- After the sale
- Wire Wisdom Cable Tray
- On meetings and productivity
- Improve crimp quality to increase productivity
- It's no longer about information it's about knowledge
- Short circuit testing for automotive systems and harness design



Wotko Cable and Harness Assembly

By Fred Noer

aking a profit as a company and making a difference in society are closely connected concepts for Dustin Coon and Bernard Brunotte in the growth of their wiring harness and cable assembly manufacturing business.

The men incorporated their company, which is called Wotko Cable and Harness Assembly, in November 2013 in Rochester, Mich. The city of 13,000 residents is on the far north side of the Detroit metropolitan area and 25 miles from downtown Detroit. "We have a philanthropist ideology and a bigger picture of objectives," Coon said. "We are very open to how to serve the community and fulfill greater roles that are important to society. We want to provide good opportunities for others.

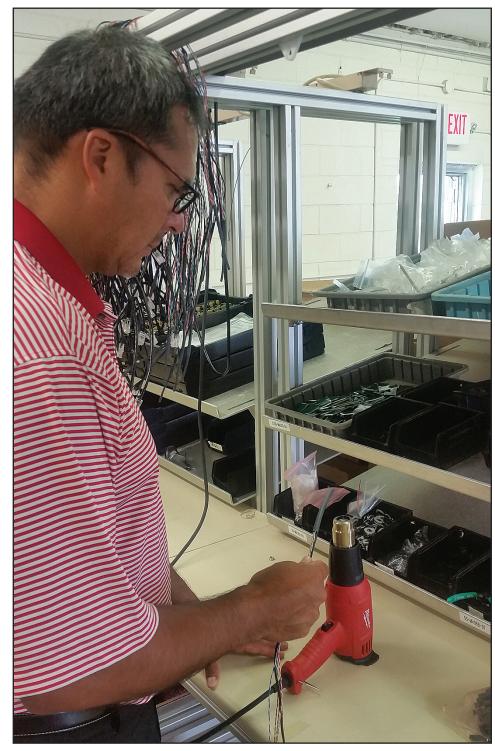
"Our vision is to work with disadvantaged young adults and give them opportunities for success as they go from high school into mainstream society but who do not go to universities," Coon said. "We are trying to address poverty and oppressed people in society."

As a relatively new company, adding permanent full-time staff members will occur in the coming months. At this

On Meetings and Productivity

By Joe Tito Wiring Harness News

ike many, I'm often frustrated by meetings. We have all been in meetings that have us checking the time, wondering about the work that isn't getting done. I'm convinced the proliferation of meetings has become toxic in organizational culture these days. That's why I'm so intrigued by the work of Al Pittampalli whose brand new book, Read This Before Our Next Meeting: How We Can Get More Done, deals with the scourge of meetings as they fill the calendars in the modern workplace. "meeting cost calculator" reveals a number of useful results. These simple calculators take the hours of meetings, number of attendees, and average salaries, to come up with a financial cost in the preparation and holding of meetings. But Mr. Pittampalli asserts that a bigger cost is the emotional toll on people, and the creativity it saps from the organization. He is convinced the over-scheduling of meetings keeps people from doing the actual work that they love, and that actually furthers the mission; be it their mission or that of the organization.



Employee of Wotko checking production.

point, orders are handled by Coon, Brunotte and up to three temporary employees.

The first order to launch the company was a simple harness with two terminations and was processed in April 2014. By the end of the year Wotko had only \$14,000 in sales. However, the company is on target to hit six figures this year serving the military, automotive, medical equipment and law enforcement markets and doing specialty jobs. "We've really turned the corner by proving ourselves and earning everyone's respect, and our entity is moving ahead in a positive manner," Coon said. "We have kept costs down, and we've been profitable the whole time. We are not feeding the animal out of our pocket. All our equipment has been paid for through strategic planning.

enue approaches \$500,000, full-time employees will be hired. One will have expertise in harness and cable production and be certified in IPC/WHMA A-620 standards. Another will specialize in quality control, and the third will have documentation and inventory experience.

Performing a search on the term

Another cost the author refers to is in the delay of decision making meetings tend to foster. He refers to them as the

_Continued on page 7

"Part of our philosophy is that the business is an entity with its own identity," said Coon, 45, company president. "It is its own creation and its own machine. Those who work here will move forward by creating an identity for Wotko." As orders increase and annual revCoon would like to have \$1 million in sales and more employees by the end of 2016 to increase the marketability of the company. "Then we would be taken more seriously as an entity than a startup," he said. "We need to reinvest in infrastructure, and after three years we can go to banks and accelerate the process of investment."

Coon and vice president Brunotte, 51, envision Wotko as a \$15-20 million company providing many people with jobs as well as educational opportunities through Detroit-area universities and high schools."We want to help keep U.S. manufacturing going and be competitive in a global sense," Coon said.

Financial milestones may be attained

Continued on page 10

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why do it twice when once is better

It's no longer about information - it's about knowledge

By Paul Hogendoorn

n my work, I find that people fall into one of two categories when it comes to the topic of IT: they have embraced it and are always looking for more ways to get more information technology deployed in their work processes, or, they are aware of the potential it may have but feel woefully behind and out of date. There's a third category though, smaller than the first two, but growing steadily. It's the people that have invested heavily in information systems and have collected mountains of data, but are now wondering what it all means, and if it was worth the effort.

The problem is that it's not "information" that we should be seeking, but "knowledge". There's a big difference between these two words we often mistakenly interchange. Here are some of the common definitions of the two words that can help illustrate the difference:

Information: the collected facts and data about a specific subject; definite knowledge acquired or supplied about something or somebody.

Knowledge: familiarity or understanding gained through experience or study; all the information, facts, truths, and principles learned throughout time; gen-



Paul Hogendoorn

eral awareness or possession of information, facts, ideas, truths, or principles.

Earlier this year, I had a chance to tour a factory where we were doing a small project. I was meeting the president and plant manager to review data that we had collected from a couple of critical automated assembly machines. We had some accurate data to review and interesting information to share. After our meeting, I asked to see the rest of the plant, and the president and general manager were glad to do so. We stopped in front of one of 6 identical machines and they explained the opera-

_Continued on page 6



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It's no longer about information – it's about knowledge

Continued from page 5

tion in detail. The operator was clearly straining to hear our discussion, wondering what was so interesting to the three of us. I asked if it was ok if I asked the operator a few questions, and they said "sure". Here's a small part of the exchange:

Me: "when your shift is over, and you feel like you've had a really good day- you really hit it out of the park that day - what does that day look like?"

Operator: "a pretty good day is if we get 4100 or 4200 pieces done. Our average is about 4000. If we really hit it out of the park, we'll have done 4300 or 4400."

Me: "does your boss know when you've had a really good day or hit it out of the park?"

Operator (staring directly at the plant manager and president):"I sure hope so".

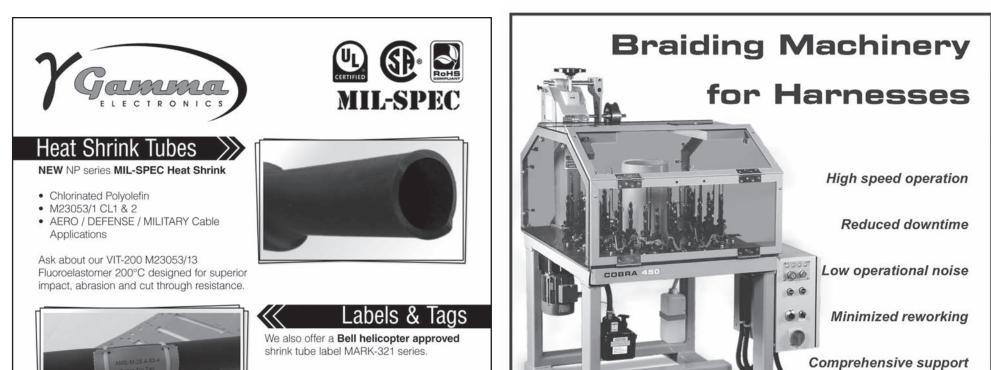
In this case, the information is that they average 4000 pieces a day, but sometimes can get 4100 or 4200, and if everything goes really well, they can get 4400. The knowledge we gained in that dialog was that a) the operators have a lot of pride, b) their pride influences their daily performance, and c) it's important for them to know that their bosses know (and appreciate) when they had a good day.

Knowledge is information and experience, and experience comes from people. The systems that are deployed in our factories today are still information systems, but what we really need them to be is knowledge systems. It needs to inform not just some of our people (i.e. managers, maintenance and CI people etc), it needs to inform all the people (operators, assemblers, everyone). And more than that, it needs to engage people so that their experience matters and is valued, because when it comes right down to it, it's what they do every day that actually creates the value that results in revenue. It's not the managers or accountants or CI teams, it's the folks on the floor.

In our manufacturing world, IT still follows the old paradigm; we use it to help us manage our businesses, to help design our products, and perhaps as part of the products we build. Outside of the manufacturing environment however, the mandate of IT has expanded to "Create value. Connect people".

The most significant continuous improvement we can make in our factories today is to start thinking more about knowledge and less about information, and remembering that knowledge comes from our people. Let's change our information technology into knowledge technology by using it to better to connect our people, and add more value.

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





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On Meetings and Productivity

Continued from page 1

default stalling tactic. Instead of making a decision when a problem arises, decisions are often deferred to the Monday staff meeting, or the weekly production meeting. This deferment creates organizational lethargy and often results in a watered down, overly collaborated decisions that lack boldness, and only serves to kick the can down the road.

Meetings have devolved from a tool to communicate, to a purpose in and of themselves, Pittampalli contends. We have institutionalized them and made them their own function. We meet because it's Monday. We meet because we feel we should meet, and this causes a great disconnect. Because there is a disconnect, we don't see the meeting as a tool like email or memos.A perverse incentive is created where people hold meetings without questioning why they are there. He jokingly refers to them as "weapons of mass interruption."

So how do we fix this? Mr. Pittampalli suggests we should just stop having so many bad meetings. It sounds trivial, but he routinely consults with organizations and persuades them to do just that. He implores them to start by just calling off a routinely scheduled meeting for three weeks. If the world ends and the team is in a shambles, they can bring the meeting back. Individuals working at these companies didn't realize they were working in a culture plagued by meetings that lacked purpose, energy, and brevity.

What his clients find more often than not is that the world doesn't end, and more work gets done. In fact, when important decisions need to be made, they aren't held off to the next meeting. Instead they are made boldly at their point of origin with a quick consultation by those directly involved. And instead of using a meeting to disseminate information and decisions, organizations make better use of email, audio and video messaging to communicate. These types of asynchronous communication tools are much better suited for status updates than assembling people in real time.

When you cancel the meeting, as Mr. Pittampalli suggests, something very powerful happens. It forces an organization to ask the question "why." You can't have the meeting back just because it's Monday. There now has to be a purpose in interrupting everyone's schedule. The meeting now has to be seen as a tool and not a function. Pittampalli contends that when we return the meeting to its status as a tool, they become much more effective and rare.

We all need uninterrupted space in our routine to do the work that matters. Once you engage in the practice of concentrating on the purpose of meetings, you can begin to weed out the bad ones. Those few that remain will be purposeful, intense, and short.



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Wotko Cable and Harness Assembly

Continued from page 1 _

more readily if Coon and Brunotte acquire another harness manufacturer. "We looked at a company that has infrastructure, but they chose a different path, and there was no sale," Coon said. "We're still looking to buy a company."

After starting in Coon's residence, Wotko operates from a leased 2,000-square-foot facility in a Rochester industrial park. Room is available for expansion. The location is advantageous for serving automotive, government and military OEMs and tier 1 and tier 2 companies, Coon pointed out. The manufacturing process includes Tyco, Komax and KM USA machines cutting and crimping wire and connectors. Assorted hand tools are used, too. Electronic equipment and customer-supplied fixtures test for quality, which has been exceptional, aided by first article and customer samples.

Lead times average 3-4 weeks, but "we can usually beat that," Coon said. "It is based on how soon supplies come in, so it ebbs and flows. We haven't had any problems yet."

Among the suppliers are Tyco, Molex, Avnet, Arrow, Digikey, Allied Wire and other major suppliers. "We're pleased with our suppliers on price and delivery," Coon said. "Everyone has been real cooperative, and that makes our relationships enjoyable."

Obtaining components and filling orders quickly have gained Wotko favor with companies that have had work done offshore. "We got one job for a medical device because our lead time is four weeks better than outside the United States," Coon said. "We're aware of other countries with cheaper labor, but our goal is creating jobs and positive relationships with other entities so capitalism is not so stressful.

"In the United States our niche is more complex manufacturing and higher quality," Coon said. "That's

what will bring back U.S. manufacturing, and with Wotko I'm glad to be part of that."

The processes and other aspects of Wotko will operations be improved when the company earns ISO certification, first for automotive and then for military. The quality management systems segment of the certification process should be finished in late September or early October, Coon stated, adding that "then we'll be able to get contracts for bigger work."

Products include wiring for a meat thermometer, police cars, an automotive oxygen sensor and a medical box build (which is three feet long and has 30 pages of work instructions). Runs range between 150 for a water-sealed connector with four wires to 1,500 for a complex harness.

One tentative 2016 contract is a box build with lead wires for a medical equipment company that supplies hospitals. Wotko already has made products for the firm. Winning the contract would support further Wotko growth, Coon stated.

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"We're working on other things, too," Coon said. "We don't want to grow too fast. We're being very patient, and we don't want to get in a hurry."

Coon's business plan has projections for five, seven and 10 years. He emphasized the plan is "a living document that is very fluid. We have made

__Continued on page 12

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Wotko Cable and Harness Assembly

Continued from page 10

many changes to it to meet our needs and as we are meeting our goals."

The Wotko name (pronounced "wood-co") is Native American and comes from the word in the language used by the Seminole Nation of Oklahoma that means raccoon. Its shortened version of coon matches Coon's last name.

Coon is half Native American and belongs to the Oklahoma tribe. His father is a full-blooded Native American and a member of the same tribe.

At 51 percent, Coon is the majority owner, and Brunotte owns the other 49 percent. Therefore, Wotko qualifies as a minority business enterprise through the Michigan Minority Supplier Development Council in Detroit.

The organization provides Wotko with technology programs, consulting, supplier databases, introductions to corporations and access to buyers. The U.S. Small Business Administration could offer similar features to Wotko if Coon and Brunotte become involved in its 8(a) Business Development Program.

Coon also is a veteran with a disability related to his hearing. He served in the U.S. Marine Corps in the early 1990s as a member of Force Reconnaissance, which consists of special operations teams that provide commanders with military intelligence, often gathered behind enemy lines.

Training for Force Reconnaissance was "a very rigorous indoctrination that was very intense," Coon said. "You build a phenomenal mindset by going through it." Coon served in Kuwait, Iraq, Somalia, Australia, Hawaii, Okinawa and California.

Coon, who grew up in Rochester, returned to the city after his military service. He received a bachelor's degree in business with a finance emphasis in 2001 from Wayne State University in Detroit and intended to be a stockbroker, but that did not materialize.

A chance meeting in 2012 on

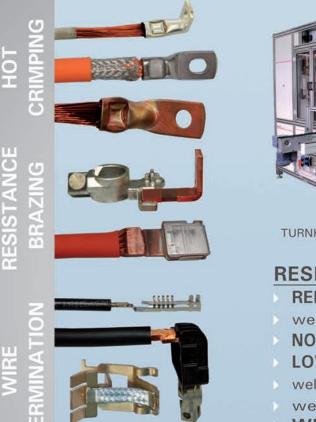
the golf course at Oakland University in Rochester between Coon and Brunotte led to a good friendship due to their mutual interests in golfing, jogging and riding their Harley-Davidsons. They eventually started Wotko, which they financed themselves.

After receiving a bachelor's degree in business in 1988 from Wright State University in Dayton, Ohio, Brunotte first worked three years for Circuit Center in Dayton as the outside sales manager. He next was the national sales manager for almost two years for Design Linc and Electro Linc in Troy, Mich.

For the next 5½ years Brunotte owned Siber Sales that provided manufacturers representatives to several companies. He founded B2 Sales in Rochester in January 2000 and continues to operate it in addition to his Wotko involvement. B2 primarily sells automated optical inspection equipment to printed circuit board man-



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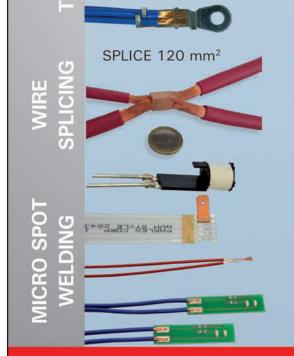
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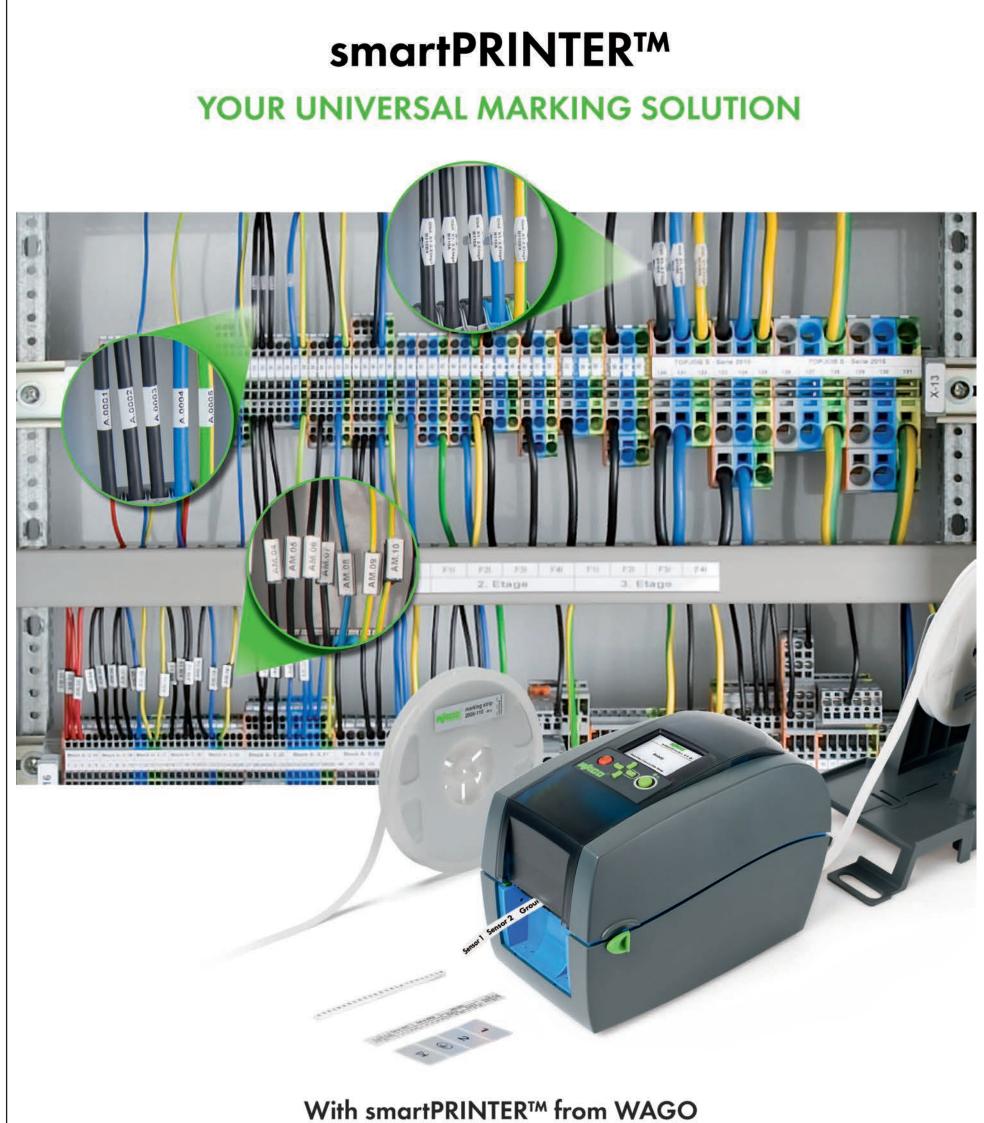
39 Scenic View Dr. | Deep River, CT 06417 Phone: +1 860 227 0683 | Fax: +1 860 526 9296 info@strunk.de | www.strunk-connect.com ufacturers.

Brunotte's other experience was ownership of a printed circuit board company in Markham, Ontario, and serving as national sales manager in 2006-12. The firm, which was sold, still is operating and supplies PCBs for prototypes and production.

Brunotte became directly involved with harness production in 2007. Extension cables were needed by one of his B2 customers, Kuchera Defense

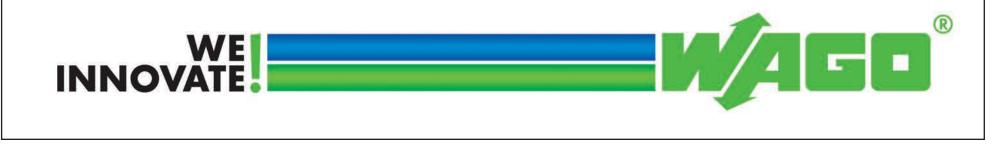
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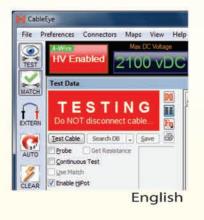
If you need reliable, fast diagnostic tools to find intermittent connections, locate shorts, opens, or miswires, our live graphic wiring display makes this a snap.

If you want to automate a test procedure to ensure consistency, our built-in scripting with operator prompts does the job.

If you need to protect your stored cable data from inadvertent erasure or tampering, set each operator's log-in privilege as needed.

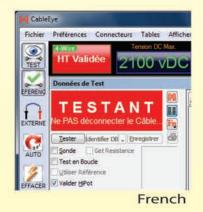
If you need to integrate your testers in an automation environment, we can provide a LabView interface, an API, and import/export tools.

If you insist on reliable hardware and rock-solid support, we insist on that too. Here's what others have to say:











Wotko Cable and **Harness Assembly**

Continued from page 12 _

Systems in Windber, Pa. (The company subsequently has been purchased by API Technologies in Delaware.) The cables were for lighting on U.S. military vehicles known as MRAPs, which stands for mine-resistant, ambush-protected.

The cables were supposed to be produced by another B2 customer. When that arrangement did not pan out, Brunotte and a partner set up operations and kept 15 people employed for the two-year contract.

"I'm lucky to be with him. I'm learn-

ing quite a lot," Coon said. "He has a great deal of understanding processes, knowledge and information, and he can take something all the way from conception."

Similarly, Coon is finding satisfaction in facing the challenges of operating Wotko and fostering its growth."I enjoy doing the work and the challenges of thinking strategically," he said. "I like being creative, letting my mind wander and coming up with solutions."

For more information, call 248-854-8634, e-mail info@wotkollc.com, visit www.wotkollc.com, or write P.O. Box 82580, Rochester, MI 48308.



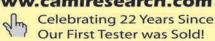


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NEWS PLUGS continued



Zuken USA Names Kent McLeroth as New President and CEO

Zuken Americas announces the appointment of Kent McLeroth to the position of Chief Executive Officer. McLeroth joined Zuken USA in 1995 and most recently held the position of Vice President of Systems Engineering.

Jinya Katsube, Zuken COO and Representative Director, said: "Kent is a 25 year EDA industry veteran with extensive design and Product Lifecycle Management (PLM) expertise. He brings technical acumen and strong core values to this leader-

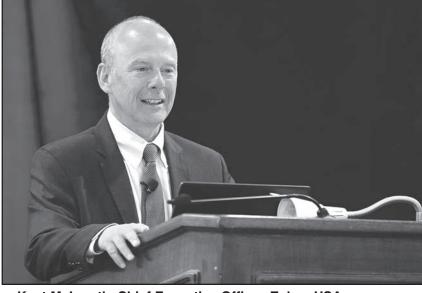
ship role. I am excited to be working with Kent as we take the Americas business to the next level."

McLeroth commented: "I first became associated with Zuken as a customer, designing hardware for a major defense contractor, and have always been impressed with Zuken and their continuous innovation and technology leadership."

He continued: "That leadership continues today with a product-centric design suite that is unprecedented. In virtually every industry - from transportation to aerospace to consumer electronics, today's integrated products demand an integrated design approach and Zuken is already delivering. It is a privilege and an honor to lead our operations in the Americas as we continue our growth and technology leadership."

McLeroth is based in the Zuken Americas headquarters in Westford, MA.

Zuken is a global provider of leading-edge software and consulting



Kent McLeroth, Chief Executive Officer, Zuken USA

cess. Coming from a wide range of industry sectors, specializing in many different disciplines and advanced technologies, Zuken's people relate to and understand each company's unique requirements. For more information about the company and its products, visit www.zuken.com.

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SDE STANDARD DIE ENVELOPE CRIMP TOOLING



services for electrical and electronic design and manufacturing. Founded in 1976, Zuken has the longest track record of technological innovation and financial stability in the electronic design automation (EDA) software industry. The company's extensive experience, technological expertise and agility, combine to create world-class software solutions.

Zuken is focused on being a long-term innovation and growth partner. The security of choosing Zuken is further reinforced by the company's people—the foundation of Zuken's suc-

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Mando Can Do.



When Armando Zacarias goes out on a Eubanks service call, unusual things happen.

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

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

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

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

"Can't be done" is not in Mando's vocabulary-either English or Spanish. On his own initiative, he solves problems, leads training classes, helps boost plant

efficiencies, and makes lasting friendships while doing it.

Mando exemplifies the Eubanks



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AFTER THE SALE

By Loren Smith

Tim often asked by owners of wire harness companies who are considering selling their companies what life is like after the sale. Obviously, I can't give them a one-size-fits-all answer, so I generally start to counsel them by asking, "Is your primary motive for selling liquidity or retirement?"

When liquidity is the goal, owners usually stay involved in the business. When it is retirement, owners typically remain on the scene just a short period. The following examples should shed some light on what life can be like after the sale.

Retirement

"Alfred," at 74, decided to sell the harness business he had started 40 years ago. He had been considering selling for several years, and he now felt that his age made retirement necessary.

Because Alfred hired an intermediary to manage the process for him, he found himself in the fortunate position of having several worthwhile buyers with little difference among them in price and terms. So Alfred based his decision mainly on his--and his advisors'--assessment of which prospective acquirer would most likely treat his employees and customers with the same respect he always had.



Loren M. Smith, CEO Blue Valley Capital

It has now been five years since Alfred sold his company. After a sixmonth transition, he moved to a warm climate and is happily retired. All of his principal employees are still with the company, and he has been pleased to see the new owners take his company to a next level of growth.

Continued involvement 1

"Tom," a 45-year-old founder, sold because he wanted capital to expand and he wanted liquidity. He did not like the feeling of having all of his net worth tied up in his business.

Continued on page 19

- *** **FOR SALE** ***
- 1 ARTOS MTX10 Multi-Task Wire Processor
- 1 **ARTOS** CS336 Wire Processor
- 1 ARTOS CS326A Cut and Strip Machine w/ PF6 Prefeed
- 1 ARTOS CS326 Cut & Strip Machine, CD11 Coiling Bowls, w/ Prefeed
- 1 ARTOS CS29 Cut & Strip Machine, #42774A
- 2 **ARTOS** CS26A Cut and Strip Machines
- 1 ARTOS CS7 Cut and Strip Machine
- 1 ARTOS PF3 Prefeed
- 1 **ATS** Crimp Press, Series T3000, with Applicator
- 1 AUTOJECTOR HCS70 Injection Molding Machine
- 1 BRADY 'WRAPTOR', approx., 2014
- 3 CARPENTER Model 70B Strippers
- 1 COBRA 450 36-Carrier Harness Braider, approx. 2011
- 1 EUBANKS 4000-04 Tandem Cut and Strip Machine, #890-151, w/extra Blade Sets
- 30 FEINTECHNIK RITTMEYER Pneumatic Strippers, Type AM.STRIP.015
- 1 IDEAL Model STP Stripper, Part #45-930, Serial #4593001204, cycle count 21681
- 1 IDEAL 'Stripmaster' Model 940 Wire Stripper, Part #45-940
- 1 IMAJE Jaime 1000 S8 SI Ink Jet Printer, 2004
- 1 KENCO 5T Press
- 1 KINGSLEY Model KIP-20 Hot Stamp Marker w/11 Identification Discs
- 2 KODERA Model C566 Processing Machines
- KOMAX Gamma 333PC w/2 MCI711 Crimp Presses; 2 OMI Crimp Force Monitors, approx. 2.5m cycles, 2007
- 1 KOMAX Gamma 333PC w/2 MCI711 Crimp Presses, 201AE Wire Marker, Tinning Station, Updated in 2008
- 1 MECHTRIX Model MPF-35 Prefeeder
- 1 METRONIC Alpha Jet C Inkjet Printer, currently set up for black ink, approx. 2006/07
- 1 MORGAN Injection Molding Machine, Model G-100T
- 5 MORGAN Injection Molding Machines, Model G-125T
- 1 NEW ENGLAND BUTT 72-Carrier Braider (flat strap capability)
- 1 NOVEXX I.D. Tube Printer, Model TMS 2000Plus
- 1 SCHLEUNIGER CC36 CrimpCenter, 2010, w/MECHTRIX MPF-35 Prefeed
- 2 SCHLEUNIGER CP1500 Heavy Duty Coilers
- 1 SCHLEUNIGER CS9100 Cut/Strip Machine with a PF2000 Prefeed
- 2 SCHLEUNIGER CT32 Crimp Presses, one New 2008
- 1 SCHLEUNIGER ES9320 EcoStrip Cut/Strip, 2006
- 1 SCHLEUNIGER HS4140 Hot Stamper
- 1 SCHLEUNIGER OmniStrip 9450 Automatic Cut and Strip Machine w/PF2000 Prefeed
- 1 SCHLEUNIGER PF3000 Prefeed w/Dancer
- 1 SCHLEUNIGER PF2000 Prefeed
- 1 SCHLEUNIGER PF1100 Prefeed
- 1 SCHLEUNIGER PT26 Pull Tester
- 1 SCHLEUNIGER US2100 Bench Stripper
- 2 SCHLEUNIGER Uni-A Applicators
 - App #2 Tool 700.337.001/002 (Terminal #AMP 770901-1 and 770902-1)
 App #3 Tool 700.337.001/001 (Terminal #AMP 770901 and 770902)
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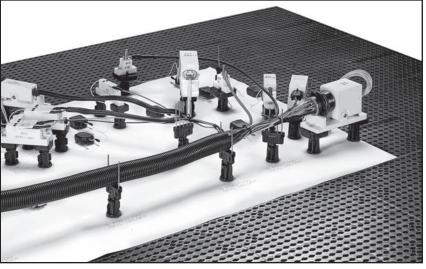
NEWS PLUGS continued



Panduit Quick-Build™ Harness Board System

Panduit Corp., a leading global provider of wire management solutions for wire harness builders, launched today the patent-pending Quick-Build™ Harness Board System. The Quick-Build™ System is a revolutionary modular, expandable solution comprised of 1' X 1' (305mm x 305mm) reusable grid tiles with specially shaped holes that accept repositionable accessories to improve the productivity of wire harness build time by up to 18% compared to plywood board and nail method.

The specially designed Quick-Build™ mounting pegs lock into the



grid tiles with just a twist. Used along with the Quick-Build™ mounting platforms and nail holders, which accept Panduit conventional wire harness layout accessories and industry-standard testing fixtures, these components create a modular harness board system.

"Low-Volume-High-Mix (LVHM) manufacturers achieve the greatest savings due to reduced material costs -- up to 65% of layout and board builds," according to Bob Krisel, Vice President of Panduit OEM Solutions. "By reducing the number of bulky plywood boards, the Quick-Build™ Harness Board System delivers more than 50% in storage space savings."

APPLICATORS / CRIMPING PRESSES / TOOLING



Mini Left to Right



Mini (2 Post) Air Left to Right



Heavy Duty Slide



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Med. Duty Air End Feed Quick Change Tool Pack



Med. Duty Slide Quick Change Tool Pack ild[™] Harness Board System delivs more than 50% in storage space vings." The Quick-Build[™] System elevates harness routing above the grid tiles, allowing wire harness manufacturers to use the Panduit Automatic Cable Tie Installation Tool (PAT). The PAT System is six times faster than conventional cable tig

than conventional cable tie installation systems, which can further improve productivity. Whether the need is to build a variety of wire and

build a variety of wire and cable assemblies to meet different customer specifications or for prototyping new harness designs, the more harnesses built with the Quick-Build™ System, the more wire harness manufacturers' profitability increases by:

• Improving storage efficiency and reducing costly square footage from storing plywood harness boards not in use

• Reducing labor needed to retrieve and store plywood harness boards

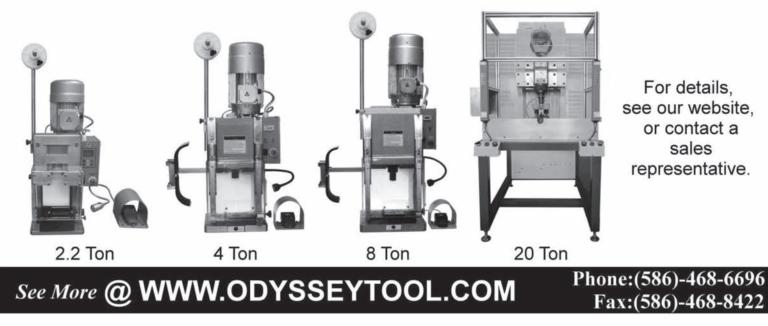
• Decreasing setup time as compared to the plywood board and nail method

• Reducing repetitive work and improving safety from use of hammer and nails

• Reusing existing Panduit harness board accessories to

Quick Change Tool Pack

NEW ODYSSEY CRIMPING PRESSES



create a modular system

• Decreasing capital expense by reducing the number of harness board accessories and test fixtures stored with plywood boards

For more information, visit www.panduit.com/QB

Panduit OEM Solutions When you harness the ingenuity of Panduit, you tap into a 60-year legacy of leadership in wire management that helps OEMs and contract manufacturers organize, connect, and protect electrical wire and cable systems for optimum performance and lowest total cost of ownership.

For more information visit www.panduit.com/ OEM

AFTER THE SALE

Continued from page 17 _

Tom loved selling and customer interaction in general, but he had discovered that many of the duties associated with being a CEO were not to his liking. As a result, when Tom sold his business to a competitor, he elected to move into a sales capacity.

In the years since his sale, Tom has been very happy calling on old and new customers. He does not miss the CEO role at all--a slot now filled by an individual the buyer moved into that slot. Tom feels fulfilled focusing on sales, and he has been able to help expand the company.

Continued involvement 2

Now it's my turn. When I sold my company to a private equity firm, I kept a minority share and stayed involved for the five years we owned the company together. Going from sole shareholder to minority shareholder was a real adjustment, but the change had its pluses. Most important was stress reduction, especially whenever our company hit an inevitable rough patch. Having extracted most of my company's value with the sale, I found sleepless nights to be a thing of the past.

Another adjustment was preparing for and participating in quarterly board meetings, now that I was part of a new

corporate structure. After 20 years of not needing to report results against a plan, this was new for me, but it was much more engaging than burdensome.

Overall, I was very fortunate. The private equity partner kept my management team in place and did not attempt to play a day-to-day role in the company.

Another major change for me was growing by acquiring other wire harness companies, a strategy our private equity partner wanted us to pursue. They provided us with the capital to make a number of acquisitions, enabling us to drive our revenue from \$23m to \$85m.

All of our acquisitions were deals I brought to the table, but without the capital infusion they would never have been possible. I found the acquisition activity extremely rewarding--so much so that I have continued to this day to do M&A work.

Over the years I have been party to a great many transactions. Although I can't say that sellers wind up happy 100 percent of the time, I have found that when an owner thinks through what he or she wants after the sale and focuses on that objective, in the vast majority of instances the outcome is a good one.

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





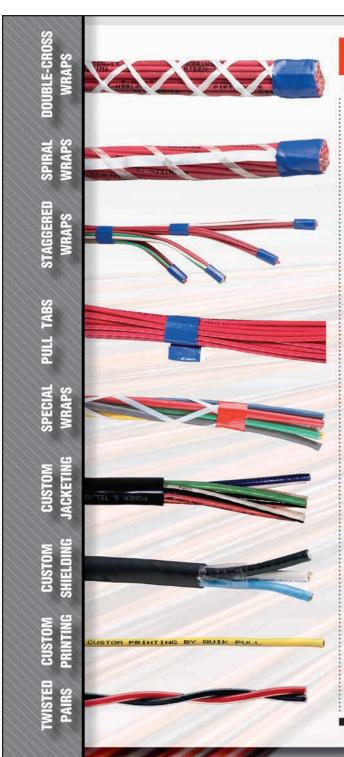
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Improve Crimp Quality to Increase Productivity

By Pete Doyon VP, Product Management Schleuniger, Inc.

high quality crimp termination will usually exceed the service life of the product in which it is installed. On the other hand, a marginal quality crimp termination can cause electrical failures early in a product's life. Since a high percentage of product failures can be traced to poor electrical connections, crimp quality is of paramount importance. There are many factors that come into play that affect crimp quality. Knowing the relevant factors, and to what extent each factor affects the end result, will help to guide the process engineer towards achieving the best possible results.

The best place to begin the journey to improving crimp quality is to review the wire and terminal combination. The terminals must be made from quality materials and have very tight tolerances. Variation in material stock thickness will

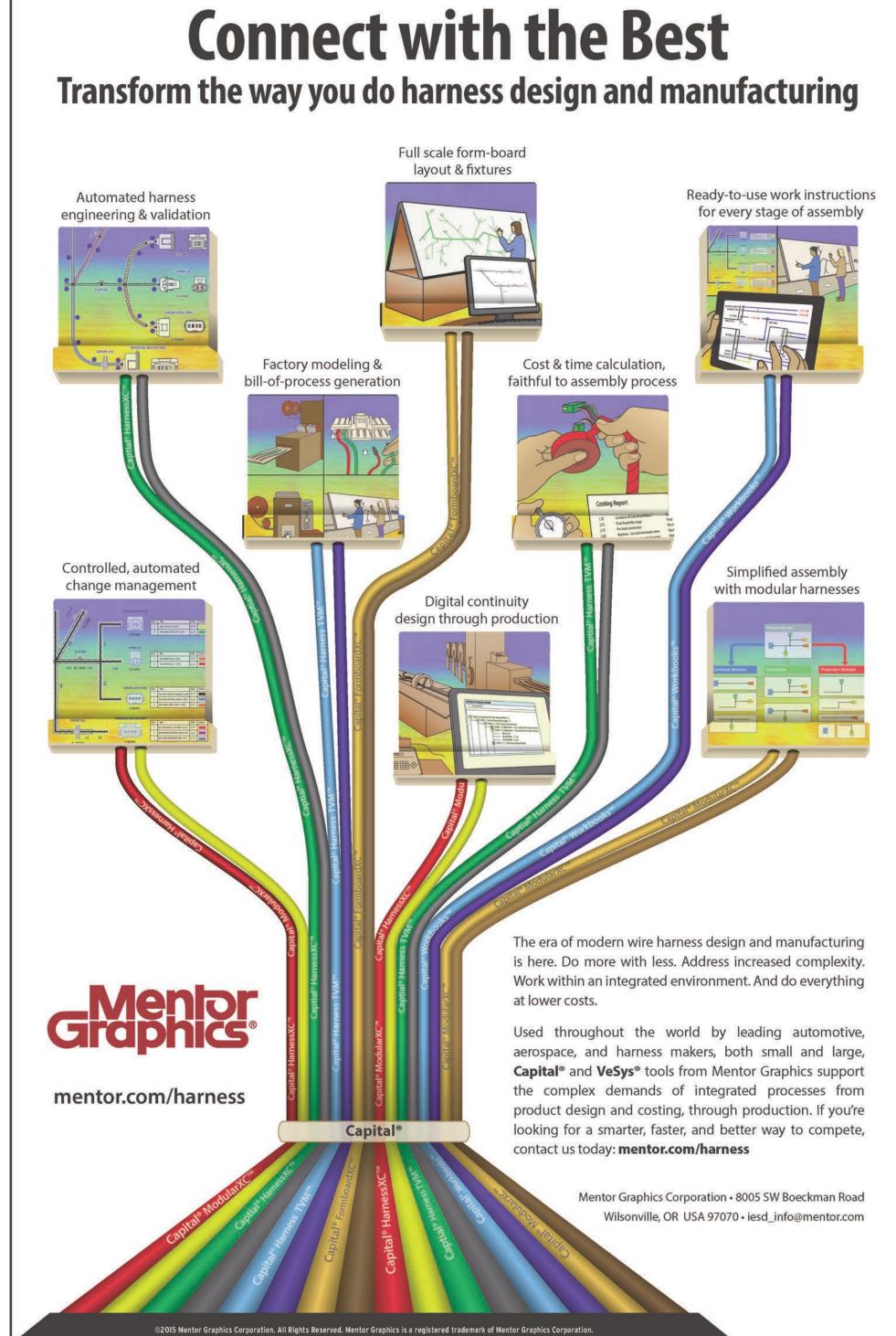
Continued on page 23



The Schleuniger CrimpCenter 36 S fully automatic crimping machine.







Improve Crimp Quality to Increase Productivity

Continued from page 21 _

cause variation that makes it more difficult to monitor the in-process crimp quality. Some terminals are rated to handle three or four wire sizes. Usually these terminals work well for the middle wire sizes, but the results are marginal for wire sizes at either end of the spectrum. For example, crimping a 24 AWG wire in a terminal rated for 20 to 24 AWG might not work as well as crimping a 24 AWG wire in a terminal rated for 24 - 28 AWG. Handling terminal reels gently to prevent the terminals from getting bent will go a long way in improving how well the terminal is positioned over the anvil before crimping.

To obtain consistent high quality results, you need a crimping press that provides a repeatable shut height under load and has a con-

sistent crimping speed. These are fundamental criteria that should be held constant as to not add any variation to the crimping process.

The crimp applicator tooling must provide a crimp that meets the manufacturer's specifications for crimp height and crimp width. Check the crimp height and perform a pull test to determine if the crimped wire and terminal combination are within the terminal manufacturer's specification.

Going one step further, a crimp micrograph is the best way to analyze what's going on inside of the crimp barrel. It allows you to see voids due to under compression, count strands, check symmetry, and take several other measurements that determine whether a crimped termination is acceptable or not. More and more OEM's require crimp micrographs (in addition to crimp height and pull tests) to verify and document these additional parameters. Once you've checked crimp height, performed a pull test and a micrograph, actual production can begin. The only way to monitor in-process quality is to use a crimp force monitor (CFM) to monitor the crimp force of each and every crimp. There are many factors that affect successful implementation of crimp force monitors, but that is beyond the scope of this article. I will mention that applicator and press quality play a huge role in CFM reliability and effectiveness.An applicator and/or press that is in poor condition will

introduce variation (noise) that the CFM will see and will reduce its ability to detect a good vs. bad crimp. The best way to ensure that your CFM has the best chance for success is to implement a regular maintenance plan for your crimping presses and applicators.

So how can improving crimp quality increase productivity, you ask? The short answer is that by addressing all of the factors that can reduce crimp quality up front, there will be fewer defective crimps produced. In a fully automated machine, the CFM will detect whether a crimp is out of tolerance. If so, the machine will cut the crimped terminal off of the wire and eject the defective wire into the collection tray. This is done so operators cannot mix bad product with good product. The machine will make a new wire assembly to replace the defective one. This time and material spent for producing defective wire assemblies is a complete loss.

There is a cost for good crimping quality and it requires an investment in high quality equipment and tooling as well as an ongoing preventive maintenance program. By building quality into the process and doing things right the first time, rejects and rework are reduced and productivity is greatly increased. In almost all cases, the return on investment for good quality is very short and the dividends continue paying out indefinitely.



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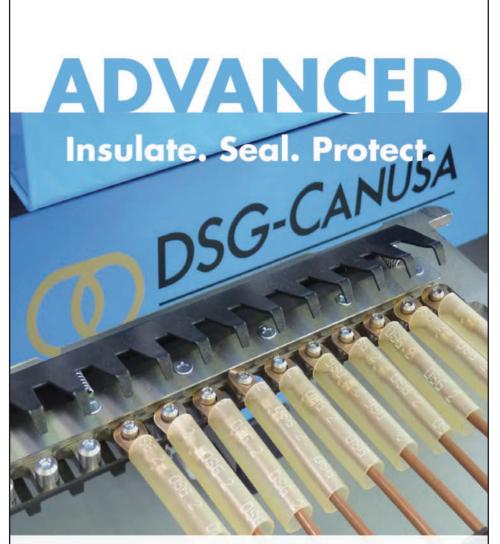
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NEWS PLUGS continued



Fairview Microwave Releases New Coaxial High Power RF, Microwave and Millimeter Wave Limiters

Fairview Microwave Inc., a supplier of on-demand microwave and RF components, introduces a new family of broadband, high power limiters that aid in protecting sensitive RF receivers and components such as LNAs that are in close proximity to high power signals.

The new high power limiters from Fairview Microwave operate over broad frequencies ranging from 0.5 GHz to 40 GHz depending on the model. This release contains seven limiter designs featuring limiting thresholds between 3 to 10 dBm and low leakage power of 10 to 15 dBm. Fairview's new selection of coaxial limiters exhibits high CW power handling up to 200 Watts peak power and fast recovery times of 10 to 100 nanoseconds

Fairview Microwave's new high power, broadband limiters are constructed with high-rel, ruggedized packages that are designed to meet MIL-STD-202 environmental conditions for humidity, shock, vibration, altitude and temperature cycle. These components are also guaranteed to operate over temperature ranges from -54° C to +85° C. The 50 Ohm hybrid designs utilize limiting diode circuitry and do not require any external matching components.

"Our new portfolio of high power RF limiters provides designers and engineers



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the components needed to protect their sensitive RF receiver components from high power signals that could result in irreparable damage to the system," says Brian McCutcheon, Vice President and General Manager at Fairview Microwave. "These high power limiters offer industry-leading performance and are well suited for applications such as electronic warfare, instrumentation, fiber optic communication systems, radar, SAT-COM, point-to-point radio, telecom and R&D.

Fairview's new selection of high power coaxial limiters are now instock and available to ship today. You can view this line of new products by visiting http://www. fairviewmicrowave.com/rf-products/ broadband-high-power-coaxial-limiters.html. Fairview Microwave can be contacted at +1-972-649-6678.

Minnesota Wire Achieves AS9100 Aerospace Certification For Leading-Edge Wire And Cable Assemblies

Minnesota Wire is pleased to announce that its St. Paul headquarters and R&D facility is now AS9100 Certified, which means that a comprehensive effort has verified that the management system is present to develop, design and manufacture wire and cable for aerospace applications. Achieving this certification allows the company to produce and sell specialized custom wire and cable products that meet demanding requirements of the aviation, space and defense industries.

"We've been introducing innovative new products to the cable industry for a decade now," said Minnesota Wire CEO Paul J. Wagner. "So this is just the next step for us, as our customers are eager for standardized manufacturing of products that no one else does, like our iStealth® and iStretch® cables."

(T)

confident that as a result of this certification process, Minnesota Wire is capable of meeting the high-level demands of the aerospace industry," said Mark Thesenvitz, Minnesota Wire Quality Assurance Manager.

Minnesota Wire is a vertically integrated, custom manufacturing and development house of wire, cable and interconnect assemblies for the Medical, Defense, Instrumentation and Telecommunications industries. The company is a market and R&D leader in: electrical signal integrity, mitigating triboelectric effects, radiotranslucent wire and innovative connections for wearable electronics, patient monitoring systems and leading-edge medical devices.

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The 30,000 square foot headquarters in St. Paul, Minnesota boasts a full R&D and test and measurement center, an Electromagnetic Capabilities (EMC) chamber for electronic pre-compliance testing and a "wet lab" for its nanotechnology applications. Another high-volume, 58,000 square foot focused-cell, lean production facility is located in Eau Claire,

Wisconsin. MW is ISO 9001: 2008 certified, ISO 13485: 2003 compliant, ROHS compliant, and is a MIL-STD and IPC-620 certified harness manufacturer. For further information contact Minnesota Wire, 1835 Energy Park Dr, Saint Paul, MN 55108 Phone (651) 642-1800. Visit www.mnwire.com



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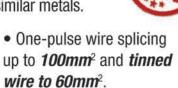
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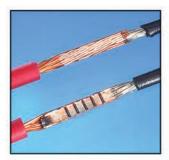




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"The process of obtaining this certification was quite involved," said Eric Wagner, Minnesota Wire President. "We appreciate the commitment to excellence that our employees exhibited during this effort.

The operating standards that resulted will also greatly benefit our core business producing custom products for the medical and defense industries."

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NEWS PLUGS continued



Sonobond's Ultrasonic Tube Drawing System Reduces Friction, Significantly Improving Internal Surface Finish

By employing high-frequency vibrations to create a continuous cycle of increasing and decreasing pressure between tooling and work piece, Sonobond's equipment reduces frictional forces and increases the plasticity of the metal being drawn. The result is a fine metal tube suitable for medical devices and other tubing products used to transport critical fluids.

Sonobond's ultrasonic tube drawing components include a power supply, transducer, tapered coupler, back support rod, and die or plug. The power supply converts line power to high-voltage, highfrequency electrical power needed to drive the transducer, which is attached to a coupler at the back end of the back support rod and mounted on a carriage on the draw bench.

The transducer converts electrical energy to vibratory energy. Waveguides or components – typically a tapered coupler and back support rod – are designed to resonate at the frequency of operation of the power supply and transducer. They carry the vibratory energy from the transducer to the die or plug, held by the back support rod. Sonobond's system reduces draw force by as much as 35 percent, permitting heavier reductions and decreasing the number of draws needed for a finished product. Additionally, ultrasonic tube drawing eliminates sticking and slipping, also known as "chatter." There's less breakage and product loss, especially at startup when frictional forces are highest. Draw speed can be increased as much as 400 percent. Most significantly, surface finish on tube ID can be improved to RMS (Root Mean Square) values of 8 or better micro-inches.

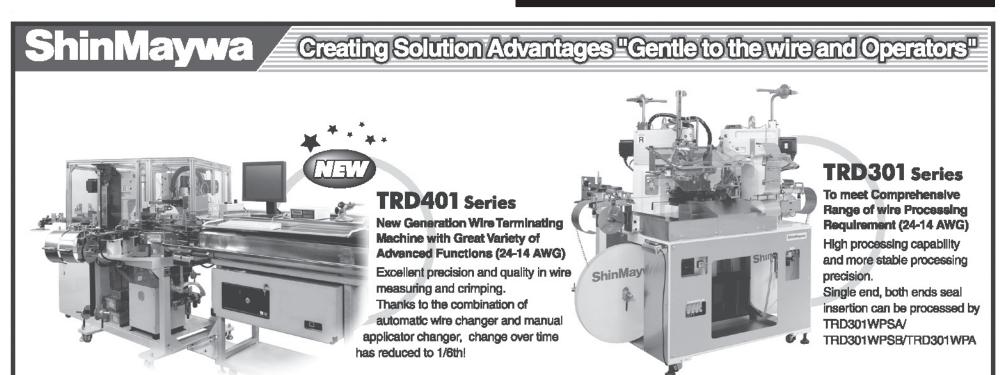
Because of its ability to achieve fine internal dimension finish, Sonobond's ultrasonic tube drawing components especially benefit manufacturers of tubing for a variety of medical applications including: syringe needles and other sharps; implantable device components; in vitro diagnostic probes; catheter and guidewire bands; micro-surgical tools; stents; and heat-exchanger tubes for controlling blood temperature during surgery.

Sonobond Ultrasonics can evaluate your current tube drawing operations, recommend components, or design complete systems to complement existing or new drawbenches. We offer ongoing customer service from initial inquiry through installation and implementation.

For immediate assistance and information on ultrasonic tube drawing, please call 800-323-1269, 610-696-4710, or email jdevine@SonobondUltasonics.com. For information about our other products and services, please visit www.SonobondUltrasonics.com.



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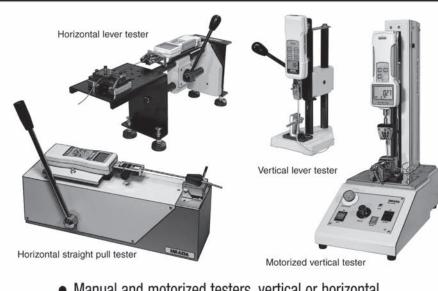
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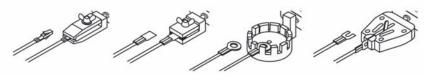
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Is that smoke? **Short Circuit Testing for Automotive Systems and Harness Design**

By Mike Stamper, **Mentor Graphics Corp**

rotecting vehicle wire harnesses from overloads that could be catastrophic is a critical design criterion. The designer must ensure that the fusing strategy protects the wiring. This process typically involves calculating the maximum load on each wire manually and then comparing the result to a spreadsheet that may have been created many years ago.

This process is very error prone due to its manual nature. You might find that alarming - and it is - but cars and planes are driving and flying just fine. There are several reasons that is so:

1. Circuits are over protected. Due to the manual nature of most design processes designers tend to err on the side of caution; this means wires that are larger than needed for the actual load. Over protection adds both cost and weight to the harness.

2. Physical testing. Very expensive physical prototypes are built and test engineers physically test the design to ensure the circuits are protected. This is costly both in time and money, and is often so late in the design process that changes resulting from this testing are very expensive to make.

3. Engineers and designers are smart. Many designs are simply carried over from year to year. History tells them what works and what doesn't - but we must ask the question: is this the most efficient way to design?

Analysis and Simulation

We often hear the words simulation and analysis when we are discussing circuit protection. While simulation has often been heralded as the savior of wire harness design it is rarely implemented, and if it is, it creates a huge bottleneck in the process. First a highly trained skilled simulation expert must create complex models, run their simulations and then analyze the results. The results are then fed back to the harness engineering team who then in turn must make decisions based on the often complex and difficult to understand graphs and results.

An important input that is always missing in doing simulation this way is the actual configuration of the vehicle. Not all loads are present in all vehicles. An example is a car where navigation is optional. Which simulation will be done - with navigation or without? Let's add an optional moon roof into the mix: now you have $2^2 = 4$ vehicle models to simulate. As you add in more optional con-

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tent you can see the number of simulation combinations climbs to 2^n where n= the number of options.

For a simulation and modelling expert who has expertise in the creation of motor models and wire models, the complexity of potentially billions of vehicle combinations is outside the scope of any simulation. Even if you could run that many simulations, there would be insufficient time to interpret all of the resulting simulation charts and graphs to make a meaningful design change prior to building vehicles in production. Design-to-manufacturing times are shrinking every year; there is no time to do simulation this way, which forces designers to choose wire and fuse sizes based on historical lookup tables in a spreadsheet or on paper. Assuming no manual mistakes are made, the designer usually ends up with an over protected design that increases cost and weight.

What can be done?

The solution to this dilemma is to harness the expertise these simulation experts have and empower every engineer to analyze their designs and provide fast and meaningful feedback. By capturing the criteria for wire and fuse sizing - your engineering intellectual property - we believe that your design tools should inform your engineers whether a problem exists or not. Analysis tools should analyze the vehicle and point the engineers directly to specific problems, and moreover, suggest solutions to those problems based on your engineering know-how. Staring at graphs and curves of detailed simulation runs for a handful of optional content is a long process and still subject to the interpretation of the data.

It's easy to get started, with the right tools

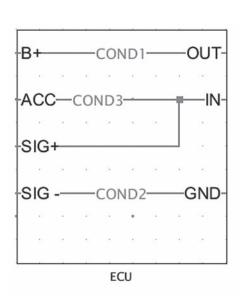
There is a cheaper and more accurate way to design. A step in the right 1. Accurate load information for devices that draw current, e.g.:

Motor Size (hp)	115 Volts	208 Volts	230 Volts
1/7	5 Amps	3 Amps	2.9 Amps

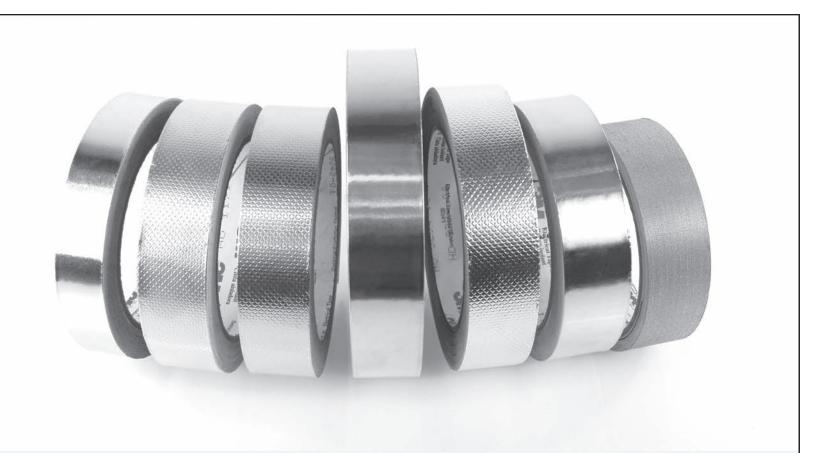
2. Current flow through electronic control units (ECU's):

a. We often hear that the inside of ECU's is proprietary and the task to model them is very daunting. When you focus on the task at hand – determine if your fuses protect your wires – modelling of the internal ECU connectivity is trivial with the right engineering tools. An example of all that might be needed is shown in figure 1 (hypothetical example).

Figure 1 (right): For fusing, a simple model can be used for the ECUs.



____Continued on page 31



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direction is to capture the design data in an electronic format that can be analyzed with software. With the right set of design tools, engineers and designers can implement rules to implement correct-by-construction design methodologies. Problems can be found early in the process, well before physical prototypes are built - perhaps eliminating the need for prototypes altogether.

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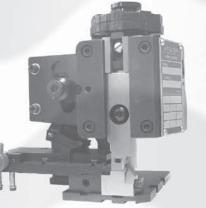
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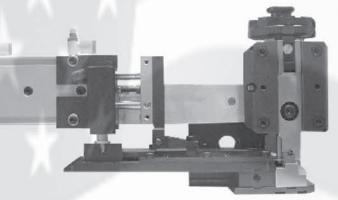




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Short Circuit Testing for Automotive **Systems and Harness Design**

Continued from page 29

3.A model of the architecture of the vehicle describing the location of the components and the relative temperatures of each area of the vehicle and the harness interconnect points, as shown in figure 2.

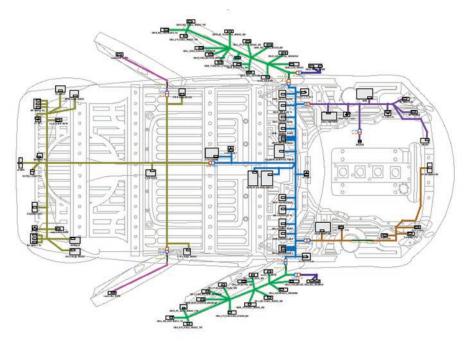


Figure 2: The location and temperature extremes for harness interconnect points must be modeled.

Accurate models for the battery, fuses, wires, and the basic discrete devices 4. found in your vehicle (lamps, motors, switches, grounds, relays, etc.)

Continued on page 45

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NEWS PLUGS continued



Qualtek Offers AC/DC Open Frame Power Supplies up to 200W

Qualtek, a leading manufacturer of power supplies, expanded its series of compact size, high efficiency, low cost AC/DC open frame power supplies to include 35, 45 and 200 watt versions. The three model families include: QPS-35 (35W power supply), QPS-45 (45W power supply) and QPSF-200 (200W power supply). The power supplies can accommodate a wide universal input voltage range of 90-264 Vac and the following DC output voltage options: 35W - 5, 12, 13.5, 15, 24, 36, 48; 45W - 5, 12, 24, 48 and 200W - 12, 24, 27, 48.

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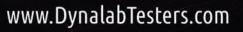


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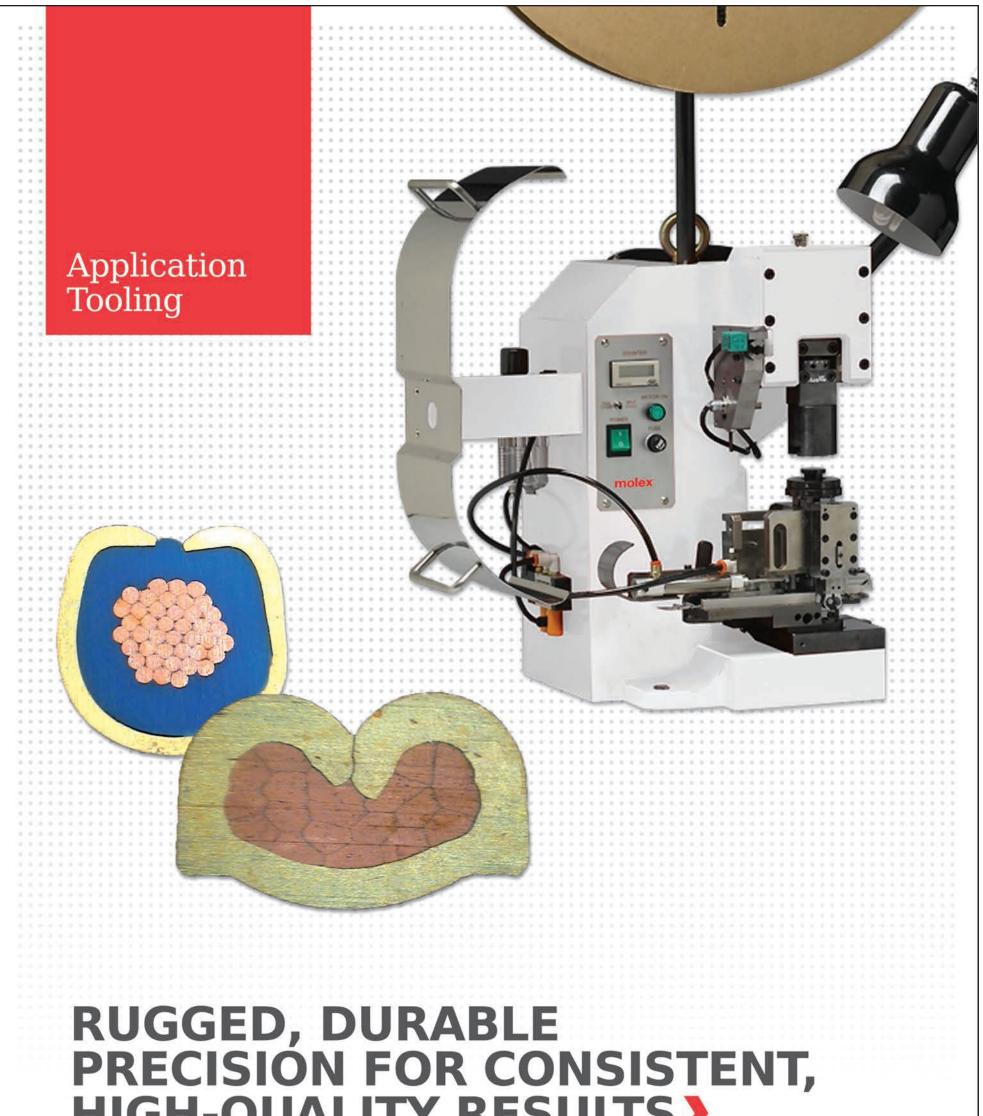
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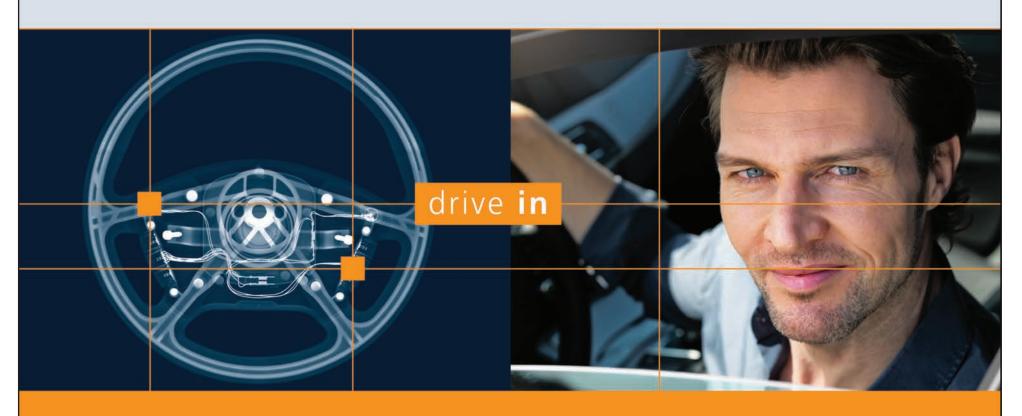
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NEWS PLUGS continued



Keith Sanducci Joins MicroCare, Will Manage West Coast Sales

MicroCare Corp. is very pleased to announce that Mr. Keith Sanducci has joined the MicroCare sales team as the Region Manager, West Coast. Keith is an experienced technical sales expert and has strong links to the MicroCare distribution network up and down the West Coast.

Keith was raised in Southern California and has lived in Orange County for 45 years. One of his earliest jobs, in 1989, was



Keith Sanducci, MicroCare West Coast Regional Manager

as an outside sales rep working for an industrial distributor in Southern California. He quickly earned a fine reputation where he served the burgeoning aerospace, defense, and manufacturing industries. Moving up in responsibilities, he managed a team of over seven outside salespeople for a major abrasives manufacturer. In 2006 he joined the sales team of WASSCO, a regional distributor of electronics production supplies where he first was introduced to the MicroCare products. Later he moved to the R. S. Hughes Company where he was equally successful with their products.

Keith is excited to be part of the Micro-Care family. His portfolio will include direct sales of certain MicroCare products, as well as the development of the distribution network for MicroCare and the Sticklers® line of fiber optic cleaners. He is looking forward to using the qualities, ethics, and skills that he has developed over the years to successfully present MicroCare to industry in California, Oregon, Washington, Idaho and British Columbia as MicroCare expands and grows across the region. He currently resides in the city of Irvine with his wife of 20 years.

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KOA Speer Receives Supplier Excellence Awards from TTI

KOA Speer Electronics, a leading supplier of passive electronic components, they have received TTI's 2014 Platinum, Diamond and Best Quality Awards for Supplier Excellence. The TTI Supplier Excellence Award Program represents the highest recognition possible of a suppli-

er's performance within TTI. The program is centered on quality measurements that include: on-time delivery, receiving quality, customerreported quality, administrative quality, operations and business systems.

2014 marks the fifth consecutive year KOA Speer has received the Diamond and Best Quality awards, which are awarded to the supplier with the overall highest point achievement, and to the supplier who scores the highest in each of the possible Quality categories. KOA Speer has been a Supplier Excellence Award recipient in 19 of 20 years that TTI has presented the awards. The Platinum Level Excellence Award is an honor that can only be achieved after superior performance for a minimum of 5 consecutive years.

Melanie Pizzey, TTI President Global Business Operations, stated "We are pleased to announce this year's Diamond Award and the Best Quality Award will be presented to KOA Speer Electronics for the fifth year in a row, acknowledging their distinguished performance in the Americas for 2014. KOA Speer has continued to demonstrate their dedication and commitment to excellence." 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 electronic manufacturers worldwide. Broader and deeper inventory, leading-edge products and custom supply chain solutions have established TTI as the leading specialist in electronic



TTI's Supplier Excellence Award

component distribution. Globally, the company maintains 1.2 million cubic feet of dedicated warehouse space containing over 850,000 component part numbers. Along with its subsidiaries, Mouser Electronics and Sager Electronics, TTI employs more than 4,600 employees and is represented in over 100 locations throughout North America, Europe and Asia. For more information about TTI, visit www.ttiinc.com.

KOA Corporation, whose global presence includes corporate headquarters in Japan, and sales locations in the USA, Germany, China and Singapore, offers a wide range of products which include thick and thin film resistors, current sensing resistors and resistor arrays; thermal sensors, fuses and varistors; wire wound, multilayer, power and thin film inductors; LTCC's and modules. KOA Speer Electronics, an affiliate of KOA Corporation, has served the electronics industry since 1980. Visit www.koaspeer.com

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INDUSTRIAL INFO-TAINMENT





NEWS PLUGS continued



VERSIPOLE™ Configurable Power **Distribution Blocks in either Finger-Safe or Open Styles**

BURNDY®, a leading manufacturer and provider of connector solutions to the industrial, energy, construction, telecommunication, petrochemical, data center, and transportation industries, announces the introduction of VERSIPOLE™ Configurable Series Power Distribution Blocks. These are typically used in electrical panels and wire ways for splicing cables and distributing power from primary run(s) to secondary/branch circuits.

These blocks are Listed to Standard UL1953. Each configuration is also now available in an "Open" style and "Finger-Safe" style. Finger-Safe styles include a plastic top cover and plastic end plates that protect from accidental contact with potentially energized surfaces and meet require-



Burndy Power Distribution Blocks

ments of IEC 60527 with an IP-20 rating. Although offered in standard 1, 2, or 3 pole configurations to support a variety of common run and tap combinations, the configurable series can also be designed to accommodate an infinite number of made-to-order combinations. Adders are available to expand the number of poles of an existing configuration. Optional translucent polycarbonate hinged covers for use with the "Open" style are available separately to provide increased user protection.

Headquartered in Manchester, New Hampshire BURNDY has over 90 years of dedicated customer support in both service and product.

Contact Burndy at 47 E. Industrial Park Dr, Manchester, NH, 03109. Phone 1-800-346-4175, or visit website www.BURNDY.com

Sticklers[®] Introduces High **Volume Fiber Optic Cleaning Kits** with Enhanced Static Control **Capabilities**

MicroCare Corp. presented its enhanced line of Sticklers® fiber optic cleaning products at the OSP Expo on 2-3 September 2015 in Denver, Colorado. At this expo the Sticklers® team featured the new Sticklers® High Volume Fiber Optic Cleaning Kits which contain the company's latest innovation, the Sticklers® CleanClicker® fiber optic connector cleaners.

The Sticklers® High Volume Cleaning Kits contain all the equipment needed to clean thousands of SC, FC, ST, E2000, LC and MU connectors both unmated and in-bulkhead — all in a handy, rugged and easy-to-find woven bag. Each kit contains two "push-to-clean" CleanClicker® fiber optic connector cleaners along with the necessary cleaning fluids, lint-free wipes and Stickler® CleanStixx™ endface cleaners. Each kit contains enough materials to clean more than 2,300 connectors. The kits are available in commercial and "Military Ready" versions. Uniquely, even though the kits contain cleaning fluids the kits are not hazardous and can be shipped anywhere in the world by ground, air or sea without restrictions or extra cost.

"One of the biggest innovations in the Sticklers® product line is the emphasis on speedy 'wet-dry' cleaning," noted Dan Sinclair, Sticklers® National Sales Manager. "Wet-dry cleaning eliminates static from the end-faces, resulting in cleaner fiber and trouble-free networks." All of the products required for wet-dry cleaning are included in the new Sticklers® High Volume Fiber Optic Cleaning Kits.

"We are going to prove, right on the floor of the exhibit hall, that Sticklers[®] 'wet-dry' cleaning eliminates any static-build-up quickly, easily and consistently," Mr. Sinclair added. "The fast-drying, nonflammable Sticklers®

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Continued on page 40

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INDUSTRIAL INFO-TAINMENT



NEWS PLUGS continued



Continued from page 39

cleaning fluid dissipates the static charge, effortlessly unlocks any particulate on the end-faces, and thereby out-performs all other cleaning products in the industry."

The OSP Expo is one of the leading forums in North America for telecom professionals. With a focus on improving the installation and maintenance of carrier networks, industry leaders from visit OSP Expo to connect with new vendors and learn about new technologies. All of the Sticklers® fiber cleaning products, the CleanClicker® fiber optic connector

cleaners, the various cleaning kits, the unique Sticklers® fiber optic cleaning fluid, the CleanStixx™ fiber cleaning sticks and a variety of high-performance lint-free wipes all will be on display at the Expo.

The Sticklers® family of fiber optic cleaning products is the industry's most complete set of cleaning tools. They are engineered to meet diverse industry needs ranging from the cleaning of individual connectors and patch cords, to cleaning massive outside plant installations, to cleaning enterprise and private network systems. The Sticklers® team also offers factory support for new product development and expert troubleshooting for customer problems. For further information visit www.sticklerscleaners.com.



Laura Dana Human Resources Manager **TLC Electronics**

Laura Dana Joins TLC Electronics

TLC Electronics, Inc. is pleased to announce that Laura Dana has accept-

> ed the position of Human Resources Manager at TLC Electronics, Inc., assuming her new role effective August 17, 2015.

> Dana comes to TLC with a strong background in human resources. She was previously employed as an HR Project Specialist and as a consultant in both medical and industrial manufacturing environments.

> "Dana's human resource experience will contribute greatly to TLC Electronics meeting the goals of our company and our employees as the company continues to grow", stated TLC Electronics' Office Manager Laura Crofford.

> Dana earned a Bachelor's degree in Business Administration and Management from the University of Wisconsin-River Falls. She enjoys spending time with her husband, 3 children and friends, as well as reading and traveling.

> Dana may be reached at I.dana@tlcelectronics.com or direct dial 651-558-2569.

> TLC Electronics, Inc., based in St. Paul, MN is one of the Midwest's largest regional distributors of electromechanical components and value-added assemblies for the electronics industry.

HEAT SHRINK APPLICATION TOOLING



RBK-ILS Processor MKIII

Raychem Model 16B Tabletop Belt Heater



Model 19 Belt Heater

The Model 19 belt heater is the latest generation of versatile process heaters suitable for installing a wide range of heat shrinkable products. Two pairs of timing belts grip the individual work pieces and carry them through an infrared heating zone. The work pieces then pass through a cooling zone before finally being deposited into a collection bin.

The system is ideally suited to installing Raychem tubing products onto both ring terminals and FASTON terminals as well as automotive splices and other suitable applications where the work piece and substrate are suitable for processing. The system is suitable for continuous running with minimum maintenance and downtime. The system provides good process control with both the motor speed and heating elements having closed-loop control. Other controls provide a high level of process security and prevent unauthorized changing of parameters. *CE approved

Process Control

- Closed-loop temperature control
- Closed-loop belt speed control
- Max/min element temperature alarm bands
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- · Lock-out gate prevents loading of product if the element temperature is tool low and if any of the alarms activate

Diagnostic

- · Heater failure alarm
- · Drive circuit fault alarm

Safety

- · Emergency stop switch
- Cool down circuit

RBK-ILS Processor MKIII

The RBK-ILS processor MkIII is a semi-automatic unit designed specifically to install splice sealing products onto ultrasonically welded or crimped splice joints used in automotive harnesses. The tool can operate in several modes: Stand-alone operator sets time and temperature Sequenced - preset times and temperatures can be sequenced automatically (and can also be randomly selected from sequence stored) Automatic communication with upstream ultrasonic welder can allow time and temperature to be automatically set without operator intervention.

Product Features

- Long life heating elements
- · Installation times, temperatures, and product size information (individual selection)
- Sequenced installations
- · Operator key lock / password protection levels
- · Automatic heater retraction on mains failure
- Automatic calibration (single cycle)
- RS232 interface allows time, temperature and product sizes for the next installation to be transferred from a remote machine (e.g. an ultrasonic welding tool)
- CE approved



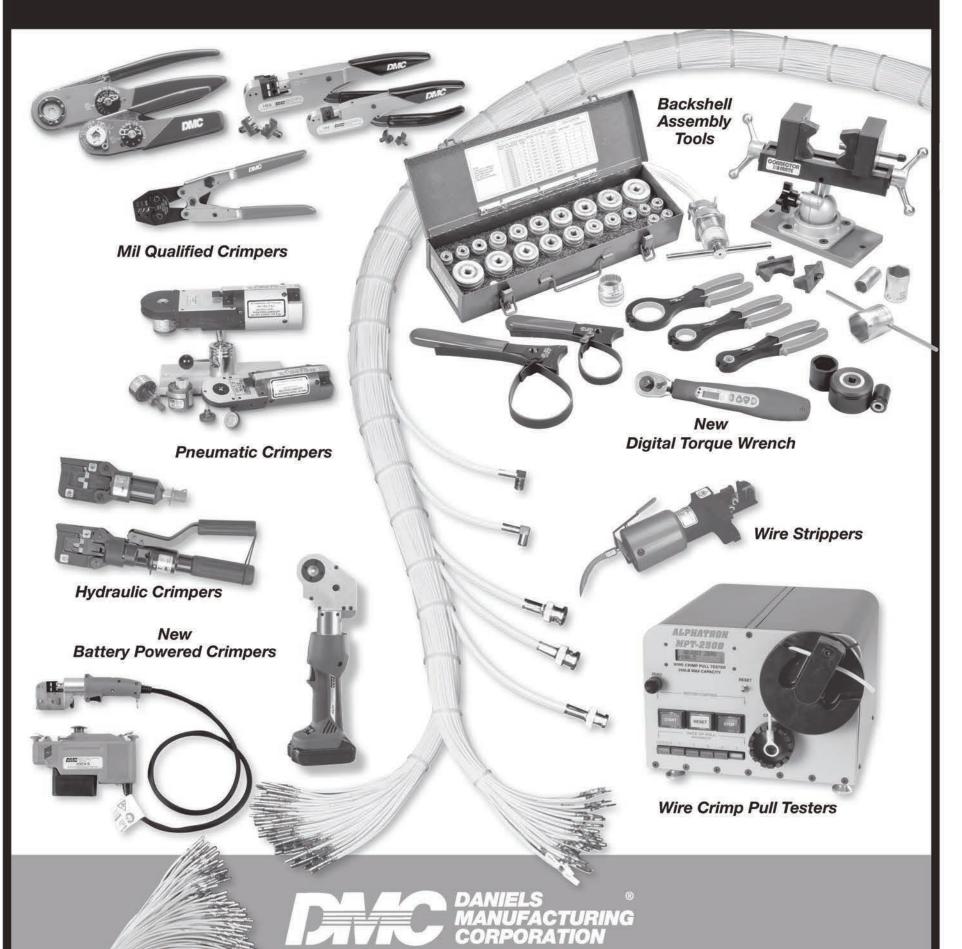
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NEWS PLUGS continued



BURNDY® Announces the **Contractor Series Tool 6-Ton** Li-Ion Battery Platform IN-LINE® **Crimping Tool**

BURNDY®, a leading manufacturer and provider of connector solutions to the industrial, energy, construction, telecommunication, petrochemical, data center, and transportation industries is pleased to announce the introduction of the Contractor Series 6-Ton Li-Ion battery platform IN-LINE® crimping tool that combines performance with an economical purchase price.

The Contractor Series tool maintains the quality and reliability that BURNDY® is rec-



Contractor Series 6-Ton Li-Ion Battery Platform IN-LINE® Crimping Tool

ognized for and offers better than industry average crimp speeds. Fixed, scissoraction crimping jaws are available in three standard configurations; each accepting standard "W" and "X" style die sets. Features include 350° head rotation, ergonomic balance, non-slip grip area, safety-lock feature and an audible pop off indicating a proper crimp completion.

As with all BURNDY battery operated tools, the Contractor Series is powered by Makita 18V battery technology.

Supplied with the tool is one (1) 3.0Ah battery and a charger. BURNDY offers a one-year warranty on the Contractor Series of tools.

Headquartered in Manchester, New Hampshire BURNDY has over 90 years of dedicated customer support in both service and product.

Contact BURNDY at 47 E. Industrial Park Drive, Manchester, NH, 03109, call Customer Service at 1-800-346-4175, or visit our website at www.BURNDY.com

Fairview Microwave Expands Waveguide Portfolio with New Family of Waveguide Directional Couplers

Fairview Microwave Inc., a supplier of on-demand microwave and RF components, introduces their new family of precision waveguide directional couplers.

This release consists of 28 models covering a frequency range from 18 GHz to 110 GHz in seven popular frequency bands including K, Ka, Q, U, V, E and W bands.

Fairview Microwave's waveguide couplers are available in waveguide sizes from WR-42 up to 18 GHz all the way to WR-10 up to 110 GHz. These directional couplers are offered with 10 dB or 20 dB coupling values and have high directivity of 30 dB typical with insertion loss is as low as 0.6 dB in certain models.

Fairview's new waveguide couplers are available in both standard and split block configurations and are also available in

> both E-Bend and H-Bend designs. They utilize a multihole design that provides optimal power reflection measurements and consistent performance.

> Fairview's new millimeter wave waveguide directional couplers are widely used in applications such as onthe-bench testing scenarios, radar systems, satellite communications, point-to-point backhaul, signal sampling and other general purpose applications in wireless transceivers.

> These waveguide couplers are constructed using high quality brass copper and are gold plated for added precision and accuracy.

"Our newest portfolio of waveguide directional couplers provide designers a comprehensive selection for millimeter wave signal sampling and testing components when coaxial solutions are not possible," explains Brian McCutcheon, Vice President and General Manager Fairview at Microwave. "We are committed to expanding our waveguide product lines to ensure we have the components needed by engineers as the industry continues to push towards higher and higher frequency applications."

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Identification for All Applications

Most Common Methods of Wire & Harness Identification:

- Heat Shrink (Sleeves or Tubing)
- Tie on Cable Markers
- Pre-Marked Wire and Cable Markers



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Fairview's new waveguide directional couplers are now in-stock and available to ship today. You can view these new waveguide components by visiting http://www.fairviewmicro wave.com/rf-products/ waveguide-directional-couplers.html directly.

Fairview Microwave can be contacted at +1-972-649-6678.



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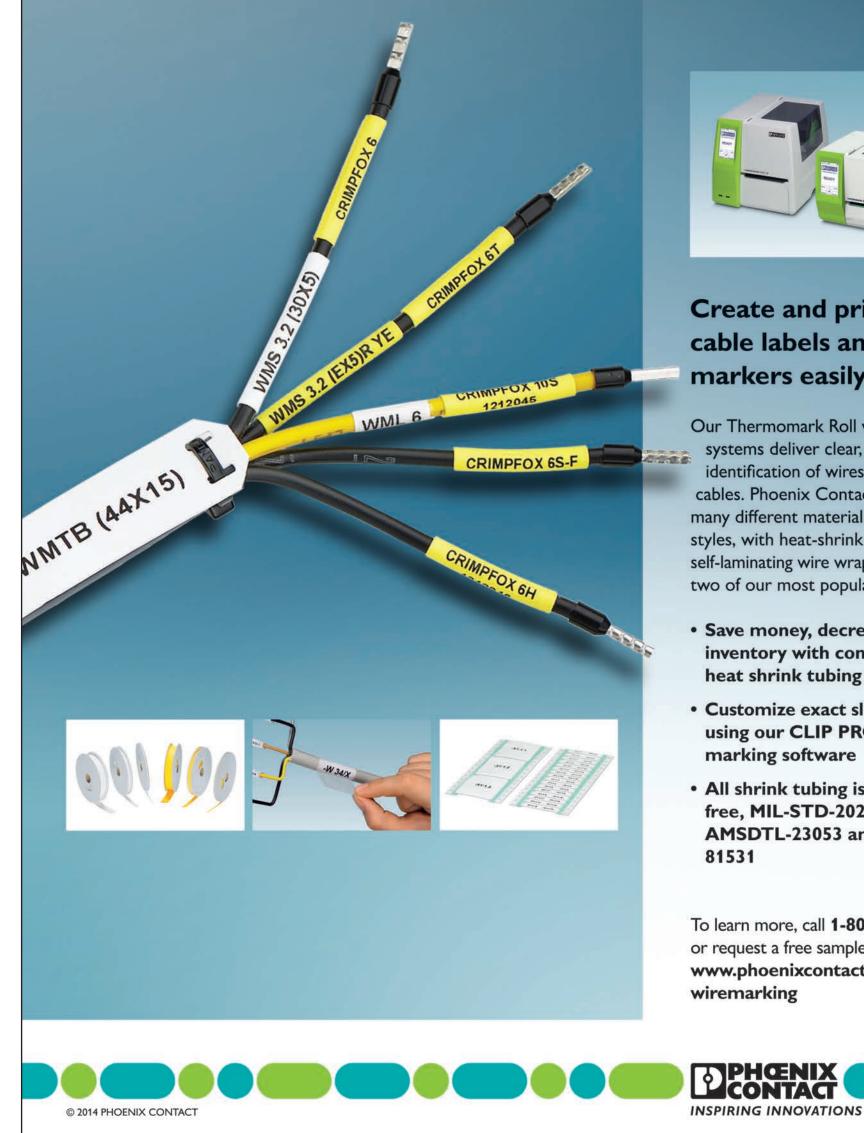
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Short Circuit Testing for Automotive Systems and Harness Design

Continued from page 31

You can do this

Figure 3 shows an example of what is possible with the right set of tools. The engineer can take the recommended wire size (in the column Wire CSA(max)) and actually apply that to the design, driving part number selection from this information.

Name	Applied Voltage	Applied Current	Applied Power	Wire CSA (max) V		
PWR-IGN-RUN-2	0.13905	13.10975	1.822911	1.75		
PWR-IGN-RUN-1	0.07492	13.1097	0.982179	1.75		
PWR-BATT-4	0.01066	13.1098	0.13975	1.75		
PWR-BATT-2	0.13905	13.1098	1.822918	1.75		
PWR-BATT-1	0.01259	13.10995	0.165054	1.75		
GND-BATT-1	ID-BATT-1 0.045154		r-1 0.045154		0.591959	1.75
9N-GND-AIRBAG_EC	0.074595	6.00026	0.44759	1.0		
PWR-IGN-ACC-2	0.05592	4.19363	0.234508	0.75		
PWR-IGN-ACC-1	0.10379	4.193635	0.435257	0.75		
2N-POWER-5-2	0.13289	5.16635	0.686556	0.75		

Figure 3: With the right toolset, engineers can easily apply standardized wire sizes directly to the design.

With this information, design decisions can be made early in the process, prior to any physical parts being built. By embedding the years of experience your engineers have, you can offer this level of analysis and decision making to a much broader audience as well.

Finding problems early saves money

The graphic in figure 4 (page 46) depicts the relative cost of making changes to designs during the design cycle of a vehicle. The later the problem is found the more costly it is. Warranty and recalls cost vehicle manufacturers billions of dollars a year - which significantly impacts the bottom line of companies that don't discover problems until the vehicles are already in customer hands. Where you want to find problems is as early in the design process as possible.

Enabling your design engineers to continuously analyze their designs prior to manufacturing a prototype saves time, money and can improve reliability of your products. Most testing for electrical design starts in the prototype phase

_Continued on page 46



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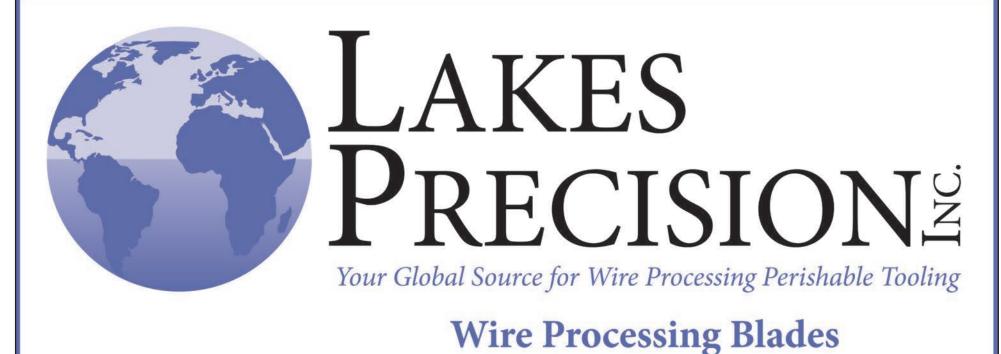
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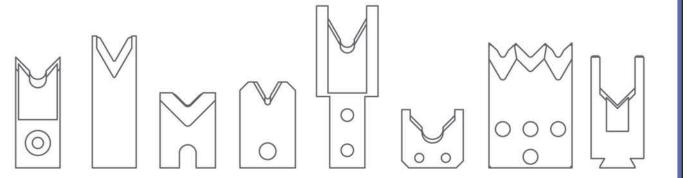
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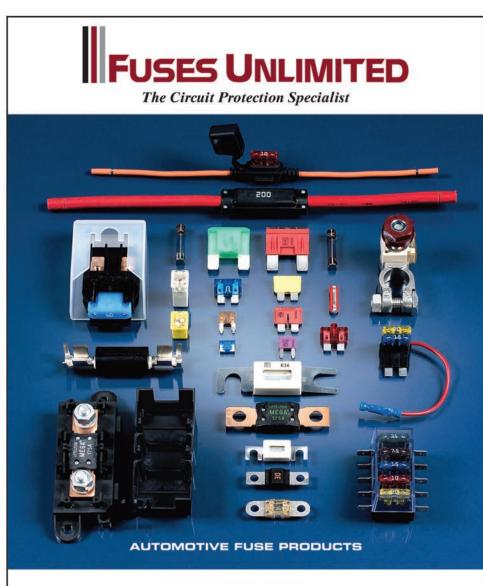
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Short Circuit Testing for Automotive Systems and Harness Design

Continued from page 45

where the cost is highest represented by the faded curves following along the red line in figure 4 (below).

If you spend more time and energy up front in the IDEA to LOGICAL DESIGN phases, you will spend much less time, money and effort during Integration and have less Warranty and Recall's. Figure 5: Three types of short-circuit testing: A - High Side short testing, B-Low Side short testing, and C - Short over the load testing.

Typically this type of analysis happens with physical testing. This entails building a very expensive prototype vehicle after the design is complete, which can cost upwards of \$1,000,000 or more. These prototype vehicles are built not only for electrical testing but

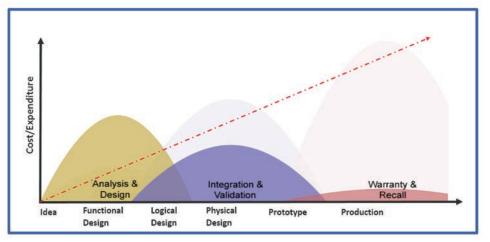


Figure 4: The further into a design (or production) a fault is found, the more costly it is to rectify.

Removing the need for prototypes

A type of wire and fuse sizing analysis that is becoming more popular is short circuit testing. There are three types of short circuit testing, as depicted in figure 5. also physical testing. Short testing of this nature runs the risk of damaging the wiring which would require an expensive repair in order to make the vehicle ready for the next test the vehicle is scheduled for. This type of testing should be accomplished in a virtual environment prior to design completion, prior



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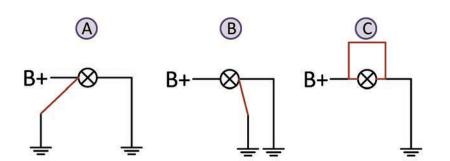


Figure 5: Three types of short-circuit testing: A - High Side short testing, B -Low Side short testing, and C - Short over the load testing.

to the building of expensive prototypes, and should be available to every harness engineer in your organization not in the hands of a select few simulation experts.

Fuse blow time vs. wire fume characteristics

An analysis that is starting to catch on in Japan is to size the fuses such that under short circuit testing the fuse will blow prior to the wire covering material beginning to fume, or smoke. Wire manufacturers in Japan are starting to publish the fume characteristics of wires so vehicle manufacturers and harness manufacturers can do this type of fuse sizing and wire sizing.

The main driver behind this type of testing is durability. As the wire heats up under stressful load conditions and the covering of the wire begins to fume the durability of wire is compromised. This can lead to any number of durability issues. As the insulation weakens in a wire deteriorates it can become brittle and potentially lead to exposing the bare wire underneath and potentially causing a dangerous short. Imagine an

airbag circuit shorting unexpected and deploying while driving. The cost of warranty and recall costs are staggering. The more testing you can do up front, the more design engineers you can have doing the testing, the easier the testing is and the better the products will be.

This type of testing, sometimes referred to as "Wire Smoke Testing" is being done with physical vehicle prototypes and is costly and time consuming. This principal of this type of testing is outlined below - briefly, the load is shorted (either on the High side, Low side or across the load) and the circuit is observed. If the covering material of the wire begins to fume prior to the fuse blowing then a solution is investigated. This could involve changing the fuse to a larger size, a fuse with a shorter blow time, a larger wire, a wire with a different material, etc. Figure 6 illustrates the concept.

_Continued on page 48

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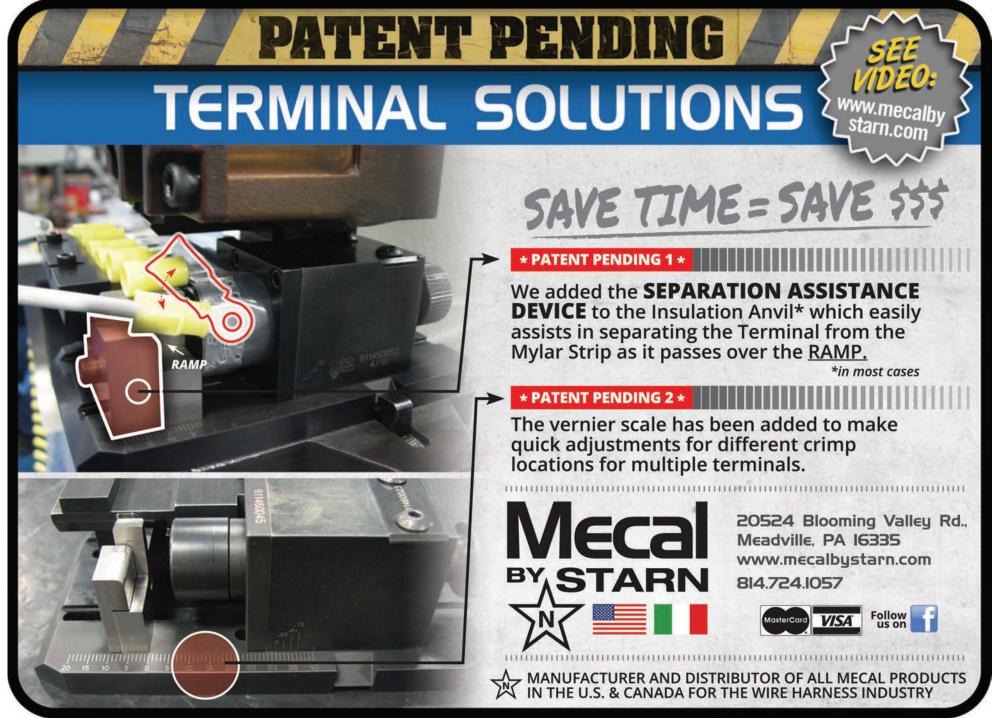
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Short Circuit Testing for Automotive **Systems and Harness Design**

Continued from page 45

In the graph in figure 6, we have taken a hypothetical FUSE and WIRE and have plotted the Fuse Blow Time and Wire Smoke Time (both in seconds) vs. Current (Amps). Let's take a look at two points on the graph:

1. At about 20 Amps we see for this WIRE and FUSE combination the Fuse will Blow (orange line) prior to the Wire Smoking (blue line). This is the desired condition.

2. At about 8 amps, we see the wire will smoke prior to the fuse blowing. This is NOT the desired condition as this could lead to deteriorating of the wire material and overall cause a durability issue

There are tools available and on the market today that can help you do this. Ask yourself if automating any of these types of analysis in a virtual environment early in the design process by any engineer in your company is important:

- Full vehicle load testing
- Automated testing of multiple vehicle configurations
- Automatic Fuse sizing and part number selection
- Automatic wire sizing and part number selection

Fuse Blow Time vs. Wire Smoke Time

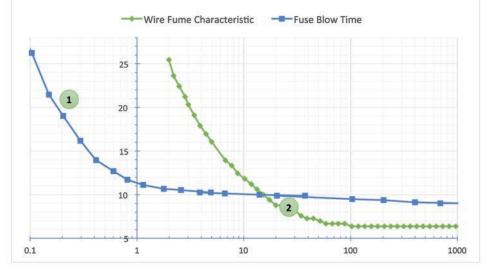


Figure 6: Fuse blow time and wire smoke time.

· Automated short circuit testing - High side, low side, over the load or rotating through all three

• Testing for fuse blow time vs. wire material fume time to increase the durability of your wiring

Testing physical prototypes presents two expensive problems:

(1) the prototype is very expensive to build and maintain and

(2) faults found as late as the prototype are very expensive to fix.

The solution is to employ virtual prototypes and simulation for systems that can be properly simulated. Wiring harnesses are readily simulated and virtual prototypes can readily detect faults, such as short circuits or time for the fuse to blow vs. time for the wire to smoke. Employing these tools can not only save a great deal in costs, but can remove significant time from the development cycle as well.

For further informa-

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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NEWS PLUGS continued



Nordson ASYMTEK's Spectrum II Automates Dispensing in the Manufacture of GN ReSound Hearing Aids

Nordson ASYMTEK, a global leader in dispensing, jetting, and coating equipment and technologies, announces the sale of two Spectrum™ II S2-922 in-line dispensing systems to GN ReSound, one of the world's largest manufacturers of hearing healthcare solutions. GN ReSound, based in Ballerup, Denmark with production facilities in Præstø, Denmark, presently has an installed base of off-line Nordson ASYMTEK coating systems and Axiom™

X-1000 dispensers. The Spectrum II systems are being used as part of automated manufacturing production lines to apply underfill in the manufacture of hearing aids.

"We chose the Nordson ASYMTEK systems because we are familiar with the ASYMTEK brand and have found that their equipment gives us the required performance and flexibility for many different processes needed in conjunction with manufacturing hearing aid electronics," said Elvin Solberg, manufacturing engineering manager for GN ReSound. "Before, underfill was done manually off-line. Dispensing underfill in-line with the Spectrum II reduces manual handling and gives a more uniform result, a more efficient SMD manufacturing process, and better yield."

Nordson ASYMTEK's award-winning Spectrum II dispensing platform is a high-speed, high-accuracy precision dispensing system for microelectronics, semiconductor, MEMS, and manufacturing/assembly applications. It has a small GN ReSound is a leading international developer and manufacturer of advanced and innovative hearing healthcare solutions. It advances the wireless revolution with its unique 2.4 GHz and Bluetooth® Smart solutions. GN ReSound has reinvented the hearing system with its revolutionary line of smart hearing aids, and is driving and defining the future of hearing care. GN ReSound is headquartered in Ballerup, Denmark. For more information, visit www.gnresound.com.

Brad[®] Micro-Push[®] Connectors Boost Operational Efficiencies and Lower Costs

Molex Incorporated launches today its Brad® Micro-Push® M12 Connectors for factory automation and industrial lighting applications. Featuring an innovative push-on mating interface, the connectors reduce installation time up to 80% com-



Brad[®] Micro-Push[®] Connectors

pared to screw-style connectors and facilitate simple blind-mate connections in tight locations.

Constructed without any metal components, the solution provides excellent seal performance to IP65 specifications while reducing material costs.

"Cost cutting is an issue across the board, forcing OEMs and system integrators to find new ways to save money. In certain applications, an IP65 rated connector provides plenty of protection but without a viable M12 version many had to turn to the more costly and complex IP67 option," said Nathan Caughel, global product manager, Molex. "The Brad Micro-Push connector solves this issue by delivering high level M12 connectivity without the unnecessary features, helping reduce material costs and simplify the assembly process."

With an IP65 NEMA rating, the Brad Micro-Push connectors protect against ingress of solids and can withstand lowpressure water streams. They also include a threadless coupling design that eliminates reverse threading in high-vibration environments, reducing downtime for even greater cost savings. The visual and

___Continued on page 51



Stapla's USC-4 touch panel controller

footprint, but accommodates dual valves, up to 6 heaters, and/or dual lane conveyance.

"Nordson ASYMTEK is proud to once again build upon our strong partnership with GN ReSound and have our award-winning Spectrum II dispensers chosen for their automated production line," said Nordson ASYMTEK's global account manager, Lars Nielsen. "The precision dispensing accuracy and application flexibility of the S2-922 made it the ideal choice for GN ReSound's advanced packaging processes."



At Stapla, our <u>experience</u>, our <u>technicians</u>, and our <u>applications laboratory</u>, are the tools and reasons why we excel at defining the best welding solutions for our customers.



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

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NEWS PLUGS continued

Continued from page 49

tactile keyway alignment ensures complete interface mating to deliver excellent vibration resistance while the non-metallic coupler alleviates grounding and electrostatic discharge concerns. The Brad-Micro Push connector also offers backward compatibility with legacy M12 connectors.

For more information about Brad Micro-Push M12 connectors from Molex, visit www.molex.com/link/ micropushm12.html.

Providing more than connectors, Molex delivers complete interconnect solutions

for a number of markets including: data communications, telecommunications, consumer electronics, industrial, automotive, commercial vehicle, aerospace and defense, medical, and lighting. Established in 1938, the company operates 50 manufacturing locations in 17 countries. The website Molex is www.molex.com. Follow us at www. twitter.com/molexconnectors, watch our videos at www.youtube. com/molexconnectors, connect with us at www.facebook.com/ molexconnectors and read our blog at www.connector.com.

NEW Flat Cable Configurator

Cicoil, a leading manufacturer of Flexible Flat Cables, is pleased to announce its NEW EZ-Flexx[™] Flat Cable Configurator. An entire section of the website is dedicated to this Free Web-Based Tool, which allows a user to easily design a custom flat cable in just minutes. And the new EZ-Flexx[™] cable within the flat cable profile, which means that over 1 million flat cable designs are available for immediate production and quick delivery. If you don't see a component that you require, no need to worry, a Cicoil Application Engineer can be contacted to help in adding other elements to your cable design.

In addition, users can move around, add and remove any elements in their flat cable, in any variation up to 3.75 inches wide. Cicoil's Online Configurator makes anyone a Flat Cable Designer.

Once the flat cable is designed, users receive a price quotation, custom part number and an engineering drawing delivered to their e-mail inbox within seconds. Once the cable is ordered, Cicoil guarantees a 1-2 week delivery on any cable designed using the Cable Configurator.

Cicoil's Cable Configurator can be

viewed, tested and played with at www.cicoil.com/flex_ cables/configura-tor.asp.

In addition to Configurator designs, Cicoil offers Standard Off-the-Shelf Motion Control, Video, Data, Power, Thermocouple and IDC Ribbon Cables and Assemblies.

All cables are encapsulated with Cicoil's exclusive, crystal-clear Flexx-Sil™ jacketing compound, which clearly shows the purity and cleanliness of the material, as well as the precise placement of each individual cable component.

All of Cicoil's Cable Configurator Cables are UL Recognized, CE Conforming, RoHS & REACH Compliant, Class 1 Clean Room Rated and are cured continuously, with no debris or material contamination in an automated, climate controlled environment.

Cicoil has been a leader in designing and manufacturing high performance cable assemblies for almost sixty years. The company's Patented Flexx-Sil™ Flat Cable Technology provides high flexibility, extremely long life, and they can withstand temperature extremes from -65 degrees to +260 degrees Celsius.

Cicoil's quality assurance system is certified to the ISO 9001 (AS9100) standard.

Visit www.cicoil .com for more information, or call 661-295-1295 to speak to an application engineer.

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MOLEX ML-XT[™] SEALED CONNECTION SYSTEM

The rugged ML-XT[™] connection system with market-leading high-performance seal technology is a cost-competitive solution offering superior reliability for critical vehicle-wiring applications in harsh environments.

Customers specifying low-circuit-count connectors for rugged harness applications in vehicles require a highly-reliable, securely sealed connection system to minimize electrical failures and prevent costly machinery downtime. This system needs to withstand high temperatures and harsh environments, including exposure to chemicals, at the lowest cost. The ML-XT[™] system meets these needs with high-performing seal technology proven to prevent ingress of fluids under extreme conditions.

Applications Include:

design makes Cicoil flat cables easy to separate and strip, just like any round cable, and also makes the flat cable more light and flexible.

With a few simple mouse clicks or touch of a screen, Flat Cables can be constructed of many elements, including pow-er conductors, shielded signal pairs, video & coax wires and tubing for liquid and air. To make the process even quicker, Cicoil has added Specialty Modules (Camera Link®, Cat 6A, FireWire, USB 3.0) to the Configurator. Any of these elements can be combined in any position Aerospace and Defense - Commercial aviation, Military vehicles

Automotive - Cars, Motorcycles

Commercial Vehicle - Agricultural machines, Buses and coaches, Construction and mining equipment, Forest and garden equipment, Generator sets (Gensets), Marine equipment, Material handling, Search, detection and navigation equipment, Trains and rail equipment

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www.cablescan.com

NEWS PLUGS continued



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

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

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

Shear™ flush cutter for wire up to 12 AWG, and the Model 501 thumb adjustable wire strippercutter for 10 to 26 AWG.

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

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

Flexible Flat Semiconductor Cables

Rated for Class 1 Clean Rooms utilized in Semiconductor Wafer Fabs, Cicoil's Flexible Flat Cables are ideal operational critical for applications that require absolute reliability. The crystal-clear designs are free of halogens & contaminants, and are an excellent alternative to PVC, Polyurethane and Teflon cables, especially in continuous motion and long-term flexing operations. Cicoil's One-of-a-Kind extrusion process allows multiple power conductors, shielded signal pairs, Fiber Optics, Ethernet, Coax, Thermocouple Wires and flexible tubing for air, wire placement or fluid transfer, and other design elements like Cicoil's patented Strip-Mount[™] fastening strip to be placed in a single flat cable, precisely controlling

the Inner component spacing, jacket thickness and the overall cable shape.

The highly durable outer Flexx-Sil™ rubber jacket is self-healing from small punctures and will not wear, crack or deform during a lifetime of more than 10 million flexing cycles or long term exposure to vibration, de-ionized water, cold temperatures (-65°C), alcohol, extreme heat (+165°C), stress, UV light and many chemicals.

Standard "off-the-shelf" Cables are available for immediate delivery and cable assemblies, complete with connectors are offered in 3 foot, 6 foot and 12 foot lengths.

Custom Flat Cable designs can be easily constructed through the use of Cicoil's On-line EZ-Flexx[™] Cable Configurator http://www.cicoil. com/flat-cable/configurator.asp.

Assorted round cables can be incorporated into a single flat profile, and mul-

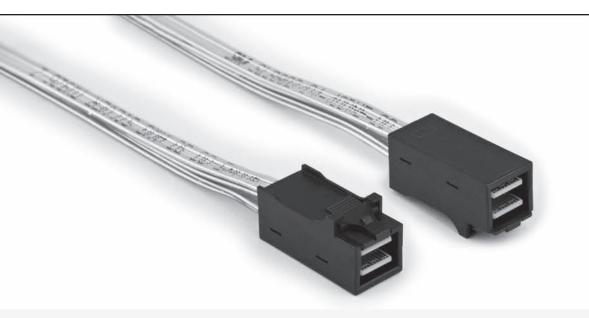
tiple flat cables can be placed side-byside or even grouped into space saving stacked positions. For adhesion-free, continuous movement in a cable track, Cicoil offers low-friction GlideRite[™] and SlideRite[™] coating options by request.

As compared to bundled round and podded flat cables, the EZ-Flexx[™] concept allows for easy stripping and a significant decrease in cable prep time. The unique design is also compatible with standard hand held manual and automated stripping and crimping equipment.

Cicoil's Cables for Semiconductor Applications are UL Recognized, CE Conforming, RoHS & REACH Compliant, Class 1 Clean Room Rated and exceed the outgassing requirements of ASTM E-595. All cables are manufactured in an automated, climate controlled and debris-free environment.

Cicoil has been a leader in designing and manufacturing high performance cable assemblies for almost sixty years. The company's Patented Flexx-Sil™ Flat Cable Technology provides high flexibility, extremely long life, and they can withstand temperature extremes from -65 degrees to +260 degrees Celsius. Cicoil's flat cables are used in thousands of demanding applications; including aircraft fuel control cells, semiconductor automation, and the Space Shuttle. Cicoil designs and manufactures its Flexx-Sil™ jacketed cables and cable assemblies in an automated facility in Valencia, California. Cicoil's quality assurance system is certified to the ISO 9001 (AS9100) standard.

Visit www.cicoil.com for more information, or call 661-295-1295 to speak to an application engineer.





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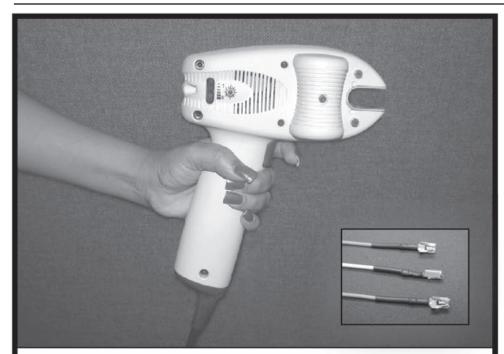
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*polyolefin, 5" length

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

Focus-Lite $^{\scriptscriptstyle\rm TM}$ technology uses radiant energy to shrink heat-shrink tubing in a fraction of the time of traditional methods.

Here's why it works: Dual Quartz Halogen bulbs are focused to direct all of the usable radiant energy to the cable/wire diameter covered by shrink tube. This allows for 10 times the average energy expended by the bulbs to be delivered to

the target zone. What you will see is an amazing difference in shrink time!

The Focus-LiteTM is equipped with an adjustable timer for repeatable shrinking, time after time. It also has a dimmer switch that controls the power for sensitive components. Visit our website at **www.judco.net** and see our full line of Focus-LiteTM products.

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- Appliance Wire & Cable
- Crossed Linked Polyethylene 150C°
 Irrigation Cable
- Pet Wire
- Thermoset Insulated Wire
- Communication Cable
- Plenum Cables
- Our products meet or exceed RoHS requirements.

Industrial Wire and Cable Corp. has been manufacturing wire

NEWS PLUGS continued



Flat Cable Assemblies for Targeting Systems

Cicoil's highly durable Flat Cable Assemblies are designed for use in targeting pods, thermographic camera and infrared sight systems typically utilized in multi-role fighter aircraft, attack helicopters and maritime surveillance vessels where unparalleled performance is critical and cable failure is not an option. The compact, Flexx-Sil™ encased flat cable solutions are engineered to provide consistent electrical characteristics, space & weight savings, EMI/RFI suppression, optimum cable flexibility and are well suited to meet the stringent demands of missioncritical applications.

Unlike other types of cables, such as Teflon or Polyurethane, Cicoil utilizes an exclusive process of encapsulating individual components in a shock absorbing jacket that renders them unaffected by repeated exposure to severe vibration, G-Forces, flames (UL 94V-0), ice, fog, ozone, steam, humidity, extreme temperatures (- rigors of turbulent flight. This combination of features makes Cicoil flat cable assemblies the ideal alternative to formed flat cables, wire harnesses and bulky round cables in high tech targeting and vision system applications.

Each Cicoil flat cable can incorporate a variety of components including power conductors, controlled impedance pairs, shielded control wires, video conductors, multi-layer shielding options and Cicoil's patented StripMount ™ fastening strip, all combined in a single condensed cable design, precisely controlling the inner component spacing, jacket thickness and the overall cable shape. Cables are available in continuous lengths, break-outs, custom shapes for very tight spaces, cut to order, or as assemblies, complete with connectors of your choice, 100% tested and inspected for peak electrical performance, quality and reliability.

Cicoil's unique crystal-clear Flexx-Sil™ encapsulation needs no external sheathing or conduit for protection, is tear-resistant and will not deform or wear during a lifetime of more than 10 million cycles, even under tight bending radius and high speed flexing conditions. Cicoil's highly durable Flexx-Sil™ jacket is "self-



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healing" from small punctures and cable jacket damage can easily be repaired in





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4705 S. Coach Drive Tucson, AZ 85714 (520) 747-4500 (520) 747-5800 fax tomatlas@worldnet.att.net the field. For applications that require resistance to abrasion and adhesion, Cicoil offers low friction coating options by request.

Cicoil's Shock Absorbing Cables are Halogen-Free, Flame Retardant, UL Recognized, CE Conforming, RoHS & REACH Compliant, and are cured continuously, with no debris or material impurities, in an automated, climate controlled environment.

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

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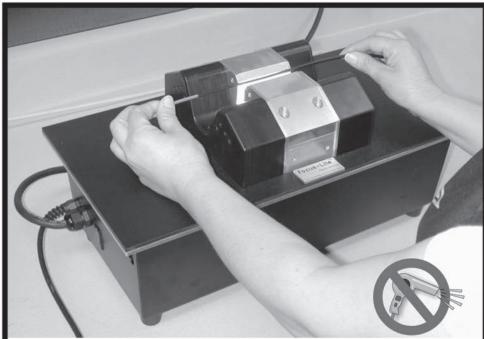
MR30A Hand-Held Air-Operated Cutter (blades sold separately)

more information, please visit www.eraser.com, or contact Eraser at (800)724-0594 or info@eraser.com.

The Eraser Company, Inc., celebrating over 100 years in business, manufactures a wide range of machinery that enables customers to manufacture, prepare, and process, wire, cable, and tubing products more efficiently, effectively, and profitably. The company is ISO 9001:2008 Certified, and their products can be found worldwide.

For more information on Eraser's entire product line visit www.eraser.com or call (800)724-0594.

Wiring Harness News SEPTEMBER/OCTOBER 2015 55



Save up to 80% of your labor cost on heat shrink operations

The Focus-Lite[™] by Judco Manufacturing, Inc., is the solution to all your heat-shrink operations. You can say goodbye to the high labor cost, excessive heat, and inefficiencies of other methods. **The Focus-Lite**[™] <u>reduces the time</u> necessary to shrink most types of heat shrink tubing. It also <u>improves the process</u> control and <u>overall quality</u> of your shrink operation. The **The Focus-Lite**[™] can be used for <u>high volume</u> bench top applications as well as low volume prototypes and laboratory applications.

Focus-Lite $^{\scriptscriptstyle\rm TM}$ technology uses radiant energy to shrink heat-shrink tubing in a fraction of the time of traditional methods.

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

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

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

WIRE WISDOM CABLES TRAY

Cable tray is one of the most common methods of supporting wire and cable. There are many different types of cable tray including basket, ladder and solid-bottom. Tray can be manufactured in various types of material including aluminum, steel and fiber and other nonmetallic materials. Cable tray allows for the clean organization and routing of cable and offers advantages over conduit because cables are easier to access for installation, repair, removal and future development.



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CABLE TRAY DEFINITION

Cable tray is classified by the NEC (NFPA 70 the National Electrical Code)

as a support system and not as a raceway. Generally speaking raceway completely encloses the cable inside of it.

Wiring Method	Article
Armored cable:Type AC	320
CATV cables	820
Class 2 and Class 3 cables	725
Communications cables	800
Communications raceways	725,770,
	and 800
Electrical metallic tubing: Type EMT	358
Electrical nonmetallic tubing: Type ENT	362
Fire alarm cables	760
Flexible metal conduit: Type FMC	348
Flexible metallic tubing: Type FMT	360
Instrumentation tray cable: Type ITC	727
Intermediate metal conduit: Type IMC	342
Liquidtight flexible metal conduit: Type LFMC	350
Liquidtight flexible nonmetallic conduit: Type LFNC	356
Metal-clad cable: Type MC 330	330
Mineral-insulated, metal-sheathedcable: Type MI 332	332
Network-powered broadband communications cables	830
Nonmetallic-sheathed cable: Types NM, NMC, and NMS	334
Nonpower-limited fire alarm cable	760
Optical fiber cables	770
Other factory-assembled, multiconductor, control,	
signal or power cables that are specifically	
approved for installation in cable trays	
Power and control tray cable: Type TC	336
Power-limited fire alarm cable	760
Power-limited tray cable	725
Rigid metal conduit: Type RMC	344
Rigid polyvinyl chloride conduit: Type PVC	352
Reinforced thermosetting resin conduit: Type RTRC	255
Service-entrance cable: Types SE and USE	338
Underground feeder and branchcircuit cable: Type UF	340

 Table 1: Table 392.10(A) Wiring Methods from Article 392 of the NEC



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TO LEARN MORE VISIT ANIXTER.COM OR CALL 1.800.ANIXTER This is a critical distinction because it means the requirements for the cable contained in raceway is different than cable supported by cable tray. Cable in tray is viewed as being exposed to a greater risk of mechanical damage and can be a potential ignition source or fuel load in a fire scenario.

PERMITTED CABLE TYPES

Article 392 of the NEC provides the basic requirements for installations using cable tray. The respective article for the cable type must also be followed. Table 392.10 (see Table 1) lists the type of cable that is allowed to be installed in tray and the types of raceway that can be used. This table includes almost all common types of wire and cable found in the NEC.

Cable types that are not presented in the table include single-conductor building wire types such as THHN/ THWN, XHHW and RHH/RHW. Article 392 does allow these types to be installed as power conductors if they are larger than 1/0 and marked for use in tray. Ground wires must be larger than 4 AWG but are not required to be marked.

FLAME TESTING REQUIREMENTS

The fire resistance is tested by using standardized flame tests. The most common flame test is UL 1685 Vertical-Tray Fire-Propagation and Smoke- Release Test for Electrical and Optical-Fiber Cables. This test involves loading multiple cables in a vertical section of cable tray and igniting the cable at the base of the tray. The cable passes the test if it does not propagate the fire. See Figure 1 for a diagram of the test. This same test is used to test singleconductor power cables 1/0AWG and larger for use in cable tray, tray cable (TC), power-limited tray cable (PLTC), instrumentation tray cable (ITC), and fire alarm (FPL), communication cables (CM) and fiber (OFN). Many end-users don't realize that 300 V cables and fiber cables are tested in the same fire test as large power cables and 600 V tray cable. Because of this finding, a cable with the proper fire rating is usually not an issue.

1' (0.30 m) (2.44 m) 18

Figure 1: Diagram of UL 1685 vertical tray flame test from the Anixter **Technical Handbook.**

Continued on page 58



Wire Harness and Connector Test

- \rightarrow Switch Probes → Step Probes
- → Twist Proof Probes
- → Push Back Probes
- → Threaded Probes

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1	28	28	4W,	16 mΩ		Φ	< 1 µA	1499 V	>1G	0.150 mA	996 V	7 M
2	30	30	4W	32 mΩ	-	÷	< 1 µA	1499 V	>1G	0.173 mA	996 V	6 M
3	32	32	4W	63 mΩ	-	÷	< 1 µA	1499 V	>1G	0.189 mA	996 V	5 M
4	34	34	4W	125 mΩ	-	æ	< 1 µA	1499 V	>16	0.204 mA	996 V	5 M
5	36	36	4W	249 mΩ	-	æ	< 1 µA	1499 V	>1G	0.204 mA	996 V	5 M
6	38	38	4W	500 mΩ	-	æ	< 1 µA	1499 V	>1G	0.200 mA	995 V	5 M

42 Nagog Park, Acton, Massachusetts 01720 e-mail: sales@camiresearch.com

Research



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

Continued from page 57

The mechanical requirements for cables are found in the relevant product standards and are established by mini-



MINI-TWISTER I

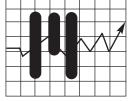
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mum required values for the tensile strength and elongation, both aged and unaged, of the jacket and insulation polymers and by things like crush and impact testing. For some applications, the minimum values allowed by the standards are not seen as sufficient. Often, in industrial applications, products are available that exceed the minimum requirements. Common examples include industrial Ethernet and industrial fiber cable.

APPLICATION REQUIREMENTS

Depending on the cable tray type and cable, there are various requirements for spacing and loading cables per Article 392. These requirements are based on the allowable cable fill area in a cable tray.

There are also requirements that circuits of different voltage classes be separated in tray. For example, a common request is for a 600 V Categoryrated cable. Due to issues with things such as connectors and electrical performance, a true 600 V cable does not exist, and it is often not the best solution from an overall design or cost basis. There are some products on the market that attempt to offer an alternative solution, but typically things such as metallic separators or raceways that don't cause secondary issues can be used instead.

For further information contact Anixter Inc. 2301 Patriot Boulevard, Glenview, IL 60026. Phone 224-521-8000 or visit www.anixter.com

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NEWS PLUGS continued



15A NEMA Tamper Resistant Power Outlet

Qualtek and TLC Electronics have introduced part number 739W-X2/45, a 15A NEMA 5-15R tamper resistant convenience outlet. The tamper resistant system features a built-in shutter system which prevents foreign objects from touching electrically live components when they're inserted into the slots. The plugs can be inserted and removed just as with standard electrical outlets. This outlet has been designed with a quick snap-in mounting configuration and will work with panel thicknesses from 0.8mm to 2.0mm. 739W-X2/45 utilizes the same panel cutout as Qualtek's popular 739W-X2/03

NEMA 5-15R outlet, so this outlet is compatible with existing applications. Insulation displacement connections (IDC) eliminate the need for special tools and are designed to be used with 14AWG solid copper conductors.

The current carrying capacity of this outlet is up to 15A at 125VAC and is rated under the Component Recognition Program of UL File No. E139605.

For pricing and delivery information, please contact on of TLC's solutions providers at 800-852-6694, tlcsales@tlcelectronics.com or see our Contact page at www.tlcelectronics.com.

TLC Electronics, Inc., based in St. Paul, MN, is one of the Midwest's largest regional distributors of electromechanical components and value-added assemblies for the electronics industry and is a franchised supplier of Qualtek products.

For more information, contact Steven Olson at TLC Electronics, Inc. 651-558-2582 or s.olson@tlcelectronics.com.

BURNDY® Announces the Expansion of the YG-B Family of Connectors for Sturctural Steel or Bus Bar

BURNDY®, a leading manufacturer and provider of connector solutions to the industrial, energy, construction, telecommunication, petrochemical, data center, and transportation industries, announces the expansion of the YG-B line of connectors for structural steel or bus bar. To provide a solution for requests to have a compression connector to accommodate thicker structural steel or bus bar, BURNDY added the YG916BTC26 to the existing family of YG-B connectors. The YG916BTC26 connector can accept between ½" to 9/16" thick structural steel or bus bar along with a tap conductor from 1/0 to 2/0 AWG stranded copper.

New Hampshire BURNDY has over 85 years of dedicated customer support in both service and product. Our customers need to look no further than BURNDY for all their connector, tool, and accessory needs with our BURNDY Engineered Systems of coordinating dies, connectors and tools. The three elements have been specifically designed to work together and engineered to meet stringent, accepted quality standards – providing the user complete confidence in the integrity of the connection.For further information visit www.BURNDY.com.

KOA Speer Introduces Fast Acting Chip Fuse CCF1F Rated to 15 Amps

KOA Speer Electronics, Inc. introduces its new fast-acting chip fuse, CCF1F, with a rated current of up to 15 amps. Due to the original chip fuse technology, this fast-acting chip fuse provides over-current pro-



Fast-acting Chip Fuse, CCF1F

tection with stable fusing characteristics.

The CCF1F, in a 2410 size, has a range of rated current from 0.4 to 15 amps, and meets IEC 60127-4 specifications (7A or less). The CCF1F ceramic case provides excellent mechanical strength and offers an operating temperature range of -55oC \sim +125oC.

The EU RoHS-compliant CCF1F is ideal

for consumer electronics, industrial and automotive markets, in applications such as base stations, car audio and navigation, LED lighting, switching equipment and DC-to-DC converters.

Lead time for the CCF1F is 10 weeks. Samples are available upon request.Link to datasheet: http://www.koaspeer.com/ products/circuit-protection/fuses/ccf1f/ #x3

KOA Corporation offers a wide range of products which include thick and thin film resistors, current sensing resistors and resistor arrays; thermal sensors, fuses and varistors; wire wound, multilayer, power and thin film inductors; LTCC's and modules.

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NEWS PLUGS continued



Molex ML-XTTM Sealed Connection System Delivers Market-Leading Seal Technology for the Commercial Vehicle Market

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installation requirements.

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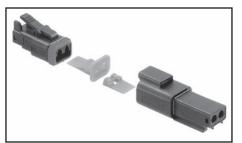
specifications, or custom design to meet your

meet your most

Molex Incorporated introduces its ML-XTä Sealed Connection System, a highly reliable, securely sealed solution that minimizes electrical failures in gruelling commercial vehicle applications while delivering assembly cost savings to original equipment manufacturers and harness makers. Rated IP68 and J2030 powerwash capable, the ML-XT system features a one-piece plug housing and seal design, which is permanently bonded using cutting-edge, two-shot LSR (liquid silicone rubber) molding technology. This ensures definitive and repeatable retention of the plug seal and prevents the seal from rolling during un-mating and mating to guarantee correct seal positioning. It also eliminates the risk of a lost or forgotten seal during installation and maintenance.

"Most standard systems are supplied without rear seal covers for the housing, leaving the seal exposed and unprotected," said Denis O'Sullivan, global product manager, Molex. "The ML-XT system includes housings that are pre-assembled with the rear seal securely locked-in place and protected by a latched rear cover. In addition, the need for welding is removed. This allows Molex to deliver a cost-competitive drop-in replacement for the defacto commercial vehicle standard sealed connectors used in multiple harsh duty applications."

The ML-XT rear seals are made from high consistency rubber (HCR) for greater



ML-XTä Sealed Connection System

tear resistance and protection during terminal insertion and extraction. The protective rear covers allow for flexible cable exits and cable movement while maintaining the optimum seal position to prevent leak paths. Wedgelocks or TPAs (Terminal Position Assurance) lock the terminals in position for a reliable electrical contact while the plug housing features an integral locking latch for secure mating.

The ML-XT system is currently offered in 2-, 4-, 6- and 18-circuit options, providing design flexibility for a vast range of sensor technologies and low circuit-count applications. The proven Molex XRC[™] terminals deliver current ratings up to 13.0A while the nine color-coded housings enable easy visual mating of harnesses to prevent mis-mating.

"By delivering a one-piece housing solution, Molex helps customer reduce purchasing and inventory costs while simplifying assembly. Additionally, the market-leading reliability of ML-XT connectors minimizes electrical failures and helps prevent machinery downtime for greater operational efficiencies not only in commercial vehicle applications but in the automotive, military vehicle, marine and aeronautical industries as well." added O'Sullivan.

For more information about the ML-XT Sealed Connection System from Molex please visit www.molex.com/link/mlxt. html.



Fairview Microwave Debuts a Complete Family of High Reliability RF & Microwave Power Amplifiers

Fairview Microwave Inc., a supplier of on-demand microwave and RF components, has released a complete portfolio of coaxial high reliability power amplifiers with broadband frequencies ranging from 0.5 MHz to 20 GHz that can operate over extreme temperatures across -55°C to +85°C.

These high-rel amplifiers are commonly used in demanding environments for applications involved with electronic warfare, instrumentation, military communications, radar, point-to-point radio, telecom, test & measurement, medical, and SAT-COM industries.

The new families of hi-rel power amplifiers from Fairview are designed to overcome the electrical and mechanical stresses that are seen with exposure to harsh environments. These RF amplifiers boast rugged package enclosures that can with-

stand vibration and shock exposure during handling and transport. Several models in this offering are designed to meet MIL-STD-202 and MIL-STD-810 environmental test conditions, while some amplifier designs are environmentally screened in production to MIL-STD-202 test conditions.

Some models feature integrated heatsink and cooling fans for improved thermal dissipation performance resulting in extended operating life. And for added reliability against harsh environments, certain models utilize hermetically sealed coaxial packages.

Fairview's high reliability power amplifiers can generate saturated output power levels (Psat) up to 100 watts and all models require only a single positive voltage supply ranging from +12 to +42 Vdc. Small signal gain levels range from 11 dB to 58 dB with IP3 linearity up to +66 dBm resulting in high dynamic range. All models are unconditionally stable.

"Our new high-rel power

BURNDY Organizational Announcement

BURNDY[®], a leading manufacturer and provider of connector solutions to the industrial, energy, construction, telecommunication, petrochemical, data center, and transportation industries, is pleased to announce the promotion of Stewart Gale to the position of VP Sales and Marketing, Burndy. He will report to David Smith, VP and General Manager, Burndy US and will assume his new role on September 1, 2015 in Manchester, NH.

Stewart will provide leadership and coordination over the Burndy Sales and Marketing Teams. This includes the development and implementation of a sales and marketing plan for this team that is in concert with Burndy's goals and objectives.

Stewart joined Burndy in 2011 as a Sr. Product Manager and was promoted to Key Account Manager in 2013. Stewart's current role includes national account representation across C&I & Utility verticals. Stewart has done an excellent job



Stewart Gale VP Sales & Marketing

strengthening relationships, enhancing communications, driving top & bottom line results, building the brand, developing sales strategy, and creating marketing programs during his tenure.

Before joining BURNDY Stewart was the President of Force 9 Consulting. Force 9 provides consultative services to manufactures, manufacturers' representatives, independent distributors, and industry associations across six channels: Electrical, Plumbing, PVF, HVAC, Industrial, and Building Materials. P

rior to that Stewart held positions as the VP of Marketing and Business Development with Affiliated Distributors and as VP of Sales and Marketing with Rockingham Electric Supply Company. Stewart holds a Bachelor's Degree in Economics from Johnson State College.

For further information visit www.BURNDY.com

AMP-O-LECTRIC MODEL G II TERMINATOR

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

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

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

User Friendly

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

Product Features

- Quiet operation
- Improved guarding and lighting

amplifiers are designed to meet a number of military standards which result in highly reliable operation and give designers added confidence and assurance for long term optimum performance," explains Brian McCutcheon, Vice President and General Manager at Fairview Microwave.

The new hi-rel RF amplifiers from Fairview are instock and available now. You can view the entire line of these new products by visiting http://www.fairview micro wave.com/rf-products/hi-rel-amplifiers.html directly.Fairview Microwave can be contacted at +1-972-649-6678.

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

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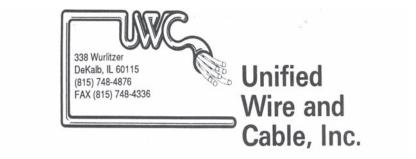


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