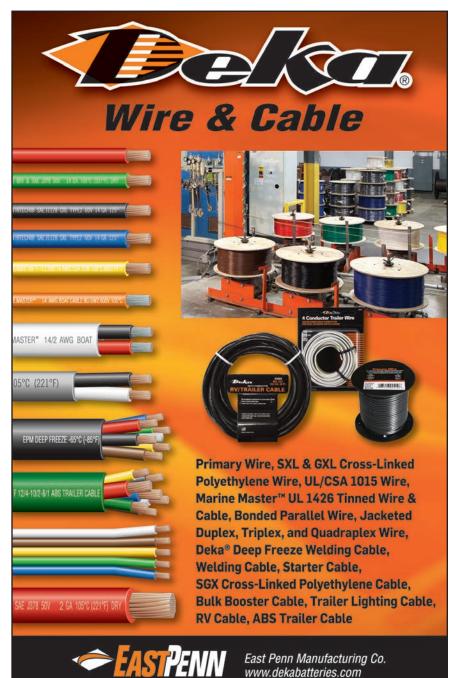
Mechtrix has designed a number of unique machines to solve specific wire processing problems. These machines range in complexity from our patented center stripping machines to terminal paper winding machines and include the following:

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



No Harness Too Complex for SemahTronix

Continued from page 1 ___





Rusty Hames, Owner of SemahTronix.

with short lead times to the prototyping and first article requirements of each customer."

Under the new ownership, the team asserted their intention to grow and expand in the traditional markets, while placing an increased emphasis on commercial specialty vehicle markets, along with agriculture and other off-highway heavy equipment. "Those are areas we have not been accustomed to traditionally, but obviously, they are complimentary to many of the things we have done in the past,"Travis said. He also discussed their mission to expand their existing recreational marine and shipbuilding applications.

Facilities

The main SemahTronix facility is 62,000 sf and employs 75 people. The secondary facility at the McPherson Women's unit is just over 22,000 sf and has 40 employees. "At that facility, we do more of our higher volume, lower complexity assemblies," Travis specified. They don't have over-molding capabilities there, but easily could should demand arise.

Asked about the challenges of operating in that environment, Travis indicated it isn't much different from their main location. SemahTronix has some non-incarcerated supervisory staff at that facility in human resource and quality management. It is also



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No Harness Too Complex for SemahTronix

Continued from page 18 ___

fully compliant with their quality and certification guidelines. "From what I've learned since I've been here is that the resounding benefit of that facility is the high quality of workmanship," he advised. Travis asserted the women working in the facility are eager to participate. For most, it's their only way to make dependent support. They have the benefit of learning a vocation, and the pride in their work keeps them in the program. "The thing that's unique about it is, for our commercial business, it allows us to



Travis Atkinson, Vice President of Business Development -**Engineer**



Alex Stubenfoll, Director of **Marketing and Sales**

get extremely high quality manufacturing in a US facility at a competitive rate." He stressed SemahTronix's extensive efforts in training individuals with valuable new skills they can put to use in their future.

SemabTronix Standing Out

When asked what makes SemahTronix unmistakable, both Travis and Alex agreed it is their ability to handle extremely complicated, high-level assemblies. "The work that we do represents a challenge that some companies would run from," Travis said, "and no challenge is too large, and no two jobs are alike."

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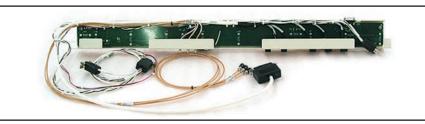
Molding.....

SemahTronix has an extensive inhouse tool shop "so if it doesn't exist, we make it!"

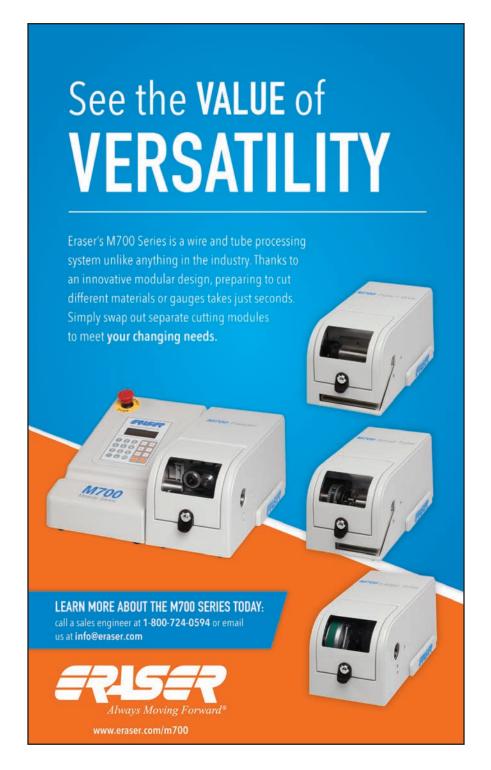
Something else unique to the company, and something for which they are sought after, is their RF matching capability. "If you have 50 conductors that have to be identical in phase matching, we've developed a unique and proprietary way to do that,"Travis instructed. "Most companies would have a high level of difficulty with that."

The final thing that makes SemahTronix unmistakable, is something they call the Pin Pusher, and Travis was eager to talk about it. It's a special tool they have developed and patented, that ensures pins on a DB9 connector are fully seated. He described the connectors as having up to 64 pins, all needing to be seated, shielded, potted, molded, then overmolded again. "And if you've done that process 64 times, and have a pin that is not fully seated, you've basically lost many hours of labor; and that assembly has to go in the trash." So, they have developed a patented means of taking the pins to full seat, and verifying they are at full seat. The tool then conducts a full conductivity test, pre-shielding and post-molding. "Where most companies would have a high fallout rate, we have 100 percent confidence from initial pin seat that they are fully engaged." The unique tool is actually something they are contemplating marketing to the harness industry.

The folks at SemahTronix love to talk about their rigorous standards and of the complex nature of the products they make. Travis and Alex seemed quite proud of the company's accomplishments and refusal to back down from any challenge. In a recent USA Today article owner Rusty Hames said, "We are committed to supporting both current and future customers with high quality, high customer service, and competitive pricing."



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A Primer on Small Wire Crimping

Continued from page 1 _



Figure 1. Comparing the size of a crimp with 0.17²mm wire cross sectional area to that of a U.S. dime

Small Wire Termination Challenges

There are several challenges inherent to small wire crimping due to the

small size of the wire, terminal, and tooling. This is not a complete list, but users see these issues most often in small wire crimping.

1. Difficulty aligning the terminal over the anvil

Setup issues and tooling quality can contribute to difficulty aligning the terminal over the anvil. Since the anvil is smaller, the target for the terminal is smaller. Applicator feed adjustments are more critical because smaller adjustment increments are needed to place the terminal where it needs to be (Fig 2).

2. Terminals are easier to deform on the carrier strip

Small terminals are easier to twist or bend on the carrier strip because

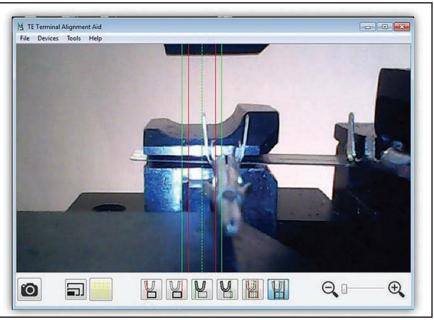


Figure 2. Terminals misaligned over the anvil



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the tab holding them to the strip can be very weak. Storing, routing, and feeding terminals can deform them on the carrier strip if users do not follow proper storage, handling, and setup procedures (Fig 3).



Figure 3. Terminal catching on a terminator guard

3. Wire memory, camber, or rigidity issues

Small wires are more susceptible to memory issues and are more difficult to straighten. In addition, small wires may droop excessively if users or machine grippers hold them too far from the stripped end (Fig 4).



Figure 4. Placing a wire in the terminal

4. Flash issues

Crimp quality specifications typically relate the amount of allowable flash to the terminal material thickness. Terminal manufacturers typically use thin material to manufacture small terminals, so small amounts of flash constitute a higher percentage of terminal material thickness. Flash that would barely be noticeable on a larger terminal is significant on small wire terminals (Fig 5).



Figure 5. Flash on a 0.172mm crimp

5. Crimp inconsistencies

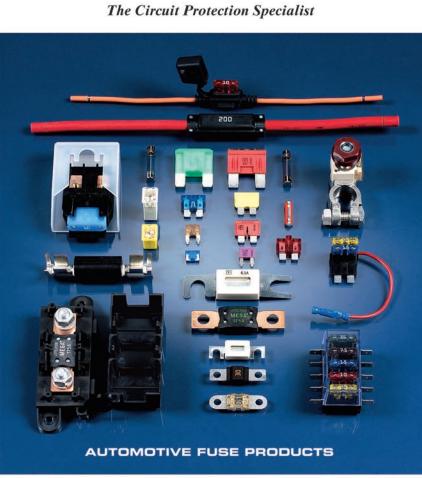
Inconsistencies in terminal symmetry and flash are more common on small wire terminations. Small variations in the crimp tooling can have a significant impact on the resulting crimp cross section (See Fig 6 on page 24).

Inspecting Small Wire **Terminations**

Traditional inspection methods apply to small wires and large wires alike. Crimp height inspection, tensile tests, visual inspection, and cross

Continued on page 24





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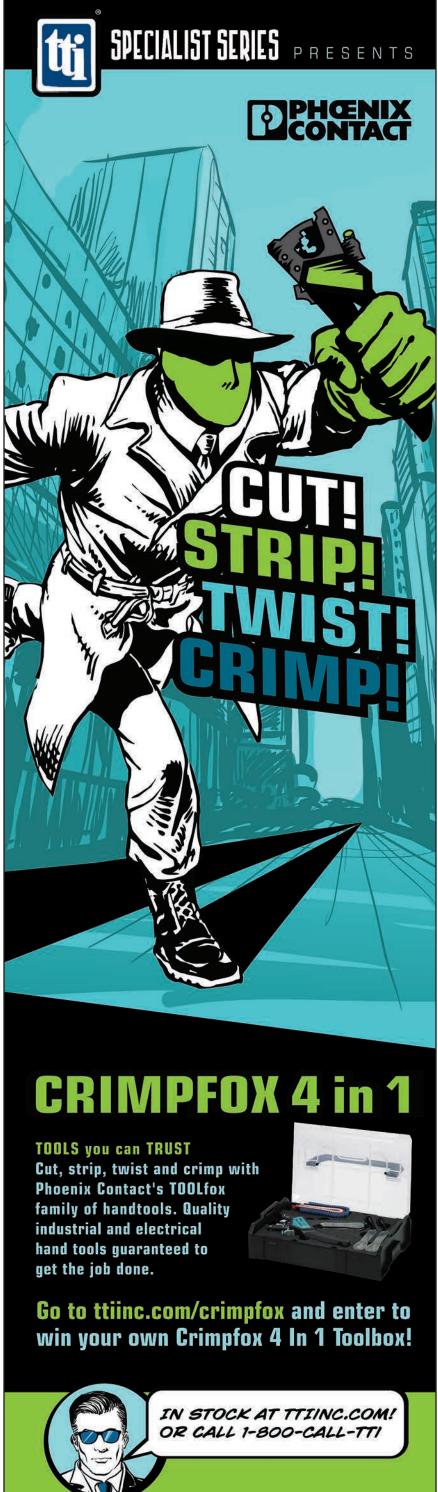
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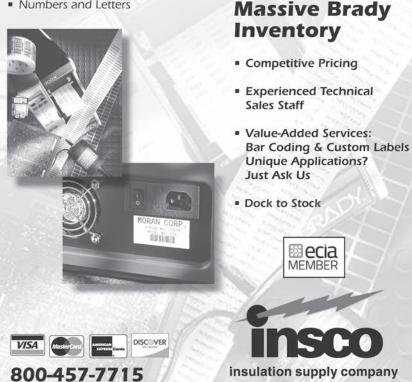


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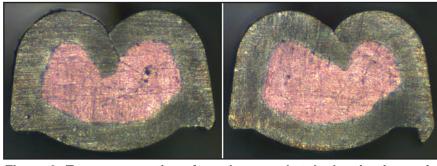


Figure 6. Two cross sections from the same batch showing inconsistencies in symmetry and flash

sections are all important. We will briefly discuss the first three and focus more on cross sections.

Crimp height inspection: Inspectors can use crimp height micrometers to inspect small wire terminations, but often involve some operator skill to measure crimp height accurately. Bench or machine measuring stations are typically more accurate and repeatable than micrometers, especially with small wires. Inspectors should check crimp height periodically during production runs to ensure consistency throughout the run (Fig 7).



Figure 7. Crimp height inspection with micrometers

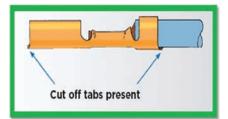


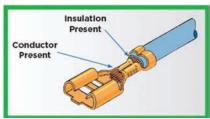
Figure 8. Tensile pull test

Tensile tests: Inspectors can typically perform tensile tests for small wire terminations on the same equipment used for larger wires. The clamps must be able to grip the terminal and wire without slipping. Inspectors must take care to disengage the insulation crimp on small wire terminations if the tensile test requires it. Many tensile test require-



tester pulls the specimen, so a motorized tester may be required (Fig 8).





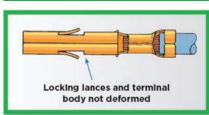


Figure 9. Excerpts from the visual crimp inspection poster

Visual inspection: The visual inspection criteria are the same for small wire terminations as they are for large wire terminations, but they can be much more difficult to see. Ample light and magnification are often required to perform an adequate visual inspection. Harness manufacturers must train their operators in the visual identification of crimp features that indicate whether the crimp is acceptable. TE publishes a poster

for visual crimp inspection, which can be found at www.te.com and searching for part number 65780-4 (Fig 9).

Cross sections: Cross sections provide the most complete view into crimp quality. Industry standards such as TE Connectivity specification 114-18022, USCAR-21, and UL 486A-486B define measurable requirements for crimp cross sections and different standards can have different requirements for the same terminations. Users must understand what the requirements are for their particular applications. Cross sections can be very difficult to create for small wire terminations and high quality equipment is required to create good cross sections. When we analyze cross sections for small wire crimps, the two most problematic areas are crimp asymmetry (as measured by the support angle, support length, and flank end distance) and flash. Several factors contribute to each of these issues, and this article will explore them in detail (Fig 10).

Asymmetry

Asymmetry in excess of what specifications allow can reduce electrical or mechanical performance of the crimp, contribute to Crimp Quality Monitor variability, and reduce

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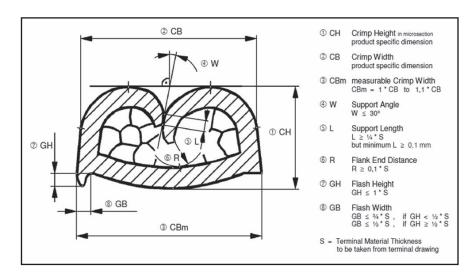
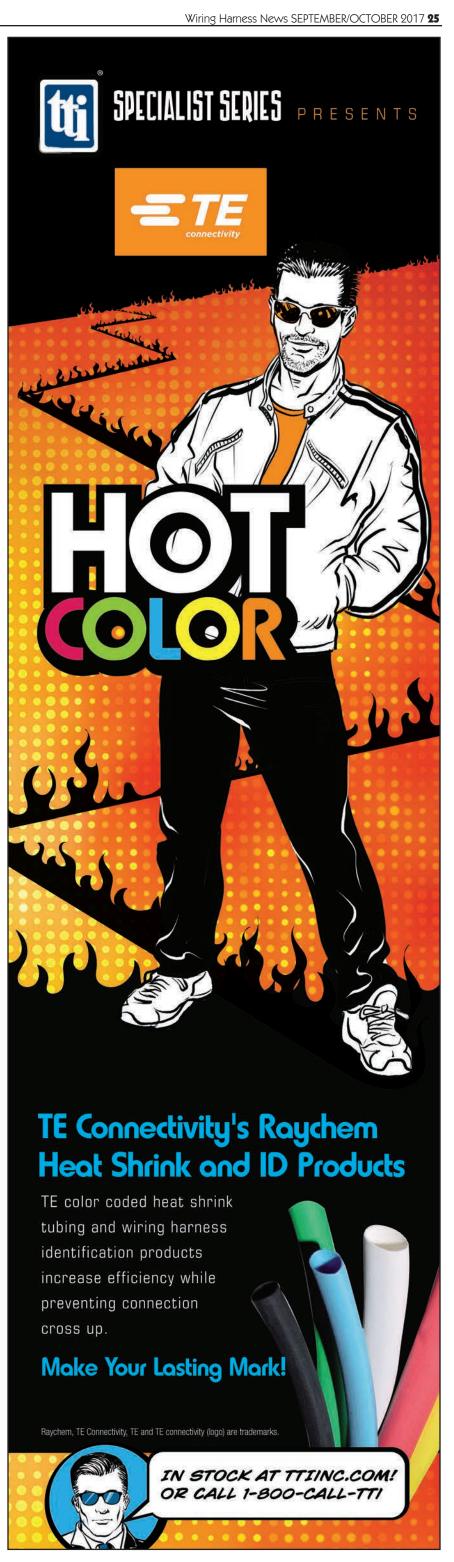


Figure 10. Crimp cross section measurable requirements from TE Connectivity specification 114-18022





A Primer on Small Wire Crimping

Continued from page 25 ___



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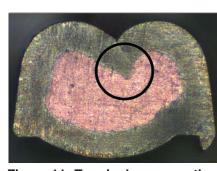
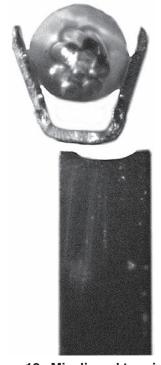


Figure 11. Terminal cross section exhibiting asymmetry

tooling life (Fig 11). It is important to note that some level of asymmetry and variation in symmetry from one crimp to the next is normal and will not affect crimp performance. Several variables that contribute to asymmetry are difficult or impossible to control. For example, the orientation of the wire strands can affect crimp

symmetry. Harness makers should follow the specification requirements and not try to achieve perfect symmetry on every crimp.

The main areas of focus in reducing asymmetry are applicator and terminator setup, tooling quality, and tooling condition. If the terminal is overfed, underfed, or twisted over the anvil, the cross sections will very likely exhibit asymmetry. Terminal overfeed and underfeed conditions are caused either by a bad terminal feed setup or poor terminal feed performance. Operators should check and adjust the terminal feed as needed every time they setup the applicator for a production run. Accurate and repeatable feed adjustments are very important to center the terminal over the anvil (Fig 12).



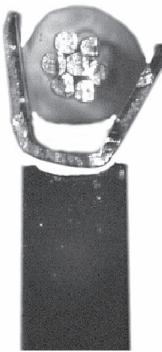


Figure 12. Misaligned terminal (left) and twisted terminal (right)

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After operators place the terminal over the anvil, they have to rely on the terminal feed to repeat the position of the terminal for every subsequent crimp. The quality of the terminal feed is crucial to achieving good feed repeatability. TE mainly uses pneumatic or servo terminal feeds for small wire applications because they have superior feed repeatability to mechanical feeds. Pneumatic feeds are more repeatable because they typically have hard stops at the ends of their stroke and users can throttle the stroke velocities for a smoother feed. The chart below shows feed repeatability distributions for three different classes of feeds. Higher quality pneumatic feeds (green distribution) have a C_{pk} around 2.0 for small wire applications. This distribution shows that, with proper setup, high quality pneumatic feeds will place the terminal over the anvil very consistently. Medium quality pneumatic feeds and high quality mechanical feeds (yellow distribution) have a C_{pk} around 1.4 for small wire applications. If operators can center the terminal perfectly over the anvil, the yellow distribution should be adequate, but this is extremely difficult to do in practice. Low quality feeds (red distribution) have a C_{pk} around 0.8 for small wire applications. Low quality feeds can exceed the feed limits even if operators are able to center the terminal perfectly over the anvil. Consistent crimps require high quality pneumatic feeds (Fig 13).

If the terminal is twisted over the anvil, it is likely that there is an issue with the terminal routing or applicator feed track setup. Handling terminals during transport and loading terminals into the applicator present the opportunity to deform the terminals. It is important to remove the deformed terminals before beginning the crimping process. In addition, terminals passing through guards can catch and twist on the carrier

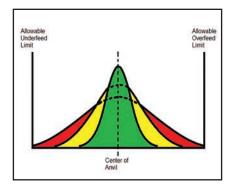


Figure 13. Applicator feed repeatability distributions

strip. Check to make sure terminals have adequate clearance through the guards. If operators adjust the applicator feed track too tightly, the track can twist the terminals as they pass through it. Make sure the feed track allows free movement in the feed direction and minimal movement perpendicular to the feed direction.

Another significant cause of crimp asymmetry is crimper tip wear (Fig 14). The crimper tip wears over time with use and can break down to the point where it is no longer able to guide the crimp legs into consistent alignment. If the crimper tip has worn, it may allow one terminal leg to pass beneath the other at the interface point, which will cause asymmetry. If terminal asymmetry shown in cross sections is consistent on every crimp, it is likely a sign of a setup issue. Check to make sure the terminal is centered over the anvil and is not

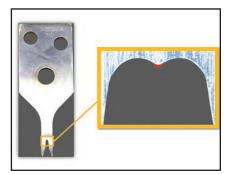


Figure 14. Crimp tip wear

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Connect the Shop Floor to the Top Floor for Wire Harness Companies

By David Oeters Corporate Communications with CIMx Software

uccess in manufacturing requires a skilled workforce supported by the right tools and processes. You need employees that can make fast, efficient decisions to meet business goals and capitalize on opportunities.

Unfortunately, many wire harness companies struggle with inefficiency. Business elements operate in silos because the shop floor and the top aren't aligned. Without alignment, the business can't adjust to market pressure or capitalize on opportunity. This disconnect hinders efficiency, profit and growth.

Bridging the Gap

Wire harness companies need to bridge the gap between the shop floor and the top floor. The four critical steps below eliminate business silos and empower your business to work collaboratively: 1) Set and Align Business Goals: You need to set clear and connected goals for your business. That starts by getting management, operations, IT and other business elements together and talking. Gather feedback, discuss initiatives and set shared priorities. You can then confidently set goals with expected buy-in from everyone involved.

2) Production Visibility: A business can't operate without a clear view of finan-

> cials, billing and expenditures, but many manufacturers along with a hazy understanding of operational processes and almost no manufacturing visibility. Production and labor data, and a real-time view of Work In Progress (WIP), fuel sustainable process improvements and help connect production and business goals.

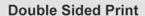
Singlesource Production Data: Collaboration requires accessible and complete production data. Frustrated manufacturing ployees forced to rely on guesswork will make mistakes. Once you unlock production data for your team at the point decisions are made, opportunities improve, and alignment and collaboration quickly follow.

Connect your Tools: Many companies still rely on their ERP or a homegrown system, which simply cannot adequately support manufacturing. These systems leave gaps in your processes. By connecting your ERP to a dedicated manufacturing software system, you gain comprehensive business visibility. **Business** managers can quickly identify underperforming or high-performing elements in the workflow and then optimize utilization. Performance efficiencies result in increased output and Continued from page 30

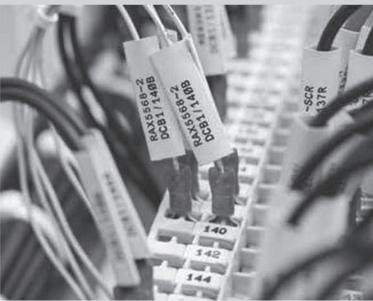
WINTOTAL V6 IDENTIFICATION LABEL PRINTING SOFTWARE FOR RAIL, MASS TRANSIT AND INDUSTRIAL EQUIPMENT MARKET

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.

TE Connectivity Identification products pre-installed. This makes the creation and printing of Identification sleeves or labels a quick and simple task.



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



WinTotal, TE Connectivity and TE connectivity (logo) are trademarks





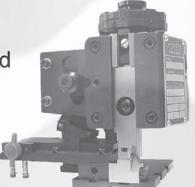




Crimping Applicators

Applitek and all of it's 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.

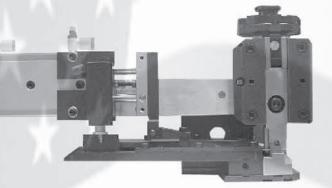


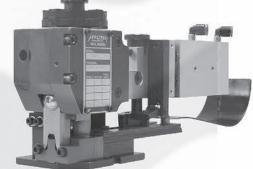


Model 1700

Model 2000

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

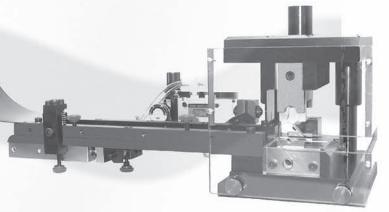




Model 1500

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.

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Visit our web site: www.applitek-usa.com

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Contact Jim Brown at jim@wiringharnessnews.com

Connect the Shop Floor to the Top Floor for Wire Harness Companies

Continued from page 28

profitability without significant investment, and capital can then be rerouted to other areas.

Business Improvement through Collaboration

Once you've aligned your shop floor and top floor, and are profiting from real shop floor visibility and connected systems, collaboration will reveal further business advantages.

With actual labor and production data on hand, you'll refine job costs with an accurate view of your expenses. You can eliminate guesswork from estimates and know exactly how much is made from each order.

The shop floor will have a real-time view of order status and WIP, and they can see how their work affects the business. When a rush job comes in, they understand the impor-

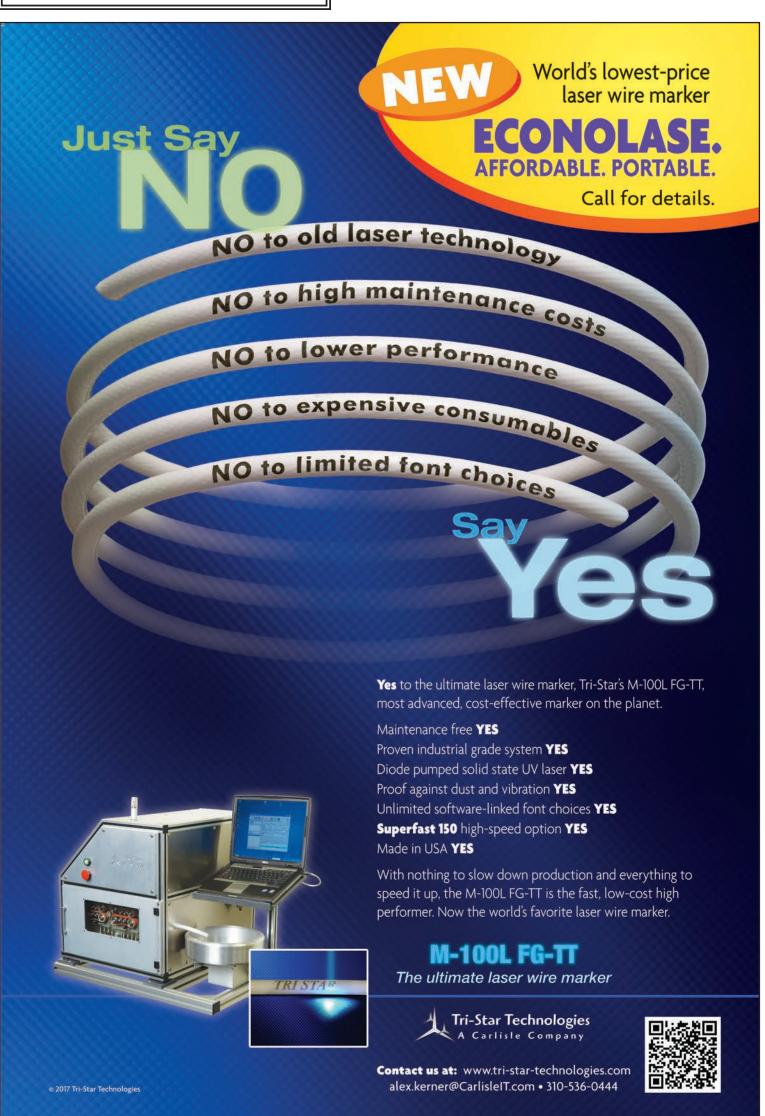
tance of accuracy and precision with each operation, and can track progress as a team.

As you identify high-performing manufacturing elements, you begin assembling a data-driven list of production best practices. By updating your existing library of approved planning with these best practices, you quickly accelerate the production of lower-performing elements.

The First Step toward Collaboration

Some companies are quickly overwhelmed by the prospects of an improvement project, even one as important as this. We suggest you start by looking at your current processes and identifying where you don't have visibility. Do you have actual, real-time labor data? How quickly can you assemble quality reports?

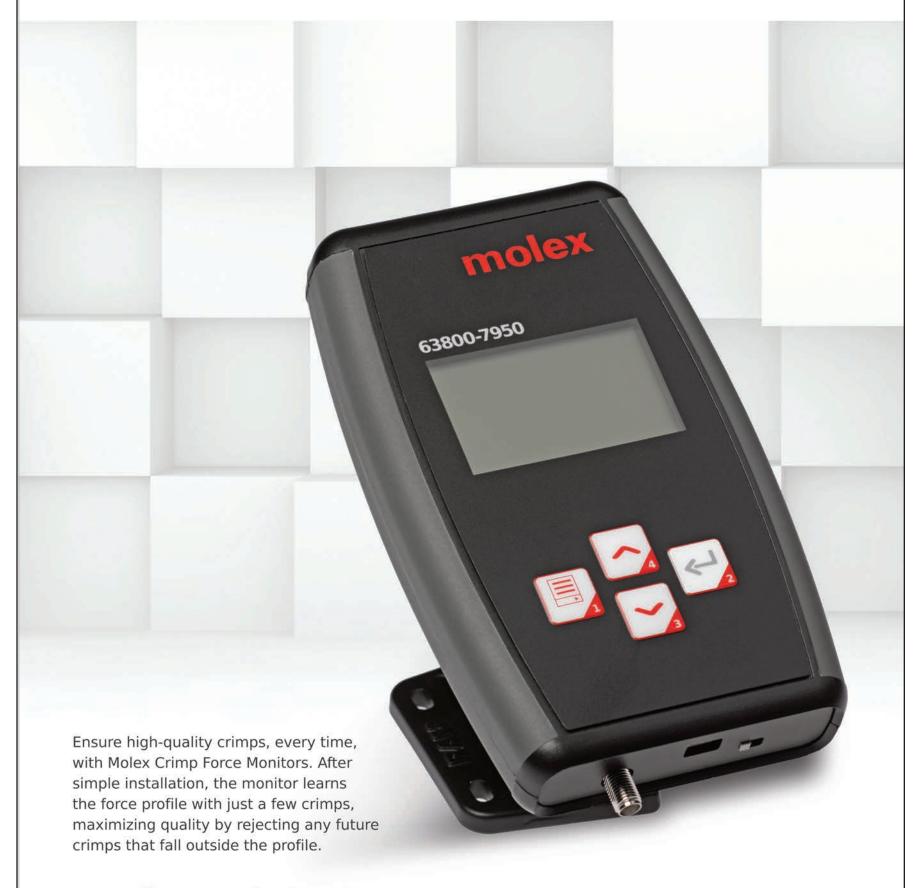
If you'd like help in getting started, CIMx offers a free Shop Floor Analysis. After a quick discussion with an Application Engineer, you'll have a report that identifies gaps in your processes along with a list of potential solutions. Want to learn more, or sign up for the Shop Floor Analysis? Visit us at www.cimx.com_or contact us at info@ cimx.com.



Slassified ads on pages 63-64

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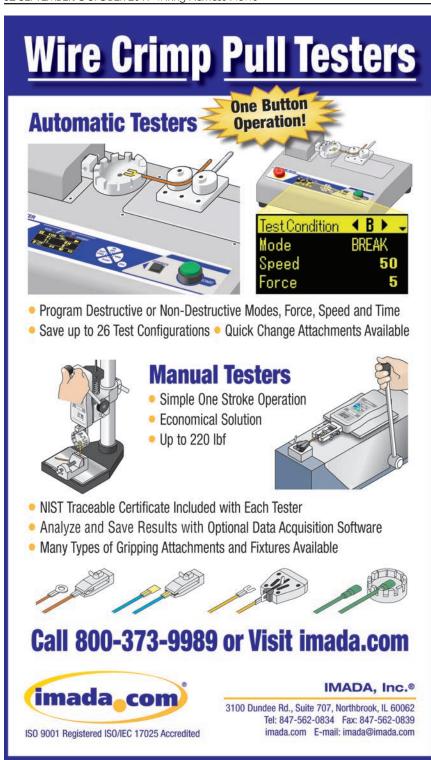
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WIREwisdom" ANIXCER.

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

600 V CATEGORY CABLE

CATEGORY CABLE

Category cables, also known as Ethernet cables, are twisted, low paircount cables (usually four pairs) designed for use in local area networks such as Ethernet. Currently, they are available in categories 3, 5e, 6, 6A and 7, which provide different levels of performance in signal bandwidth, attenuation and crosstalk associated with each cable's design.

Category cables have been installed in industrial settings for many years by separating communication and power and control circuits. Applications are evolving and now electrical and network engineers want to install category cables in 600 V cable trays without installing barriers. Other end users want to integrate Ethernet cables into industrial machinery where 600 V is required.

INDUSTRY STANDARDS

Installation requirements for communication circuits and industrial equipment are driven by the National Electrical Code (NEC) and NFPA 79 Electrical Standard for Industrial Machinery. These industry codes apply to different regulatory environments and have different allowances for cable selection and installations..

The NEC provides provisions on electrical wiring, grounding, overcurrent protection and industrial equipment installation standards for commercial, residential and industrial facilities in the United States. The NEC provides installation requirements for 300 V communication cable types such as CM, CMR or CMP that are dual listed to a Category cable type. However, the NEC limits 300 V communication cables from being installed in the same environment as 600 V cables. For example, Section 800.133 Installation of Communications Wires, Cables, and Equipment states that communication cables must be separated by a physical barrier if installed in the same raceway, compartment, junction box, etc. as conductors of electric light, power, Class 1 circuits, etc. Section 300.3(C) states that conductors occupying the

Continued on page 37





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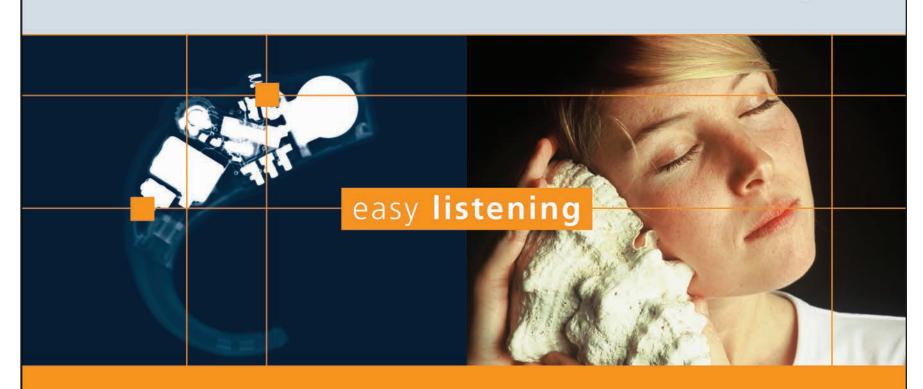
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www.cablescan.com

WIREwisdom[™] ANIXCER

Continued from page 32

same cable, enclosure or raceway must contain an insulation voltage rating equal to the maximum voltage of any conductors installed in the system.

NEC applications for 300 V category cables would not be acceptable to be installed in the same raceway, enclosure or cable as other 600 V cables unless the application allows barriers to be installed. If a network engineer wants to install category cable near 600 V cable, the category cable will need to be rated to 600 V.

NFPA 79 can also be applied to industrial applications, but only provides installation requirements for electrical equipment operating 600 V or less. NFPA 79 also covers the point of the supply to the electrical equipment of the machine. NFPA 79 provides provisions on acceptable cable types installed as an integral part of a piece of equipment. It is important to note that NFPA 79 defaults to the NEC for applications that do not fall directly within the scope of NFPA 79 and NEC provisions may apply. Similar to the NEC, NFPA 79 Section 13.1.3 Conductors of Different Circuits does require that conductors occupying the same cable, enclosure, or race-

way must contain an insulation voltage rating equal to the maximum voltage of any conductors installed in the same system. Otherwise the circuits must be separated by a barrier..

600 V CABLE **CONSTRUCTIONS**

NEC and NFPA standards allow different cable types to be installed in 600 V applications. It's important to understand which industry code applies to the application before selecting the correct wiring method.

The National Electrical Code does not recognize Appliance Wiring Materials (AWM) wiring. Category cables that meet a 600 V AWM rating would still need to be separated from power cables. The NEC does recognize and provide provisions for CM, CMR, CMP and PLTC cables. Standard category cables can be dual listed to a CM, CMR, CMP or PLTC listing, but these constructions are rated to 300 V and would not be permitted to be installed near 600 V cables.

Instead, NEC allows the use of 600 V multi-conductor cable under the listing Type TC (tray cable). Category cables can be dual listed to a TC listing, but TC cables are only permitted in sizes 18 AWG and larger and must meet industry vertical flame

tests per UL 1277 Tray Cables. Category cables approved to be dual listed to Type TC have a significant increase in overall construction and performance requirements. The conductor sizes must be at least 18 AWG along with increased insulation and jacket thicknesses. Type TC category cables are permitted to be installed in cable trays and raceways next to other 600 V cables without separation depending on the application.

NFPA 79 allows AWM cables to be installed in listed assemblies where the cable has been indentified for use in the equipment or installation. NFPA 79 Section 12.9.2 provides additional information. Category cables that meet a 600 V AWM rating would not need to be separated from power cables for NFPA 79 applications.

CONCLUSION

Category cable applications are evolving where the need to install cables next to power cables are growing. It is important to understand which industry code applies to the application and the associated permitted cable standards. The NEC recognizes Type TC for 600 V applications, while NFPA 79 allows 600 V AWM wiring.

For further information visit www.anixter.com



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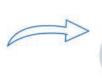
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Air Force Research Labs Paves the Way to Lower Cost on Wire Harness Assembly

Air Force Research Laboratories, Delta Sigma Company (DSC) of Kennesaw, Georgia, launched an investigation into modernizing the wiring harness assembly process by means of technological advancements utilizing augmented reality (AR) technology. DSC's patented AR system called Projection-Works™ had already helped remove \$111M of assembly cost from the F-35 fuselage, and the Air Force wanted to find similar improvements for wire harness assembly.

The Air Force provided 7 requirements to Delta Sigma to guide the development process:

1. Project Accurately Scaled Objects

ProjectionWorksTM has long had the ability to project 3D scaled objects from model data, but needed to add the ability to project 2D scaled objects from drawing data to be useful to the harness manufacturing community. This was completed early in the program.

2. System Cost Control

The price target was to reduce the price to one half of what the 3D version of ProjectionWorks™ costs. This objective was also met. ProjectionWorks is comprised of standard priced catalog items, and the price of a 2D system is 46% that of a similar sized 3D system.

3. Input Data in Its Native Format

ProjectionWorksTM imports data with little or no alterations needed. If the data exists, ProjectionWorksTM can probably use it. If the data does not exist, DSC has made it easy to create the missing pieces. Mentor Graphics' Capital Systems can export data directly to ProjectionWorksTM, and other systems will be able to do so soon.

4. Multiple Projector Harness

ProjectionWorksTM can create a harness of any size by using multiple projectors. The calibration method built into the system will compensate for small gaps between boards automatically so that very long wire routes are still projected accurately.

5. Sequenced Data Presentation

ProjectionWorksTM will create sequenced tasks (route wire, lace

bundles, add clamps, terminate connectors, etc.) and the steps within a task (each individual wire, lace, clamp, ect.). The sequence can be mandated, or the user can select parts by scanning a bar or QR code and ProjectionWorksTM will show where that part goes (such as a wire route).

6. Reconfigurable Harness Board

Augmented Reality makes it very easy to use the same board to make many different harnesses. Shops that are high-mix/low-volume can use this capability to great advantage. Using DSC's magnetic board or Panduit's Quick-Build boards, setting up a new board can be a few seconds to a few minutes, depending on size and complexity.

7. Configuration Management via Customer MES

The ProjectionWorks™ system has been designed for connectivity for those who want to use it. Although it is common to be used as a stand-alone system, an enterprise system where the MES can push work instructions to the shop floor is available.

DSC met or exceeded all the Air Force objectives. In addition to the items mention above, Projection-WorksTM can use multiple operators on a single harness, uses wireless controls for easy user mobility, and connects to Cirris test systems.

Because of the AFRL's investment in this project, augmented reality technology is available to harness builders at a very affordable price. ProjectionWorksTM has been proven to substantially reduce the cost and improve the quality of assembling systems of all kinds. Based on initial results of pilot projects, labor savings from 50 to 70 percent are expected for harness building. Delta Sigma continues to work with the Air Force Research Labs and partner companies to further develop ProjectionWorksTM to provide cutting edge solutions to improve the industry's performance.

For more information on ProjectionWorksTM check out www.projectionworks.com, or email at info@deltasigmacompany.com



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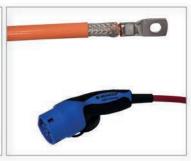


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Inside TTI's Creative "The Specialist" Ad Campaign

By Joe Tito Wiring Harness News

'f you've been dutifully scouring the pages of Wiring Har-Lness News, you have without doubt noticed some ads that literally leap off the page. Electronic component distributor, TTI, has been running a truly unique ad series featuring their beloved character, The Specialist, in comic book styled inserts. Some are in conjunction with their major principles, Molex, Phoenix Contacts and TE Connectivity. They are also running a version promoting the benefits of TTIi's Advanced Inventory Management program, and how it can help manufacturers with supply chain logistics.

Some campaigns go outside-the-box to convey a message. TTI has moved-the-box with this creative and effective campaign.

WHN chatted with Paula Renfrow, Vice President, Americas Marketing at TTI. TTI is the world's leading distributor in interconnect, passive, electromechanical and discrete components. They are a Berkshire Hathaway company, but as she mentioned, the founder and CEO, Paul Andrews, is still actively involved in the business.

As Paula revealed, a few years ago, Paul was at an annual Berkshire Hathaway meeting where he was privy to some of the new Geico commercials. Geico is another Berkshire Hathaway holding. Energized by seeing such a creative campaign, Paul came home and charged his team to come up with a fresh and edgy marketing strategy. With over 4000 personnel worldwide, he wanted to stress TTI's value proposition as having the experts and advisors on board who are specialists within the various product lines. Thus, The Specialist was born.

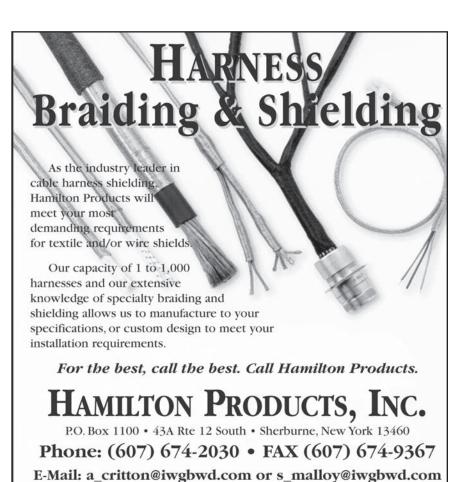
The program began, and continues to evolve, as a series of videos featuring The Specialist. "He's a little bit Mission Impossible, and a little bit Maxwell Smart," as Paula discussed the Specialist's save-the-day persona. Available at TTI's website, the videos are very instructive, and you'll find yourself watching several at a time as they are also funny and entertaining.

As for more recent adaptations

of the Specialist, Paula mentioned "My boss and I were talking and he mentioned that nobody is doing direct mail anymore." They saw this as an opportunity to fill an empty spot on the engineer's desk, and the comic book adaptation was created. "We did a lot of research before the actual comic [adaptation], and found that illustrated novels are really back in vogue and they reach across age and gender demographics," she instruct-

The WHN ads represent TTI's venture into print with the comic book style of The Specialist message. "I have these pages taped on a board in my office because I'm so crazy about the whole thing," she said, noting that the ad's specific calls to action have been very effective during their run in WHN. "We did choose the comics and the color specifically for your publication because we felt it would really pop," she concluded.

Look for more in this exciting series of ads as the Specialist highlights his ability to give his customers peach of mind. Check out ttiinc.com to see TTI's entire line card, watch the videos, and read more industry targeted news.



Home Page: http://www.hamprods.com

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NEWS PLUGS

HellermannTyton and TTI, Inc. sign wire and cable management accessories distribution agreement

HellermannTyton has signed an agreement with TTI, Inc., a world-leading distributor of electronic components, to facilitate a greater market presence in North America. The new alliance comprises a wide range of HellermannTyton's innovative, commercial-grade cable ties and fasteners, electrical installation and insulation

products, application tools, cable protection and identification systems.

"This new partnership with TTI enables us to grow our reach into additional segments of the industrial market in North America," said Dan Martin, VP of sales, North and Central America at HellermannTyton. "Both companies have a long-standing history of placing the customer experience at the forefront of all our activities, and we look forward to continuing on that path together."

Lew Lafornara, VP of supplier marketing for TTI, looks forward to the close relationship. "The HellermannTyton range of cable management solutions is very well respected in the market, and we are delighted to be able to include these products into our portfolio."

HellermannTyton cable management products will be listed and stocked by TTI, Inc. of Fort Worth, Texas, with immediate availability.

About TTI, Inc.

TTI, Inc. a Berkshire Hathaway company, is an authorized, specialty distributor of interconnect, passive and electromechanical (IP&E) components and the distributor of choice for industrial and consumer electronics manu-

worldwide. facturers Broader and deeper inventory, leading-edge products and custom supply chain solutions have established TTI as the leading specialist in electronic component distribution. Globally, the company maintains two million cubic feet of dedicated warehouse space containing over 850,000 component part numbers. Along with its subsidiaries, Electronics, Sager Electronics, and Symmetry Electronics. TTI employs over 5,400 employees and is represented in over 100 locations throughout North America, Europe and Asia. For more information about TTI, visit www.ttiinc.com.

About Hellermann-Tyton

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 electrical, 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

SDE STANDARD DIE ENVELOPE CRIMP TOOLING



Standardize Your Crimp Tooling

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A Primer on Small Wire Crimping

Continued from page 27 ___

deformed on the carrier strip. If the asymmetry occurs periodically during the crimping process, it is likely a sign of a worn crimper or a poorly performing applicator feed. Check the condition of the tooling or feed and replace as needed with high quality equipment.

Flash

Flash, also referred to as "burr", is the terminal material that extrudes between the crimper and anvil during the crimping process (Fig 15). Harness makers should reduce flash where possible because it can cause several issues. Flash may interfere with a connector housing during insertion, it may cut or damage seals or heat shrink tubing placed over the terminal, or it may break off the terminal and become conductive debris. Just as it is with symmetry, some level of



Figure 15. Terminal cross section exhibiting flash.

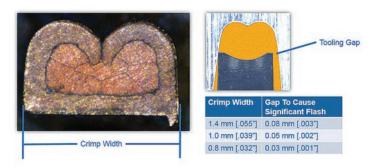


Figure 16. Allowable tooling gap as a function of crimp

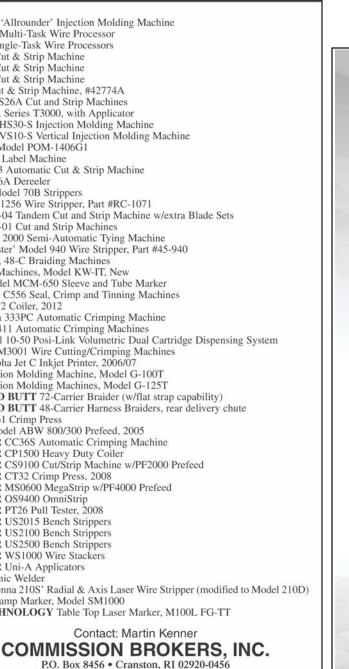
flash will not affect crimp performance in many applications, so it is important to follow the requirements outlined in the crimping specifications. The goal is generally to minimize the amount of flash, but not necessarily eliminate it.

As was mentioned earlier, most crimping specifications allow a certain height and width of flash based on the terminal material thickness. As the terminal material thicknesses decrease, the amount of allowable flash also decreases. Flash forms because of gaps between the crimper and anvil. Some gap is necessary to prevent tool crashing at various crimp heights, but smaller crimping applications require smaller gaps. Figure 16 shows the amount of allowable gap to cause significant flash as a function of crimp width. Please note that there are other factors involved in the production of flash, but these are general guidelines for tooling geometry.

The three factors that users can control most easily in an effort to reduce flash are tooling quality, tooling wear, and tooling alignment. Using quality crimp tooling is very important for all crimping applications, but is necessary in small wire crimping. The ability to control tooling gaps to this level of precision requires a combination of design and manufacturing methods that only certain tooling manufacturers can produce. Substandard tooling does not have the dimensional control required to minimize the tooling gaps while avoiding interference.

There are two types of flash performance: initial flash performance and flash performance over time. If tooling manufacturers design and manufacture the tooling properly, it will have good initial flash performance. If this tooling, however, does not have the proper

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A Primer on Small Wire Crimping Continued from page 44 _____

material and plating selections, it will not have good flash performance over time. Tooling wear is the most significant factor in flash performance over time. In addition to the crimper tips, crimpers also wear on the sides where the crimper legs contact them. This wear happens over time, so crimpers will show progressively more flash over the life of the tooling (Fig 17).

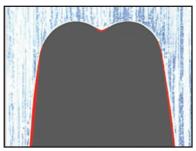


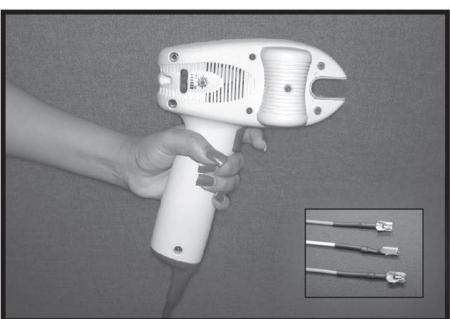
Figure 17. Crimp wear (dark areas)

Wear on the sides of the crimper is particularly important because it contributes doubly to the tooling gap. Since the wear occurs on both sides of the crimper, the total tooling gap contribution is double what it is on one side if the crimping process pushes the entire gap to one side. This is another reason why it is crucial to use high quality tooling. All tooling will wear over time, but high quality tooling typically lasts

much longer than low quality tooling. High quality tooling has the proper material and plating selections for long-term performance. To avoid frequent, costly tooling changes and potential quality escapements, only use high quality tooling.

Tooling alignment is another significant factor in flash performance. Users should avoid allowing the crimping process to push the entire gap to one side of the crimper and anvil interface, and this effort starts with tooling alignment. Take, for example, a situation where the crimper and anvil for a terminal with 1.4 mm [.055"] crimp width has a total tooling gap of 0.1 mm [.004"]. If the crimping process pushes the entire gap to one side, the terminal will likely exhibit significant flash. If the tooling maintains proper alignment throughout the crimp and divides the gap evenly on both sides, the terminal will likely not exhibit significant flash. Users should align the crimper and anvil at setup, which requires following an alignment procedure. Applicator tolerances are typically not good enough to allow a user to mount the crimper to the ram without using an alignment procedure.

One final note on flash is the occurrence of crashing. Because smaller tooling requires smaller gaps, the distance between the tooling separation at crimp height and at interference is small. Small wire tooling can



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be easier to crash than tooling for larger wires if users do not follow proper procedures. When adjusting the crimp height on the applicator, users should always start high and work their way lower. In addition, users should never cycle the applicator without a terminal and wire over the anvil. Finally, always use a ram collar when the applicator is not in use to avoid accidental contact between the crimper and anvil. Some sure signs of crashed tooling are excessive flash and shoulders on the crimper area of the cross section (Fig 18). Users should replace crashed tooling as soon as they detect it.

Wire Placement Issues

Small wires are typically much more difficult for users or machines to locate in the terminals than larger wires are. Wire flexibility and camber are the main causes of wire placement issues. If users

or machine grippers grasp the wire too far from the stripped end, the wire can droop to the point where it is very difficult to place consistently in the terminal. Users and machine grippers should grasp the wire as closely to the stripped end as is safely possible. Wire is usually stored in a coiled fashion, whether in barrels or on spools, and the process of coiling the wire induces a curvature, or camber into the wire. The smaller the core diameter, the smaller the radius of camber, and the more difficult it is to remove the camber. The wire can take a set or memory over time to the camber that can be difficult to remove. Users should keep the wire as straight as possible so they can place it in the terminal in a repeatable manner. Wire camber issues are usually more noticeable toward the ends of wire barrels or spools because

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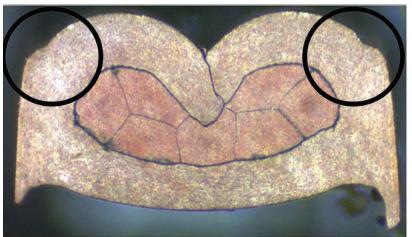
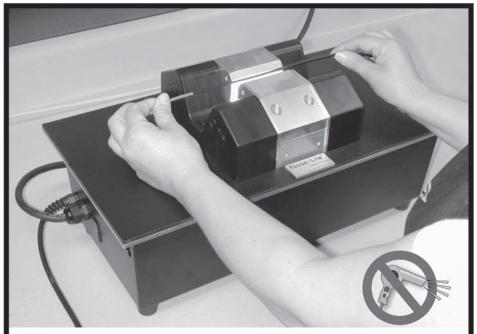


Figure 18. Terminal cross section showing evidence of crashing



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Tim C. Benincasa Joins MJM Industries as National Sales Manager.

MJM Industries, a world-class contract manufacturer of custom overmolded cable and wire harness assemblies serving a broad range of industries, announces the appointment of Tim C. Benincasa as National Sales Manager, effective immediately. In his new



Tim C. Benincasa

role, Mr. Benincasa will report directly to the company's president and will be responsible for the pursuit of opportunities that meet and grow the company's revenue and profit goals.

With Mr. Benincasa's appointment, MJM Industries hopes to strengthen their position in a variety of industries as a leading supplier for custom over-molded cable assemblies, wire harness assemblies, over-molded parts and potted components. Mr. Benincasa will play an instrumental role for the company in meeting their goals of serving more customers while enhancing the customer experience.

Mr. Benincasa is a proven business development and sales executive with a successful record spanning more than 30 years in technical sales management and customer relations. Most recently, Mr. Benincasa

served as head liason for a leading business consulting firm resulting in substantial increases in revenue and profits for several Electronics Manufacturing Services (EMS) clients.

Mr. Benincasa joins MJM Industries with impressive credentials including earning Business of the Year for two Kentucky-based manufacturing plants. Mr. Benincasa has also been awarded two patents.

MJM Industries is a global leader in the design and manufacture of custom over-molded cable assemblies, wire and cable assemblies, as well as flat flex and coax cable assemblies. Some of their value-added services include laser wire stripping for holding ultra tight tolerances and 3-D modeling for all markets. From concept to finished product, the MJM Industries staff works to ensure that all

parts are manufactured to exacting standards.

For more information, contact MJM Industries at 440-350-1230 or visit the website at www.mj-mindustries.com.

The Epson LABEL-WORKS PX LW-PX400 Portable, Wireless Industrial Label Maker

Epson LABELWORKS PX introduces the LW-PX400, a portable industrial label and wire-marking printer for creating professional labels and markers wirelessly or via USB. The LW-PX400 comes with LABEL-WORKS PX's unbeatable lifetime warranty.

The smallest, lightest and most flexible printer on the market, the LW-PX400 can work wirelessly in the field via Bluetooth, using iLabel and Datacom apps for iOS and Android mobile devices or the powerful Label Editor Professional software for PC. Label Editor Lite software is available for Maccomputers.

"The LW-PX400 is designed for ultimate versatility and is the latest in the LABELWORKS PX line of printers with innovative features that save time and money," says Andrew Kasun, marketing manager for Epson LABELWORKS PX. "The LW-PX400 is compact yet sturdy and is designed for both portability or desktop use. With both mobile apps and software, the LW-PX400 is a convenient tool to create outstanding visual communication for pro-

Wardwell Harness Braiding Machine



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

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Print wirelessly even when powered with 6-AA batteries. The Energy Star-certified LW-PX400 also comes with an AC adapter for printing at a workstation or when connecting to an outlet is more convenient. A removable Drop-Guard printer cover meets MIL-STD-810F for use in the toughest environments.

The LW-PX400 prints on supplies from 1/6" (4 mm) to 1" (24 mm) wide. Create professional visual identification with 160+ durable LABELWORKS PX supplies and mark wires/cables with selflaminating wraps and heat shrink tubing plus select from magnetic glow-in-thetape, dark, strong adhesive, removable adhesive, reflective supplies and more. With more material per cartridge, LABELWORKS PX supplies are designed to diversify and simplify supply selection for industrial applications in the facility or field.

For more information contact K-Sun at 1-800-622-6312, info@ksun.com, or www.ksun.com.

Schleuniger, Inc. to Exhibit New Wire Processing Equipment at The Assembly Show

Schleuniger, Inc., a leading international manufacturer of highprecision wire processing machines, will be exhibiting at The Assembly Show, an assembly focused trade show aimed at helping suppliers, buyers and users of assembly equipment in manufacturing plants connect, learn, share and explore all things assembly. This exclusive showcase will be held October 24-26, 2017 at the Donald E. Stevens Convention Center in Rosemont, IL. Schleuniger will be at booth #231 providing hands-on demonstrations of



Schleuniger Cable Coiler 1450

innovative solutions for stripping, cutting, crimping and marking all types of wire and cable.

_ Continued on page 50



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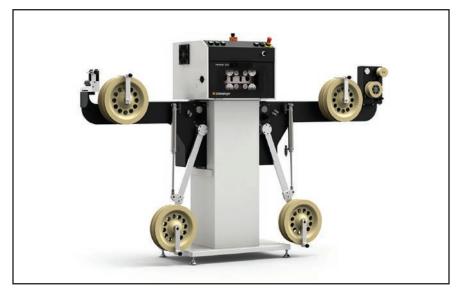
Continued from pag 49

New for 2017, Schleuniger will demonstrate its latest pre- and post-processing machines, the PreFeeder 3200 and CableCoiler 1450. The PreFeeder 3200 is a puller type prefeeding machine for wires and cables with an outer diameter of up to 35 mm (1.37"). Made for use with Schleuniger cut and strip machines, this economical prefeeder provides constant tension to the downstream wire processing machine. The new CableCoiler 1450 offers fully synchronized, precise wire and

cable coiling and is compatible with all Schleuniger cut and strip machines.

In addition, for the first time at The Assembly Show, Schleuniger will demonstrate the Laser Wire Solutions Mercury-4 laser wire stripping machine running as part of a full in-line wire processing system. This in-line system is the perfect solution for stripping shielded twisted pair cables. The Mercury-4 provides guaranteed nick-free stripping with radial and axial incision capability. The in-line system, which can be controlled via Cayman software, processes wires and cables up to 6 mm (.236") O.D. and can perform virtually unlimited length end strips or window strips.

Also new in laser technology, Schleuniger will be demonstrating an in-line system featuring a laser wire



Schleuniger's PreFeeder 3200

marker from Tri-Star Technologies. The software, can be run in-line with a Tri-Star Laser Marker, which is fully in- Schleuniger cut and strip machine and tegrated with Schleuniger Cayman can apply marks anywhere along a wire

or cable. The machine

prints in any font, size, and orientation and can mark any UV laser markable wires, including Kapton, Tefzel, and Tef-Ion insulated wires and cables. Schleuniger will also showcase equipment from Exmore, a worldwide equipment supplier in wire, cable and

connection technology. Schleuniger will demonstrate the Wire XL Multi Connection Machine. This high-performance machine with programmable features has been developed for special applications in connection technology. The Wire XL is distinguished by the constant quality of the connection process. Its user-friendliness and modular setup make this system an production excellent tool. In addition, Exmore's Un-Twister will also be shown. This semi-automatic twisting machine offers high production efficiency in combination with perfect processing quality. It is easy to operate, attractively priced and guarantees accurate performance.

additional Many products will be demonstrated, including the CrimpCenter 36 S, MegaStrip 9650, MultiStrip 9480, EcoStrip 9380 and StripCrimp 200 as well as equipment from the UniStrip line of wire stripping machines and CoaxStrip line of coaxial cable stripping machines.

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

UNIQA-PRO SINGLE CRIMP WIRE PROCESSOR

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

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

Features:

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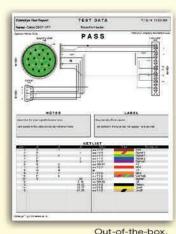
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A Primer on Small Wire Crimping

Continued from page 47

the inner windings are at smaller radii than the outer ones. Many lead makers have wire straighteners on the wire infeed, so it is critical to adjust these straighteners to remove the camber. TE also recommends using wire barrels or spools with the largest core diameters too minimize the amount of initial camber in the wire.

Summary

Small wire crimping presents a unique set of challenges, but harness makers can overcome these challenges with the help of the right application tooling partner. TE Connectivity works diligently to maximize the quality of its tooling so wire harness manufacturers can produce the best crimps.

Here are six keys to high quality small wire crimps:

1. Use only high quality tooling

High quality tooling includes the applicator, terminator, crimper, and anvil. The applicator must be easy to set up and must maintain consistent quality. Users must select a crimper and anvil designed and manufactured for initial quality as well as longevity.

2. Set up the applicator feed properly

Users must center the terminal over the anvil and the feed must

be able to maintain this placement. The feed track must guide the terminals without deforming them on the carrier strip.

3. Align the tooling properly

Users must align the crimper and anvil with each other when they are installing them into the applicator. Simply mounting the crimper to the ram is not sufficient and users must perform an alignment procedure.

4. Be careful handling terminals

Terminals are very easy to deform on the carrier strip during transportation and storage. Practice good reel maintenance and handling to avoid any deformation.

5. Monitor tooling condition

All tooling wears over time and will eventually produce crimps that do not meet specifications. By monitoring tooling condition, users can replace tooling before it causes quality issues.

6. Beware wire placement issues

Wire memory or camber is a significant issue when trying to place the wire in the terminal. Try to use the largest diameter wire core and use wire straighteners to minimize wire memory effects.





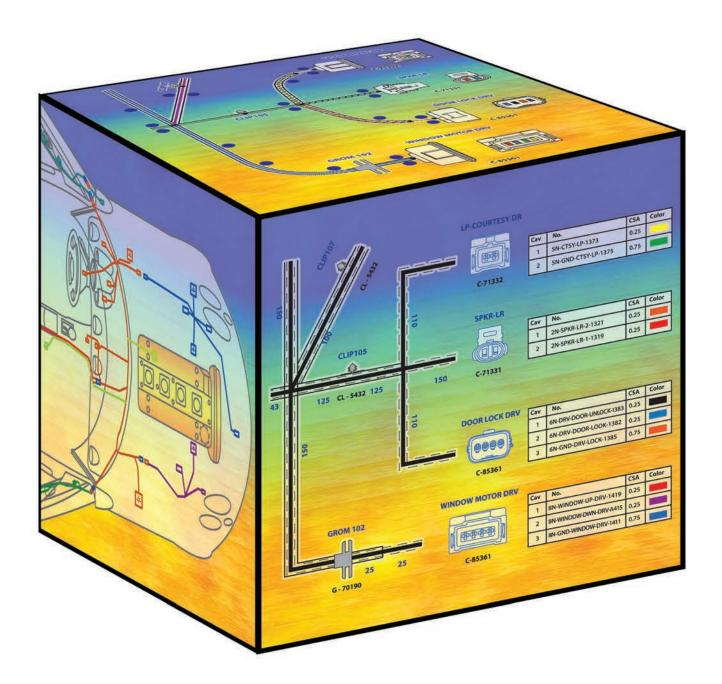
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> of the presence of a magnet to trigger a switch and make something happen," Todd Harmon, vice president for Canfield Industries. "It enhances reliability and safety in a wide range of situations." Made in the USA, the sensor's first field application equips a cement truck, where it picks up a signal from a magnet mounted to the mixing drum and controls how much the drum rotates. In an industrial automation setting, the sensor can detect the closure of a door and allow a machine to run, enhancing safety.

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New Concept in Wire and Tubing Processing from The Eraser Company

November 8 & 9, 2017: The Eraser Company, Inc. is excited to release the all new M700 Modular Series. They will be at the MD&M convention in early November 2017 to showcase their new product line, located at booth 1439.

The M700 Modular Series is a brand-new concept in wire and tube processing. With the modular design, you can quickly switch between wire, small tube and large tube processing. It's also designed to cut various wire and tubing material to repeatable accurate lengths by using a choice of multiple style cutting modules that can be used with or without the feeder module.

The M700 Modular Series is a compact table top system that has up to 100 programmable jobs. It is auto sensing and operates over the input power range of 100 - 240 VAC at 50/60Hz.

The M700F (Feeder) Module feeds material to precise lengths for cutting with other modules or can be used alone to feed compatible systems.

The M700TW (Tube and Wire) Cutter Module uses a pneumatic guillotine style



3M™ ROUND CONDUCTOR FLAT, CONTROLLED IMPEDANCE CABLE, 7700 SERIES

3M's new 7700 Series Cable is an excellent choice for a wide range of controlled impedance wire-to-board applications including automated test equipment, communications network equipment and many others. It is suitable for low voltage differential signaling (LVDS) applications. The cable's exceptional versatility means it offers a variety of connection options.

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NEWS PLUGS continued



Continued from page 54

cutter head to cut copper wire gauges up to 10 AWG stranded or 12 AWG solid and cut tubing up to 3/8" (9.5mm) OD.

The M700ST (Small Tube) Cutter Module utilizes Eraser's rotary style cutter head that can cut many grades of tubing up to 1/2" (12.7mm) OD.

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Burndy Unitap Heavy Splice Reducer

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This expansion includes 8 tap configurations and an in-line splice reducer available in both clear and UV-rated black insulation. Each conductor port contains 2 set screws to increase the strength and performance of the connector, and will provide a reliable and robust connection in the most demanding applications. These new additions are Listed to the UL Wire Connector Standard UL486A-486B and

are dual rated for use with both aluminum and copper conductor from #2 - 750 kcmil.

Headquartered Manchester, BURNDY is the only manufacturer to have the BURNDY® Engineered System of coordinating dies, connectors and tools. The three elements have been specifically designed to work together and engineered to meet stringent, accepted quality standards allowing the user complete confidence in the integrity of the connection.

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Because One Defective Wire Is One Too Many

Equipment Industry's Support of an Industry-Wide Data Collection Solution Will Benefit Wire Harness Manufacturers

By Michael Wurzman

eavy equipment manufacturers and their suppliers met earlier in August to take their first steps toward implementing a unified approach toward the collection and management of product substance content data and to reduce data management

costs. The conference, sponsored by AEM and DXC (supplier of IMDS and CDX data systems), along with RSJ Technical Consulting, was held in the Detroit area to discuss the best ways to meet the industry's collective regulatory challenges. Industry leading OEMs of agricultural, construction, mining, utility and forestry equipment, along with key suppliers discussed the best ways

to meet the industry's collective regulatory challenges.

Ensuring complete and accurate product substance content data was the conference's primary focus. In particular, conferees agreed the most critical requirement was the ability to get substance data from actual material manufacturers, the only source that can provide complete and accurate data. For reporting purposes, this data needs to be linked to all supply chain levels while still protecting supply chain confidentiality, including supplier relationships and proprietary "secret sauce" additives. Transmitting data along the industry's deep supply chains, averaging 11 tiers and sometimes stretching beyond 18, presents unique industry related challenges. Additionally, participants identified the importance of having current regulatory requirements available to all suppliers in their supply chains, in real time.

To understand the industry's need for action, and the impact to the wire harness industry, we need to understand the recent regulatory changes, impacting both. These include the REACH O5A (Once an article always an article) decision of the EU Court of Justice, changes to California Prop 65 warning requirements, the EU BPR (Biocidal Products Regulation), and the 2019 RoHS2 scope inclusion. Also of concern were the new regulatory requirements coming into play in markets around the world on an almost daily basis. A deeper understanding of the changes helps us appreciate the need for a unified industry approach.

O5A is a major shift in interpretation of the REACH regulation. The



Michael Wurzman

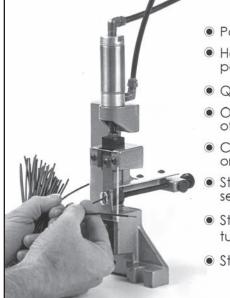
REACH 0.1% w/w substance threshold that triggers certain REACH provisions has not changed. At what article level, the threshold must be calculated has changed radically. Originally, the threshold was calculated only for the finished article being imported into the EU. It was virtually impossible for a single substance to exceed 0.1% of the weight of a massive finished product. With O5A the threshold is calculated on the weight of each article whether entering the EU by itself or as part of a larger assembly. This requires reporting down to the substance content level of materials identified in each component of any assembly. Currently this data is not easily available to many wire harness manufacturers. OEMs are now scrambling to collect the data necessary to determine O5A compliance for every component in every subassembly in every assembly in their product.

Prop 65 has changed. Enforcement of these changes begins on August





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30, 2018. In California, every private citizen is a potential enforcer as any citizen can sue a company for failure to comply with Prop 65. The bounty hunters will be out in force on August 31 looking for opportunities to sue. Currently the warnings required by Prop 65 are general in nature. The major changes are the requirement that a warning must include the name of at least one chemical and that B2B products are now clearly in scope. At a minimum, to be compliant you must know if any of the hundreds of listed chemicals is present and provide the required warnings. These warnings must be present on products as well as on each and every replacement part or accessory sold into the state. Every wire harness sold will require

this warning information be provided to your customers.

BPR is one of the newest EU product substance regula-Its complexitions. ties require not only the determination of the presence of a substance, but also the purpose for which the substance was added to a material. A single substance may be allowed, require authorization or be banned from a given material depending on whether it was added for a biocidal purpose or not. Biocides may be present in the plastics and rubbers used in wire harnesses. Harness manufacturers are now responsible for reporting this substance content to their customers. As with other recent regulatory changes OEMs are struggling to obtain the necessary data to determine compliance status for their products as enforcement actions are already being experienced and customers are already rejecting purchases for failure to provide BPR compliance documentation.

On July 22, 2019, the final "catch-all" category for RoHS 2: "Other EEE not covered by any of the categories above" is activated. This date will bring new products, including many in the equipment industry, into scope and will require data to support their compliance status documentation.

In the EU companies are being asked to go well beyond the "what's in your product" compliance question. They are being requested to perform Life Cycle Assessments (LCAs) on their products and supply chains to document water and energy usage, greenhouse gas generation and other environmental impacts as part of the bid evaluation process. We anticipate that OEMS will be reaching out to their supply chains for supporting data as LCAs become a required part of B2B transactions.

As a result of the regulatory discussions it became clear that one data collection process that would meet all reporting requirements for all regulations now and in the forseeable

future, would save time and money for the entire supply chain from the OEMs down to Tier N. The key to achieving such savings is selecting a tool that allows data collected for one industry to be used for another as well as to be analyzed against the requirements of the myriad of regulations globally.

Based on the discussions participants concluded that IMDS would not be adequate for the needs of the equipment industry and their supply chains. If you are familiar with IMDS, you know that the data collected is for use only in the automotive industry. The regulations IMDS manages are limited to those pertinent to automotive. Furthermore, the data in

IMDS is owned by the automotive OEMs. It cannot be used elsewhere without specific written agreement and payment for that usage.

Although IMDS is not the tool for the equipment industry, the data collection experiences shared by the automotive industry at this conference provided valuable insights. The equipment industry has realized that collecting accurate, quality data from the material manufacturers requires a Full Material Declaration (FMD) approach similar to that taken by the automotive industry with IMDS. The conference participants realized that their needs made CDX (IMDS's sister

_ Continued on page 60

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Equipment Industry's Support of an Industry-Wide Data Collection Solution Will Benefit Wire Harness Manufacturers

Continued from page 59 _

product) an excellent choice as it follows the validated IMDS approach to data collection.

The key feature of CDX that makes it an excellent choice is that CDX is a cross-industry platform that can be adapted and extended as new regulatory requirements come into play for any industry sector. This minimizes costs while maximizing the value of the data collected. In other words, you collect data once and can send it

to any customer participating in CDX or export it to any of several industry standard formats such as IPC1752A, IPC 1754 (currently under development) or IEC 62474. Furthermore, the system ensures that from the material manufacturer through each tier, there is the ability to know and rely on the accuracy and currency of the data. As regulatory requirements change, an OEM must be able to determine immediately if data updates are needed from even the deepest tier in their supply chain.

Rick Bromm, president of Altex Wire & Cable, as well as chairman of the Wire Harness Manufacturer's Association (WHMA) board of directors, speaking on behalf of his company, was delighted that conference participants recognized the need for an industry wide data collection and management solution. He further stated, "The need for a simplified, cross-industry reporting process is long overdue. We look forward to supporting the equipment industry's data collection efforts using CDX."

NEWS PLUGS continued

For more information about data collection and meeting regulatory reporting requirements, contact RSJ Technical Consulting.

Michael Wurzman is a leading expert in environmental compliance for manufactured products. He has specialized in the reporting of materials substance data, beginning with the ELV directive for automobiles and expanding to include RoHS, REACH, Conflict Minerals and the entire global "alphabet soup" of product substance regulations that continues to evolve. Visit them at web site www. rsjtechnical.com.



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"Sustainability is important to us and our customers," said HellermannTyton Associate Product Manager Jessica Leverance. "Redirecting surplus material to a recycler helps our customers better meet their green initiatives - in addition to supporting our own commitment."

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cables to stack, or layer, with almost no wasted dead space between cables, providing maximum conductor density for a given volume.

Flat cables also have greater surface-to-volume ratio than talc filled round cables, consequently having higher efficiency in dissipating heat. This allows a higher current level for a given temperature rise and conductor cross-section. Unfortunately for some round cable manufacturers, the elimination of talc in their designs will be exposed to heat build-up, conductors sticking together and ultimately cable failure.

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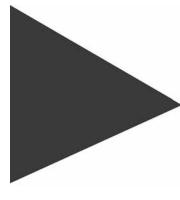












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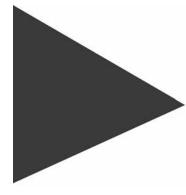
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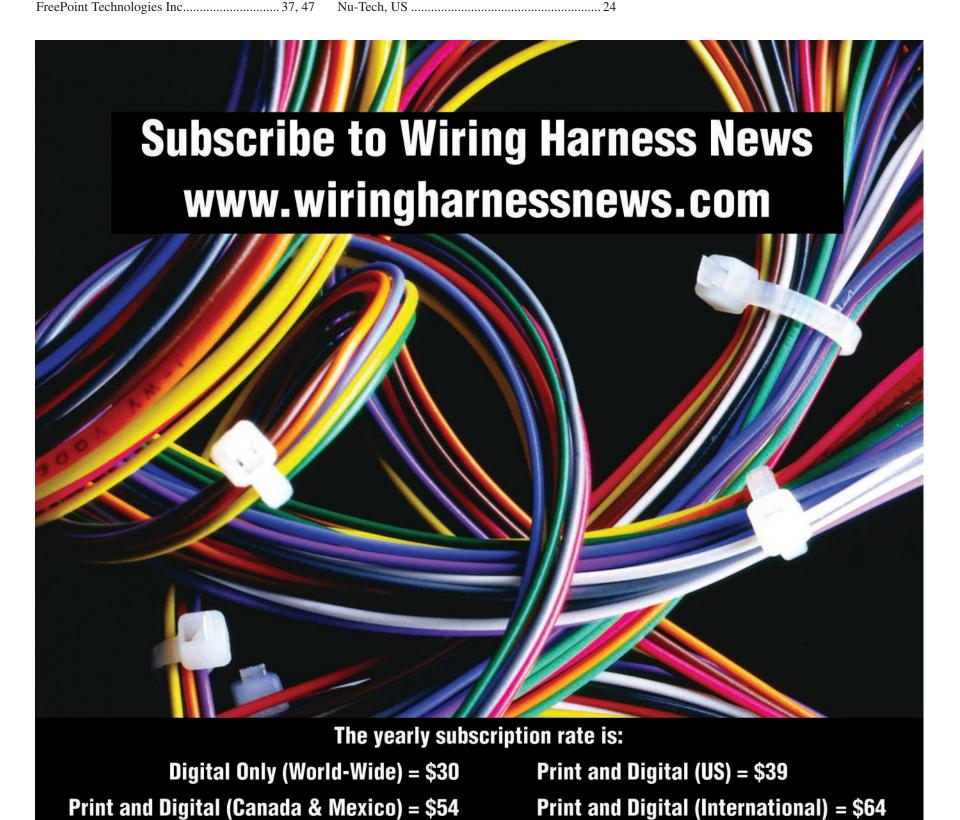
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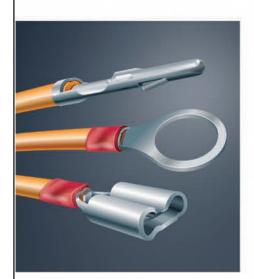
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Ramp up efficiency with a full line of equipment designed to enhance productivity and satisfy your budgetary needs. From our highly affordable AT-300 electric benchtop terminator and reliable, semi-automatic model G II terminator, to the versatile,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

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

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