This we si

- Finishing Well
- The Real Cost of Insufficient Testing
- How Reshoring Drives Profitability
- Wire Wisdom Low Voltage Cable Sheilding
- Time Management and Delegation: Science or Art?
- Optimizing the High Mix/Low Volume Manufacturing Environment



Winchester Electronics

By Fred Noer

f San Allen of Winchester Electronics were to give advice to company leaders in the wiring harness industry, he would have a simple, straightforward statement: "Find your niche where you can survive, and focus in on it."

For Winchester, headquartered in Norwalk, Conn., focusing on wiring harness and cable assembly production has led to a thriving corporation. It has gone from \$87 million in sales in 2009 to \$154 million in 2014. The company is projecting growth to \$170 million this year and has a goal of \$250 million by the end of 2017.

Allen, 58, is the general manager of the Engineered Cables Division of Winchester. The division has wiring harness and cable assembly plants in Spartanburg, S.C. (operating as Electrical Specialty Products); Nogales, Mexico; Penang, Malaysia; and Suzhou, China. He is based at the Nogales facility.

Focus of a different kind was needed when Allen joined Winchester in August 2009 as vice president of operations in North America. As were numerous businesses during the Great Recession, the company, which did much of its business in telecommunications, was struggling to adapt to the economic downturn.

At that point Winchester was a relatively "new" company. That is, in 2006 it



Thru-hole secondary assembly station.

was bought from Northrop Grumman Corp. in Falls Church, Va., by a group of Winchester managers and Audax Group, an investment company with offices in Boston, New York City and Menlo Park, Calif.

Since the managers could not raise adequate funding on their own, they were joined in the purchase by Audax, which was founded in 1999 and has more than \$6 billion invested in lower-market and middle-market companies.

Audax is led by cofounders and co-CEOs Geoff Rehnert and Marc Wolpow, and the staff includes 14 managing directors, two principals, five senior VPs and nine VPs.

Northrop Grumman owned Winchester five years. It was included in the acquisition of Litton Industries in Woodland Hills, Calif., by Northrop Grumman. In 1963 Litton bought Winchester,

_Continued on page 48

The 2015 Electrical Wire Processing Technology Expo

By Joe Tito
Wiring Harness News

hen you think of Milwaukee, you think of beer, baseball, Harley Davidson, and that incredibly warm Midwestern charm. But if your in the wire harness industry, you should also think about the Electrical Wire Processing Technology Expo. Whether your an industry supplier, a large tier two manufacturer, or a small harness shop, you simply can't miss this event. The 2015 EWPT Expo held this past May 13th and 14th held strong to the heritage this show has developed in its 15 years of existence. I'll dig into some of the detail that prove this point, but there is a specific metric I have been tracking the past few years. I'll save that for last.

With over 165 exhibitors, the EWPT Expo is the worlds largest showcase for components, processing equipment, design tools, testing technology, and all the elements that function in wire and cable harness production. The 2015 show boasted a 5% increase in attendance over last year's blockbuster numbers. The Expo was once again co-located with The Electrical Manufacturing and Coil Winding Show, exhibiting coil winding and testing products for electrical manufacturing. Also co-located for 2015 was Critical Power, an expo devoted to equipment and technology for critical power and backup systems for hospitals, data centers, military facilities, and other power sensitive applications.



Since 2001, the Electrical Wire Processing Technology Expo has grown into a comprehensive resource for the electrical wire harness, wire, and cable processing industries.

Together, these related shows brought in an additional 800 visitors.

Seminars

Cutting edge equipment, tools, and support technology alone are enough to keep folks flocking to the EWPT Expo year after year. But the exchange of ideas at the wide ranging seminars is every bit as valuable. As with previous shows, the 2015 schedule offered critical learning opportunities on industry best practices, trends, and burning issues. Here's a quick synopsis:

IPC/ WHMA A-620-B Update - Presented by: Donnie Hill, President and COO of Precision Manufacturing Co &

Rick Bromm, VP Business Development of Altex Inc. Donnie and Rick discussed the Rev. B and reasoning behind the updates. They stressed the importance of our industry in becoming the "pied piper of the A-620" to the OEM's. They also announced a new website (a-620.org) dedicated to all aspects of the specification, from purchasing options to training information.

Conflict Minerals - Presented by: Michael Wurzman, President/Founder of RSJ Technical Consulting. Michael discussed some of the intricacies for

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_Continued on page 5



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Winchester Electronics

Focusing on wiring harness and cable assembly production has led to a thriving corporation.

2015 Electrical Wire Processing Technology Expo

With over 165 exhibitors, the EWPT Expo is the worlds largest showcase for components, processing equipment, design tools, testing technology and all the elements that function in wire and cable harness production.

How Reshoring Drives Profitability

The "pros" of off-shoring are no longer what they once were, and the "cons" are becoming more significant. This is the second installment of this article. The first part was published in the May/June 2015 issue.

The Real Cost of Insufficient Testing

Breaking down the costs associated with finding and fixing a defect at various stages of the manufacturing process.

News Plugs

Read about the latest products on the market and points of interest about companies and people in the industry. Is shoes on the internet?

Optimizing the High Mix/Low Volume Manufacturing Environment

Manufacturers in the wire and cable harness industry face many challenges related to the high mix/low volume aspect of the business. This is a brief narrative of a presentation given recently by Patrick Boyer of Komaxwire at the EWPT Expo in Milwaukee.

Wire Wisdom Hazardous Location Classifications

Each type of hazardous location requires specific types of cable and/or installation methods.

Classified

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67	Advertiser Index

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why do it twice when once is better

The 2015 EWPT Expo

Continued from page 1 _

reporting under this complex legislation. He noted that wire insulation includes 15 additives that contain tin. Although there is technically a reporting requirement, the SEC is looking at this. The good news Michael touted is that this legislation, along with other pressures applied from NGO's, has led to the militant groups abandoning two thirds of the mines they previously controlled. Michael is convinced, however, that the legislation is here to stay, and databases can be created to track these and other hazardous and critical materials in the supply chain. The RSJ website has a ton of information on reporting requirements for Conflict Minerals.

High Mix/Low Volume Manufactur-

ing - Presented by: Patrick **Boyer**, Special Applications Project Manager at Komax. When analyzing production, you are not necessarily looking at which harnesses are your highest runners; rather which wires, terminals, seals or connectors are your highest runners. Equipment should be set up to run these sequences together. This will greatly enhance your OEE (Overall Equipment Effency), a metrics Patrick feels is very important. Komax can help with fixtures and equipment interfaces to make this possible.

Understanding New UL 486F for Ferrules Presented by: Vince Barone, Product Manager at Panduit Corp. Flexible cable is often substituted for solid copper cable, yet the connectors are only suited for solid cables. For this reason, ferrules are used so that the stranded cables can be terminated in the same fashion. UL 486F was released in March of 2014 to cover the use and testing of ferrules in electrical connections. The specification covers the use of ferrules in 20 through 1 AWG wire sizes.

Latest Advancements in Quality for Wire Processing - Presented by: Rob Boyd, Senior Project Manager at Schleuniger Inc.A rebound in manufacturing and significant reshoring have placed an increased emphasis on quality. Thinner wire insulation, aluminum wire, higher voltage requirements, and increased harness complexity also add to the challenge. Data is voluminous and critical in today's production environment, so there is increased pressure to integrate MRP systems with equipment. Material change detection, conductor continuity detection, and vision systems are examples of equipment addones to help increase quality.

Electrical Test - A Competitive Advantage - Presented by: Kevin Ellsworth, Product Manager at Cirris Systems. Real skill is developed most easily when feedback is immediate and unambiguous. Inprocess testing is, therefore, most effective as assemblers find defects immediately. This is most effective in reducing repetitive errors and defects. Defects are more detectable and cheaper to resolve at this point.

Many thanks to Wire & Cable Technology for sponsoring the seminar room.

Hospitality

Whether your a long time exhibitor, or a first time visitor to the show, the crew at EPI Shows and the staff at The Wisconsin Center do their best to make you feel like family. Special thanks to the following hospitality sponsors:

Assembly Magazine - Exhibitor 'Beer-N-Brats' Party

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ing Mimosa Bar TE Connectivity - Thursday Bloody Mary Bar

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And as always, we at Wiring Harness News were proud to present the After Hours VIP Party, Attendee Bags, Business Center & Lounge, Cyber Cafe, Directory, Lanyards, Massage Area, and Thursday Exhibitor Breakfast.

The Most Important Metric

Hey...its Milwaukee! What could be a more accurate metric to the shows continued success than number of kegs used during the show? This year, visitors consumed 21 kegs of Milwaukee's finest brew. That's a 17% increase over last year. EWPT is a fun atmosphere and a critical show to the industry.

If you would like to exhibit next year, don't hesitate. Space has sold out the past several years. Contact Cheryl Luck at cheryl@epishows.com.

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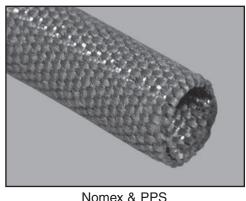


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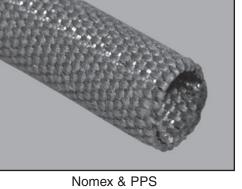
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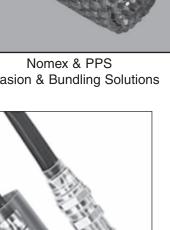
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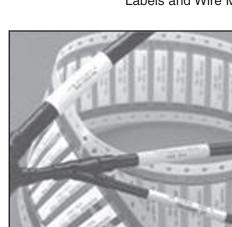


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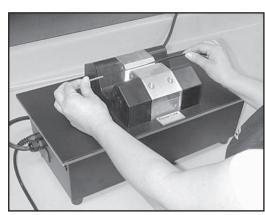
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Finishing Well



Steve Krar and Paul Hogendoorn

By Paul Hogendoorn

his thought has been on my mind quite a bit lately, perhaps it's because I just visited a 90 year old friend in his new retirement home. Or perhaps it's just because everything that gets started has to end sometime. We are counselled "to begin with the end in mind", but that's easier said than done. We get caught up in the here-and-now, and the relentless petitions of what-needs-to-get-done-next, that we take our eye off of the horizon, and forget to calibrate our sites on the point at where we hope to end up. In this age of continually emerging game

changing ideas and technologies, it is not only hard to do this, it's critical to do as well.

Steve Krar, my aforementioned 90 year old friend, has lived through a life time of rapid changes in manufacturing technology, but he continues to keep his eyes on the horizon. His work is not yet complete, and he never wavers from his course. His goal is to educate, inspire, stimulate and motivate others; to embrace, adopt, and continue developing new ideas, practices, products and technologies for our industry. To him, it's the most exciting one in the world; it's the industry that actually makes things, moulds things, shapes things and creates things. And it does more than that; it cre-

ates meaningful work opportunities for millions of people, and provides a living and lifestyle for many, many more. It gives us the opportunity to use our hands and our brains.

Over 50 years ago, Steve and his buddies started a little venture called the AdvancedTechnologyThinkTank (check out www.attt.ca). The purpose was to spend some time with a few like-minded thinkers, away from the regular distractions and demands of their careers, to

take a look at the forest away from the trees. They would do this by going into the forest for a couple of days, rent cabins, pack fishing gear and enough food (and beer), and then allow thoughts and conversations not just about what is, but also what could be. Over the years, the event has grown (although it's still comfortably small), and has attracted innovation thinkers from all over the world.

Continued on page 8

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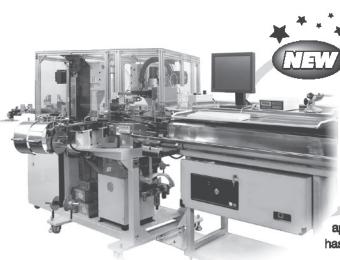
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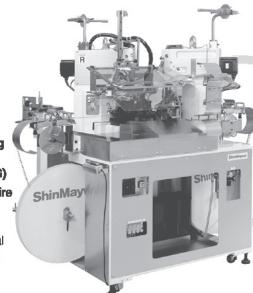
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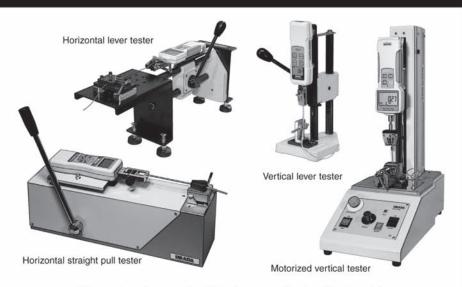
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Finishing Well

Continued from page 7 _

Even though technology has changed, Steve's vision for the event and his life in general, have both stayed on a straight and consistent path.

Right now, with the help of friends, Steve continues to sort through new information and old published works. He has authored or co-authored 86 books, and is in the process of consolidatng enough new material to publish a new book on the History of Manufacturing - the man never stops.

In business today, our attention seems naturally drawn to the excitement of something new - the quest for the next new thing, or the execution of a tried and proven practice. We are often hesitant to think about finishing something well, perhaps because once we get something running the way we want it to, we hope that it will go on forever. But it won't, because nothing lasts forever. Whatever it is, will eventually end, or evolve, or change to the point that it no longer looks like what it did at the start. I think we need to continually think about finishing well just as much as we need to plan to start well and manage wisely. Business, as in life, is full of begin-

nings and endings. Most beginnings start with excitement, great hopes, and lots of anticipation. Too often though, the endings come as a surprise, without warning and in ways we don't expect. When that happens, all of the achievements up to that point become unharvest-able, and lost to the future generations. One of our primary goals as leaders needs to be on finishing well.

Some people, like Steve, continually focus on finishing well, whether it's the latest book they are writing, or the school curriculum they are teaching, or the next group of innovators they are inspiring. Whatever activity they are doing, they have the end in mind, and finishing well is the only way they know how to do things. They are not afraid of endings, because when they set their eye on the horizon, they know the next important goal will come into view.

Good leaders aren't afraid of the endings; in fact, that's what they are aiming for.

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











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How Reshoring Drives Profitability

(Editor's Note: This is the second part of a two part article. The first part was published in the May/June 2015 issue of Wiring Harness News.)

By Michael Ford Mentor Graphics Corporation

Factory Operation Without a Distribution Chain?

The shorter the distribution chain between the factory and the customer, the fewer the quantity of products acting as a buffer for short-term changes in customer demand. This brings a higher risk and incidence to the factory in receiving sudden changes of delivery requirements following short-term consumer demand changes.

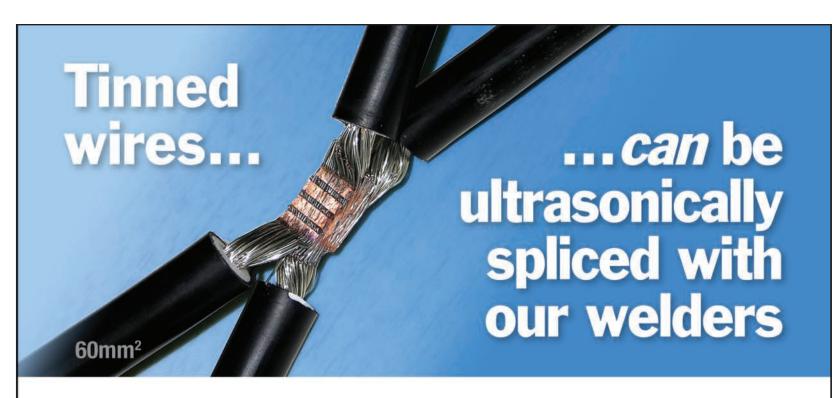
The factory has then two choices. The first is of course to augment the dwindled distribution chain by holding greater quantities of products as finished goods on site. This defeats the purpose, however, simply shifting the costs to a different location. The better alternative is to create a factory operation designed to be more directly responsive to delivery short-term demand changes. This has to be implemented without any significant reduction in capacity or productivity, requiring a whole new style of factory operation. Outside the SMT space, there has a solution for this for some time. The application of "lean manufacturing" introduced cell production, which became

popular some years ago to deliver output flexibly and efficiently. Although cell production can be applied to manual PCB assembly and test stages, it certainly does not work for SMT, which has strongly inhibited the adoption of lean thinking in PCB-based electronics manufacturing with SMT. We know, as a result of our direct experience that productivity declines as flexibility increases in SMT. Even though SMT machines are themselves very flexible, there are intrinsic elements related to the setup of hundreds, or even thousands of discrete SMT materials that are needed to make each electronic product. Solutions to overcome this issue, such as by putting additional

> machines in line to have enough material feeder locations permanently set up that are able to produce any product at any time, has been tried already. The result was that for each product variant, significant time is lost as for each machine and line, the optimization was severely compromised. inevitable reduction of capacity and the decrease of productivity meant that this model does not work. We have to look at a level above the machines and lines themselves, toward the integration of planning, to get a truly flexible solution.

Another Level of SMT Optimization

With today's planning tools for SMT, however, a chicken-and-egg situation exists because generic shop-floor planning tools cannot consider complex material grouping requirements of SMT for efficiency, and SMT-based tools cannot perform decisions related to the selection of products into groups according to dynamic shop-floor delivery needs. Both end up being separate steps, and when doing either step first, it places restrictions on the second. Optimizing both steps in one would affect far more flexible schedules, while retaining productivity as near to that of running high volume, creating a profound effect on the operation of the factory. The optimization of SMT is a multi-level operation that has challenged the most brilliant of software developers for many years. Introducing another level of simultaneous optimiza-



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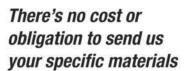




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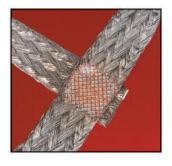
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tion seems impossible to achieve. Let's therefore look again one more time at each of these levels.

1) Machine Program Optimization: Each SMT machine program is optimized to ensure that the machine is adding value for as much of the operating time as possible, without needless excess movement that slows performance. For software developers, the challenge is to find the single best sequence, but to put just this into perspective, if every possible sequence of SMT placement path were calculated by today's fastest super-computer, it could take weeks of processing to find. SMT optimization algorithms, therefore, have to be very clever to avoid having to consider every possible permutation, to be able to find a path close enough to the best in a reasonable amount of time. It is when this optimization is performed that the cycle time for the specific machine can be known to a high degree of accuracy.

2) Line Optimization: The number of SMT placement materials for each surface of a PCB is usually more than one machine can handle, and so they have to be divided between multiple SMT machines, modules, and other processes in a line. Line optimization is the process to allocate materials to the most capable machine in the line depending on material size, shape, type, and packaging, ensuring that the most effective and

capable machines are used, reducing overall processing time and ensuring quality. It is almost impossible however that considering this element alone will evenly divide the materials. Some level of compromise then has to be made to ensure that the execution times of all the machines in the line will be the same. After all, the line is only as fast as the slowest machine. The times for

each machine can only be known, however, by doing a machine program optimization for each machine. Invariably, after allocation and machine program optimization, many iterations of material re-allocation are needed until a lowloss line balance can be realized.

3) Changeover Optimization: This is the consideration of the line down-time needed to change material setups at the machine between products. This can represent more operational loss time than any other optimization factor in higher mix manufacturing. Given a range of products to group, creating a feeder setup common to the group on the line where few if any changes are needed, means that the line can produce any quantities of any product within the group at any time without changeover loss. The material requirements of all products within the group have to be considered, and an allocation of total materials across the line is made, which is then optimised in a similar way as line

Continued on page 12

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How Reshoring Drives Profitability

Continued from page 11 ____

optimization, above. The critical issue, however, is that when running each of the products, because there are more materials set up on the machines than needed and the positions may not optimised for that specific product, the machine program optimization will suffer as a result of having to perform additional excess travel that would otherwise not be necessary. Depending on the commonality of the different materials and the number of components used of each across the different products in the group, additional feeders or even additional machines

may be needed in the line, reducing the machine program optimization and also the line optimization. Again, several iterations are required to find the best position of each material and any trade-off between materials that are completely common across all products, as well as those that may be allowed to change, usually restricted to one area of one machine, where for example a trolley can be exchanged to implement a slightly different setup. It takes many optimization cycles before the right balance of compromise is reached.

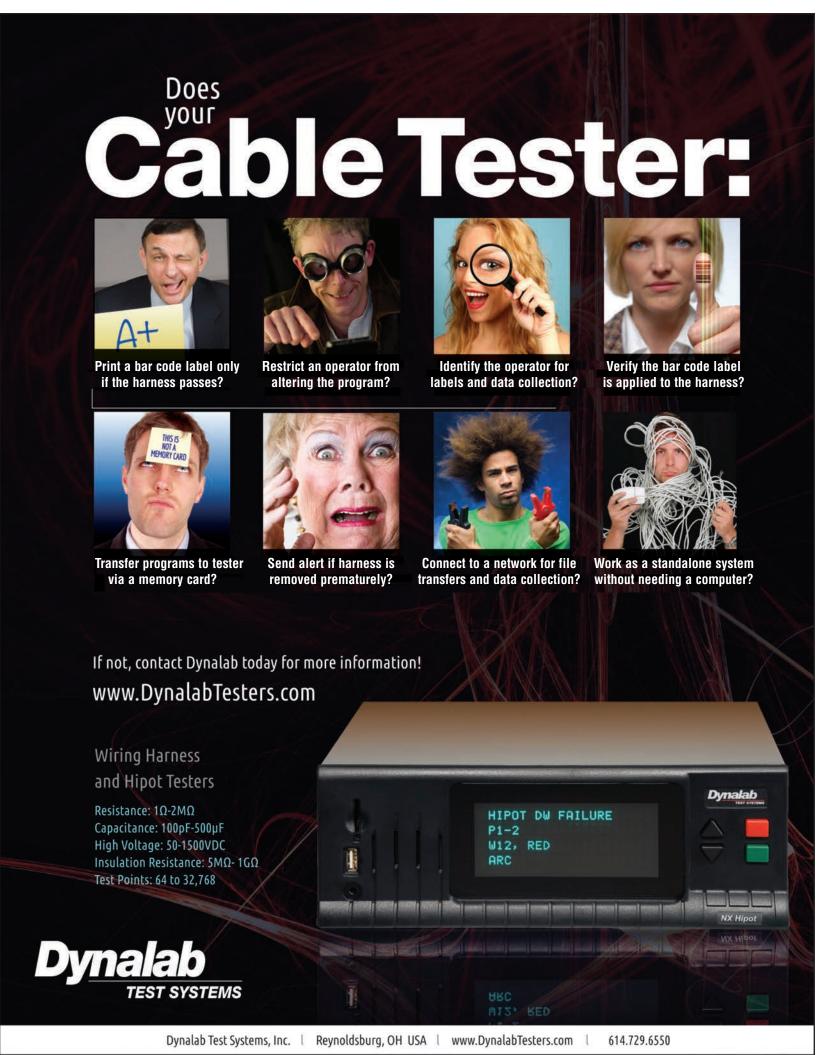
4) Product Grouping Optimization: This is traditionally the

separate step, in which the products to be grouped are selected, optimized in accordance with the completion requirements of the factory. Simply grouping products that are similar usually produces acceptable changeover optimization, but grouping products simply by what the factory is required to deliver will most likely put together groups of products with little commonality, and therefore poor machine and line optimization. The cleverness of this level of optimization is to be able to consider the total delivery requirements across the whole shop-floor where there is then a choice of many combinations for products on different lines at dif-

ferent times. Each of these selected potential combinations, however, should in theory then have to go through all of the other three optimization stages to be assessed. This would, for modern computers, be an impossible task.

The solution to our planning conundrum is to turn the problem on its head. Instead of a serious compromise being made that separates the product grouping optimization as is done today, let's consider instead separating the machine program optimization. This would mean that the actual machine program time for each optimization cycle could not be calculated accurately, but this could be argued as being acceptable, as long as a close estimate of the capability and cycle time for the machine can be made. This is not the same level of estimation as, say the ERP systems make, of a certain time per placement, but an intelligent estimation based on machine operational modelling principles. Even so, it is likely that there will be some degree of error, but this will be a very small sacrifice compared to the losses incurred by the existing practice of the exclusion of the optimization of product grouping.

This type of specialist SMT shop-floor planning optimization software is now available today, enhanced by the access to key information about the operational status and progress of the shop-floor, materials availability, the engineering setup requirements of each product, as well as the current cus-



tomer delivery requirement. Having this information available electronically means that planning is not something that is done perhaps once every month or three months, but something that can be incremental, a rolling plan repeated every day or more often if necessary, bringing the flexibility to respond to changes in short-term delivery requirements almost immediately. Limitations in the availability, accuracy, and timeliness of data on the shop-floor have very much thwarted the creation of such live planning optimization technology in the past. It has led to the momentum of the machine-centric optimization model that actually does not make sense, because it is rarely an optimization of the factory based on what the customer needs. This is the critical issue that now has been solved.

Other Issues to Consider

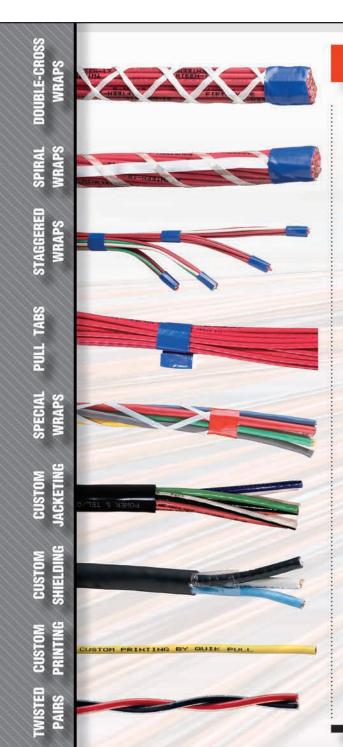
Any move to on-shoring will not happen overnight, any more than the move off-shore did. There are some other key issues to consider, including:

1) Materials Sourcing: With the majority of manufacturing currently off-shore, most of the high-volume raw material manufacturers and suppliers are also offshore. It is possible to ship the raw materials in, and it should be costefficient because most raw materials are common to many products and assembly manufacturers, especially with the use

of distributors. The major change happens, however, once onshore raw materials manufacturers get back into gear. Many of these companies still exist, as some manufacturing never went over to lower cost areas, significantly suppliers to the safety critical areas of aerospace, military, some medical, and automotive. The key question iswhether there is a critical mass remaining to once again ramp up volume for regular electronics manufacturing.

2) Materials Lead-Time: With any sourcing of materials, somewhere there will be a lead-time issue, often related to key components. If our factory is going to respond directly to customer delivery requirements, how is the ordering of materials going to be managed and controlled? The answer is actually quite simple. Nothing changes. Although the manufacturing location has changed and the distribution chain is a mere fraction of what it was, the product, and the market remain as they were. Product management, sales, and marketing are still working together to plan and manage the medium and long-term life of the product based on advertising promotions and price control. All that has changed is how the short-term fluctuations in demand are dealt with. There is no replacement of any of the key business functions, in fact, this solution can be thought of as an enhancement to those **ERP** systems





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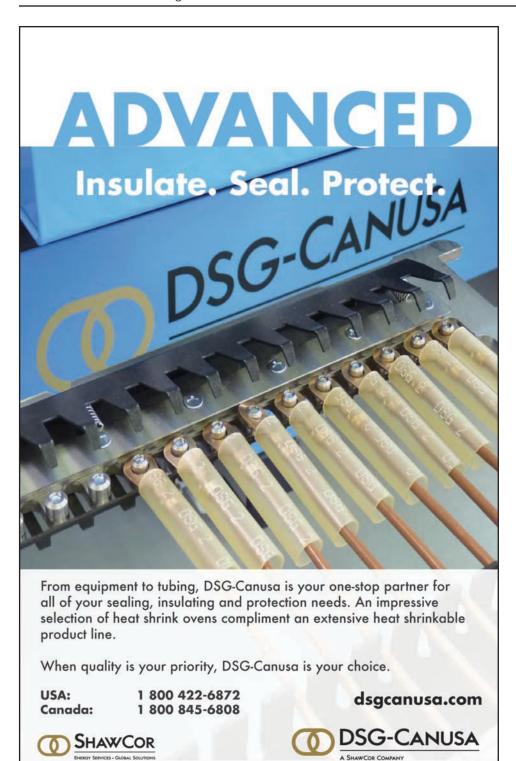
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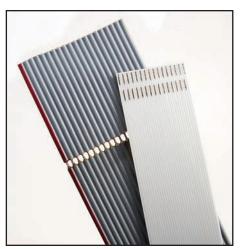
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MJM Industries Inc. Announces Acquisition of New Laser Wire Stripper Machine

MIM Industries Inc., an electronic contract manufacturer has announced the addition of a laser wire stripping machine to their operations. This machine precisely removes the insulating cover from wires preventing damage to the underlying wire. Laser wire stripping machines are the best choice for very fine gauge wires because no damage occurs to the conductor. Applications range from aerospace and aircraft power leads to wires for dental and medical drills, hearing aids, catheters, pacemakers, ultrasound transducers and other devices. Automotive applications include electronic cables, air bag harnesses, small motors and actuators.



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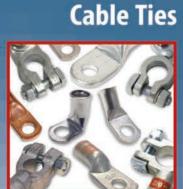










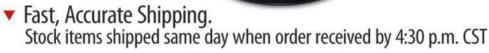






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Time Management and Delegation: Science or Art?

By Loren Smith

anaging one's time is a central topic in the business world, particularly for CEOs, but whether you are a CEO, engineer, manufacturing superintendent or self-employed handyman, the ability to prioritize and work efficiently can spell the difference between exceptional performance and poor performance.

Many approach time management as a science, conducting research, writing books, presenting seminars, creating time management programs and courses and even developing applications for computers and smartphones.

Without knocking any of those pursuits or offerings - because I have gained insight from several - I just want to emphasize an under-appreciated, essential point for bosses and managers: the importance of effective delegating.

In my years in the wire harness industry, I have observed a strong correlation between the ability to delegate and the ability to grow a business. A primary reason many companies top out at a particular revenue level or number of employees correlates significantly to the founder or CEO's ability--or desire--to delegate. To put this more positively, I credit an understanding of the importance of delegation as a critical factor in growth from small- to medium-size operations

The wire harness industry, and other fragmented industries, consists of hundreds of companies with revenues under \$10 million. While you might argue that the reason for this is low barriers to entry, I argue that fragmentation is often a function of one or more people at the top spreading themselves too thin.



Loren Smith, CEO

tion of priorities as a cause. We all know that chief reasons for resistance to delegation are a tendency to be controlling or the belief that no one can do this as well as I can. But I think there are other psychological issues at play:

One is that doing is often easier than thinking--or faster, in the short run, than assigning a task to someone who may need our guidance to accomplish it. For example, let's say a problem arises. A natural tendency is fixing it ourselves rather than delegating the fix to someone else or, better yet, teaming with someone to analyze why the problem happened and then giving that employee the responsibility of making a change to help prevent a recurrence. In that way, an employee feels our trust and has the opportunity to grow professionally, and we have more time to focus on the real priorities of running a company.

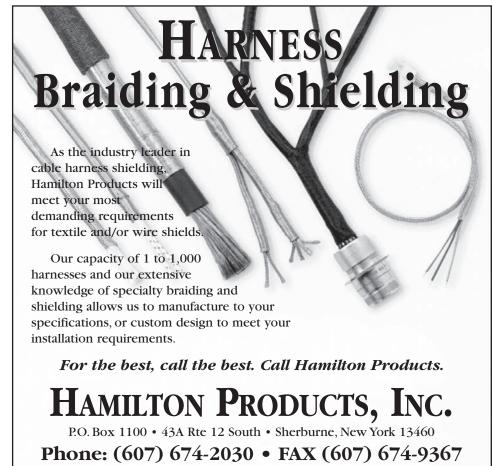
So here's an experiment: Don't throw away your to-do lists after you've egation fragmenting your time and keeping you from focusing on key business matters?

And remember, not having to do everything yourself means you are also allowed to get help improving your delegation skills. Maybe an outside consultant or someone within your company can lend a hand in refining your management style so your efforts are pointed in the right direction. (You may have heard of heads of huge companies who have

no papers on their desks. They want to be absorbed in thinking, learning and leading, not doing.)

So is time management an art or a science? I say both. In terms of study and analysis, more science. In terms of one's will and continual perfecting of one's skill with delegation, more art.

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



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The Real Costs of Insufficient Testing

By Kevin Ellsworth,
Product Manager at Cirris Systems

the tradeoff between cost and quality. The price of test equipment is one of the primary factors considered in determining the cost of a test system, but often neglected is thinking through the real costs of having an insufficient test system.

Defects introduced in the manufacturing process will always cost time and money. The size of that cost, however, depends largely on when in the process the defects are discovered. The cost of a defect rises exponentially the later in the process it is discovered. Defects found immediately after they are caused are easy to fix while defects found by the end user of a product can be very costly to the company.

This principle is easy to examine in the world of electrical testing. We can break down the costs associated with finding and fixing a defect at various stages of the manufacturing process. Consider the example of an operator swapping two pins in a connector on a moderately complex harness assembly. For each stage we'll break down what steps must be taken to fix the defect if it was not detected until that stage.

Assembly

If the operator knows immediately that they have put the pin into the wrong cavity the fix only takes a few seconds to move it to the correct cavity. Automated test equipment can be used at individual build stations to check for errors as the harness is built and ensure operators catch mistakes. Errors reported by the tester are easy to diagnose because the last action the operator took must have been the cause of the error. A fix at this stage costs almost nothing.

Final Electrical Test

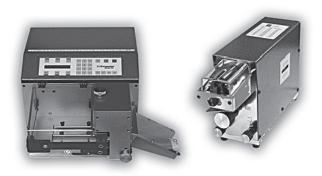
Errors in a final test can take more time to diagnose because any of the finished connections could be the source of the error. If you are using good automated test equipment you should be able to quickly identify the defect that caused a test error. If not, it may take more effort to understand the real problem. Often times once the defect is identified the harness must be transported from the test area back to an operator. The defect has to be described to the

_Continued on page 18

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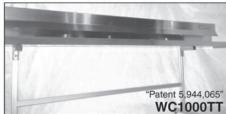
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Costs of Insufficient Testing

Continued from page 16

operator so they know how to fix it. If the harness was fully complete then the operator may have to cut through braiding or tubing and scrap some material to get to the connector to fix the problem. Then after fixing the problem the operator will have to redo the work that was done previously to put the harness back together, transport it back to the test area, and have the test operator perform the final test again. All of those steps can add up to significant time and material costs that are not included in the production schedule or bill of materials.

Functional Test

If the harness defect is not caught until it is installed into the end product the diagnostic time can go up even further. Often the harness is just one of many pieces in a system that could be causing the problem. Determining the source of a functional test failure can be an extensive and expensive process. Once the harness is identified as the cause of the problem it will have to be removed from the product and then the specific defect may have to be diagnosed separately. All of the work from the Final Test stage explained above will have to be performed to fix the defect and then the harness will have to be reinstalled into the product and the functional test performed again. The time spent in these efforts can add significant costs, but often the worst case

scenario at this stage is if the nature of the defect damages the product. One example is of a company that makes high end gyroscopic cameras for search and rescue operations. While performing a functional test on their product, two swapped wires caused the camera to burn up, costing tens of thousands of dollars.

End User

The most costly scenario is to have the defect found by the end user of the product. Depending on the product, you may have to pay for the product to be returned to you, or pay to send someone out to inspect the product. One company that makes a product for the trucking industry frequently spends over \$1,500 simply to get a technician out to diagnose a problem in the truck. A much larger cost, however, could occur if the defect causes you to lose credibility in the eyes of your customer, or even the industry. One extreme example is a cable shop that was involved in an automotive recall due to a faulty cable they produced. This cost them over \$1,000,000 in immediate costs and an unknown amount of lost future revenue due to decreased reputation.

What is your cost?

The real cost of a defect for your company will depend on a number of factors, but taking the time to figure out

_Continued on page 20

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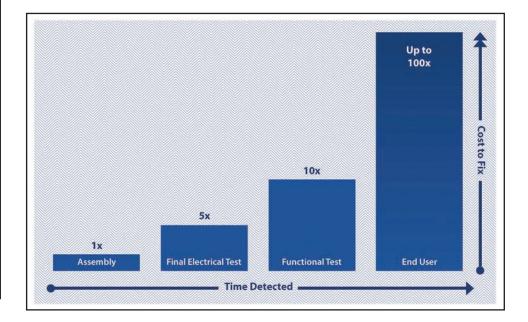
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Costs of Insufficient Testing

Continued from page 18

this information can be extremely valuable. Once you understand what a defect may cost you if found at each stage of the process, making a decision on how to implement your test process should be much easier. As an example, one company building a complex product determined that a certain type of defect discovered in the functional test stage cost them \$15,000. This type of defect occurred, on average, once a month. So the cost of missing this defect earlier in the process was $15,000 / defect \times 12 defects / year =$ \$180,000 / year. Thus any investment less than \$180,000 in equipment or process improvements that could detect this error earlier would be saving money in the long run. The numbers will be different for your company but the principle is the same - knowing the numbers will allow you to know how much you should invest in improving your process. And chances are that simple process changes, like performing an extra test a step earlier in the assembly process, can yield significant savings with relatively little cost.

If you want to be confident you are utilizing the right test process, take the time to determine if there are potential costs you may be overlooking. For electrical testing, Cirris Systems offers a free tool to help determine the cost of defects at www.cirris.com/realcost.This information will allow you to consider not just the costs of setting up an appropriate test system, but also the costs of failing to do so.





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Manufacturing Environment

Following is a brief narrative of a presentation given recently by Patrick Boyer at the EWPT Expo in Milwaukee. Mr. Boyer is the Special Applications Project Manager for Komax.

Today, contract manufacturers in the wire and cable harness industry face many challenges related to the high mix/low volume aspect of the business. They are often confronted with unpredictable forecasting, tooling changeovers, rework due to engineering changes, and shorter lead times. Increased complexity of

today's harnesses can greatly increase the cost of inventory and WIP (Work In Progress), and boost rework costs due to manufacturing errors. These costs increase dramatically as the harness progresses through production, testing, and into the field.

In general, contract manufacturing leads manufacturers towards batch manufacturing. The wire harness industry is characterized by many manual processes, and this will likely continue to be the case. The task for the harness shop is to reduce these manual processes wherever possible and relocate personnel to less repetitive tasks. Machine production time should be optimized by reducing setups and number of changeovers and reducing machine downtime. Production should be scheduled, not just by harnesses/sequences for high runners, but more so by common materials (wires, terminals, seals, connectors, etc.) are used in multiple harnesses. By optimizing production by material with the longest changeover time, and having tooling readily available at the machine for the next job, this task can be greatly enhanced. Utilizing equipment setup storage capabilities and instituting strong preventative maintenance programs will also reduce cost and downtime.

A strong quality program starts with quality materials. Too often, money saved on damaged material, or lower cost components, results in processing defects. The cost of these defects often overshadows the money saved. But excellent input materials are not the only essential to an effective quality program. Great

effort should also be extended to reduce errors in machine programming and setup. Properly trained operators and maintenance personnel are also essential to the overall quality effort.

As with any endeavor, defects are a reality in the high mix/low volume arena. But the information these defective products tell a valuable story. Defects should be closely analyzed through root-cause analysis to pin point the area of concern. They should be fully analyzed to prevent future defects in an effort to improve quality.

OEE

Faced with capacity issues, many companies act immediately to increase overtime, add shifts, or purchase new equipment. Instead they should endeavor to optimize their existing machines to increase equipment reliability, improve operator performance, minimize changeover time, and lower overall downtime. One of the most effective tools to accomplish this is OEE (Overall Equipment Effectiveness). Expressed mathematically, OEE % = Availability % X Performance % X

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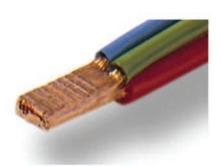
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Optimizing the High Mix/Low Volume Manufacturing Environment

Continued from page 23

Quality %. Availability is defined as the total run time of a machine, minus all unplanned downtime. Performance is how well a machine is running during operation. Quality is how many good parts are produced versus bad ones. Typical OEE is 60 percent, while world class OEE is 85%.

In addition to the manufacturing techniques several technological advances in equipment can be implemented to increase OEE. Bar code scanners are a great way to collect information from a database (wire size, strip length, connector type, etc.) because machines can be set up instantly without human error. ECAD systems like ePLAN can be used as design rule programs to foresee production issues at the engineering drawing board, and provide continuous data flow to machine and production floor. Equipment can be

fitted with automated processes for testing crimp height, length check, strip quality to spot defects early, and at their source. Loop transfers machines, like the Komax Zeta line, can be utilized to kit multiple wires with different seals, crimps, welds, markings, etc. These wires can be from different harness jobs, but the operations can be grouped for effi-

OEE optimization is a great way to improve performance in the high mix/low volume environment of the wire harness industry. It may involve some rethinking on the shop floor, but when effectively implemented, it can be a margin enhancing tool.

Patrick Boyer is a 20 year veteran of the wire processing industry and currently works for Komax Corporation as Harness Machine Product Manager and Automation Project Manager. For more information, please contact Patrick at: info.buf@komaxgroup.com





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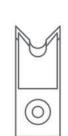
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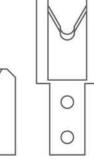


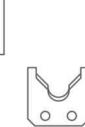
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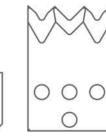


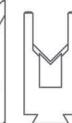












Cable and Harness Manufacturing CableEye® Q&A



HVS Test System showing screenshot of 4-wire measurement option.

What is CableEye?

CableEye is an expandable and upgradable diagnostic and Pass/Fail Cable and Harness Test System that's PC-based. It's used for assembly, prototyping, production, and QC of standard or custom wire cables and harnesses.

Each of our five models instantly measures, displays, and documents basic electrical properties. Both HiPot models, for example, can test resistance, dielectric breakdown, insulation resistance, miswires, and sporadic defects.

Most significantly, it's a system that can reliably improve productivity, product quality, and documentation ... with rapid ROI. Because it's backwards compatible for all system hardware and software upgrades, handles extensive product complexity, and has a comprehensive test portfolio, it ensures usability, and thus investment longevity, across product lines, lifecycles, and generations - so it remains relevant as our customer's product design changes.

We've several tomers still using 15 year and older CableEye systems because they've been able to keep them relevant merely by installing software updates. Current CableEye software can operate all models dating back to the very first manufactured in 1993, and run on any PC operating system from DOS, through basic Windows, to the latest Windows release.

What are the alternatives to CableEye and how do they compare?

There are three categories of test systems on the market: PC-based

(external control), microprocessor control, embedded PC (EPC) control ... from \$1,300, \$1,000, and \$4,700 respectively. As you can see, the price of an E-PC system is significantly more than a PC-based system even after adding in the price of a computer. At these price points, more functionality like automation scripting, file management, and a dynamic graphical user interface is included with PCbased systems than with the others, with microprocessor controlled systems having the least.

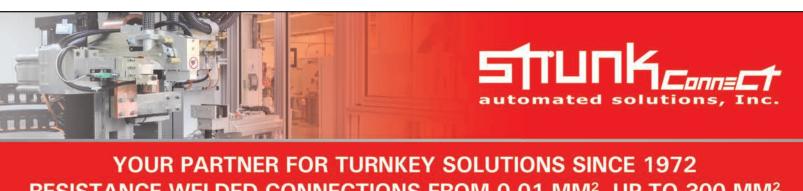
A PC-based system not only tests cables, but also provides an integrated software package for cable design, labeling, documentation, cataloging, data logging, online assembly checking, and test scripting. It supports elimination of errors in transcription, drawing, and rekeying of wire lists as cables pass through design, test, and documentation phases. The user interface capitalizes on the presence of a full color computer display, even to the extent of optional touch screen operation.

_____Continued on page 27



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Cable and Harness Manufacturing CableEye® Q&A

Continued from page 25_

CableEye, distinguishes itself from microprocessor and E-PC controlled systems in that not only does it have expandable and upgradable capabilities, but it also remains backwards compatible for all system hardware and software upgrades. This means it has the greatest investment longevity, because the equipment itself, test fixtures, data-acquisition electronics, connector cards, and the procedures and processes into which the system becomes embedded, all remain viable.

While the modern trend is towards PC-based systems, the largest volume of cable and harness equipment sold today is microprocessor-controlled. As they're not PC-based, they can't be upgraded. A popular tester design employed by several manufacturers uses a cigar-box-shaped chassis with assembly-language-driven embedded microprocessor control, rockerswitch pushbuttons, and an LCD character display. While some PC software is offered to link these testers to a PC, the software is optional and provides little more that cable file storage.

Although CableEye PCbased systems are similar to microprocessor systems in that they offer a small bench footprint and easeof- use, onebutton automatic sequences well-suited for production line testing, they differ in that PC-based systems also offer a dynamically searchable database, documentation, and data logging capabilities needed for ISO9000-certified companies, and design, diagnostic, and assembly capabilities ... so may be used beyond the production line right across the workflow.

Several standalone models are available that use E-PC control. Like the microprocessor systems, these also tend to have cigar-boxshaped chassis. While an external keyboard and monitor can be connected, these systems were designed for use with an onboard touch screen display and are more like an EM tester than like a PC-based system. By designing a PC-controller into the tester, these companies add significant hardware complexity (and some system functionality) to the tester which results in:

• considerably increased cost to the purchaser (by at least 50%),

• reduced reliability due to a greater number of components and thus an increased likelihood of failure

- higher repair cost should the system require maintenance.
- more challenging (costly) h/w and s/w upgrading.

If a hard drive is also installed, they become more susceptible to shock-induced failure because of the unit's small size and portability compared to a desktop/laptop PC, and because of their intended use in a production environment. However, without a mass storage device, much of the potential of a PC-based system is lost.

Who benefits from using the system?

Companies who produce or integrate cables and harnesses in their products, or who test/repair their own (or other's) capital equipment that incorporates cables or harnesses.

Employees across the workflow at the above companies in the areas of design, assembly, prototyping, piloting, production, QC, and shipping from engineers to technicians and managers to production line workers.

___Continued on page 29

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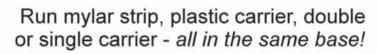
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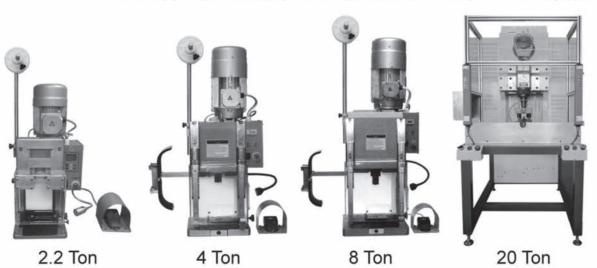
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Cablescan's Series 90 TestRite programs run under the most popular Windows operating systems, and can import wire lists, net lists, and CAD data. TestRite's browser window allows you to provide setup and work instructions using HTML, image, and audio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







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Cable and Harness Manufacturing CableEye® Q&A

Continued from page 27_

Really anyone who has an interest in:

- improving quality and productivity
- flexible, comprehensive or pass/fail testing
- a system platform that, as time passes, remains relevant across the workflow as their products change.

How does cable and harness testing with CableEye increase productivity?

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

CableEye facilitates increased productivity of quality, ready-to-ship products by encouraging error detection and resolution as upstream as can be designed-in to a manufacturing process. Error detection and correction is far more complex and time consuming if testing is only performed on a fully integrated system or product.

Clearly, down-time of revenuegenerating cabled or harnessed capital equipment can be minimized by accurate identification and diagnosis of failed cables.

Can all cables/connectors be tested with the test system, or are there specific types for which it is intended?

CableEye cable and harness test systems are unlimited by connector type (or whether connectors are present at all), and address applications with long cables or no cables (e.g. backplane, PCB).

All CableEye systems come with software that includes over 500 connector graphics, and enough dynamic templates that users can automatically generate graphic images of many standard connector shapes with the needed pin count for use in custom cable designs and printed reports. And then our optional Connector DesignerTM software, lets users design with unlimited shapes of connectors. They can even import a photograph for connector design manipulation. One of our more unique solutions, is the design of a connectorized catheter.

Our system is also supported by a growing, extensive library of about 60 connector boards, most of

_Continued on page 30



The CT4 Coastelmatic Pneumatic Tool Holder

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Cable and Harness Manufacturing CableEye® Q&A

Continued from page 27 __

which are populated with 'families' of connectors such as the audio market CB19.

You may mix and match these boards in whatever combination you require to test a cable, and the system will automatically select and display the correct connector graphic.

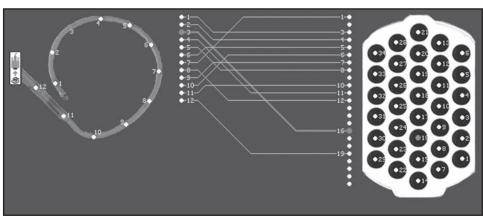
There are options for testing unusual connectors or connector combinations such as mounting them on our unpopulated CB8 or CB29 boards, or working with us to customize their own board.

To test harnesses, depending on the size, our users (a) build a mating harness, (b) construct a panel with all of connectors present, (c) build "pigtail"

cables, or (d) mount mating connectors on the CB8 custom interface board. All connectors and pins can be custom labelled with our PinMapTM software.

How much time can be saved by using CableEye? How much more productive will a user be with the system

CableEye is so simple to use, that most people have the hardware connected, the software installed, and begin testing within about 10 minutes. It's 'plug and play'. And customers report amazing increases in productivity. They've measured production time reduction in just the first few hours of use.All our models are USB certified yielding fast test times. Low voltage tests



Connector Designer™ Screenshot: connectorized design of imported catheter photograph.

performed by base units are literally faster than the blink of an eye.

Before proceeding to test, connectors not already existing in the connector library must be one-time mapped to CableEye's tester headers. Mapping the pins of complex and customized connectors, test fixtures or such, is a breeze with **PinMap**™. Audible-toneprompted, the user remains focused on the pins,

> rapidly probing the full set. No key entry is required - PinMap automatically generates a true, rather than generic, visual representation - a userfriendly visual that is easy, and therefore quick, to interpret.

> For assembling complex or mission-critical connectors, we recommend our Light- DirectorTM accessory. Assemblers can anticipate being able to roughly double their assembly rate over that of manual assembly ... they experience near zero assembly errors, and less personal fatigue.

> CableEye is designed in such a way that the same equipment used for assembly can be used for testing, so there is no loss of time in moving the assembled piece to another workstation for testing. Feedback on the quality of assembled work is immediate.

Basically, the graphical user interface with its dynamic graphics and net list contributes to faster and more accurate design, assembly, test, and diagnosis, the result of which is improved productivity.

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

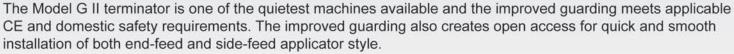
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- Total and batch counter
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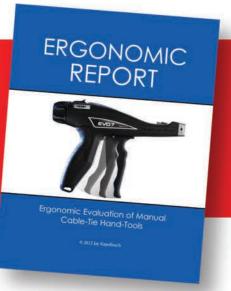
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A New Paradigm in **Crimping Press Design**

By Rob Boyd, **Senior Product Manager** Schleuniger, Inc.

t goes without saying that manufacturing companies want the highest possible quality at the lowest possible cost. These days, everyone is trying to do more with less in order to stay relevant in a competitive environment.



This can be especially true of automatic crimping presses. Conventional designs use thick, steel side-plates or a cast frame in conjunction with a motor and gear box combination. proven designs work very well, however, manufacturing costs (and there-

fore end-user pricing) are higher than desired. These high manufacturing costs are due to very high tolerance requirements for many of the components used

in conventional crimping presses. The performance of conventional presses also degrades over time due to the design of the motor and gearbox combination.

Recently, a radical new design in automatic crimping presses was introduced. The new design created a compact, efficient and cost-effective press with high

ty and durability. The design is simple, easy to manufacture as well as easy to set up and maintain. In addition, the new design takes into consideration application flexibility and integrated crimp force monitoring.



The frame is made of formed sheet metal rather than solid pieces of heavy steel or a cast frame, and instead of the conventional motor and gearbox combination, a direct belt-drive system is used. A patented ram spring mechanism is incorporated into the press ram, providing excel-



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lent consistency and durability. An adjustable press easily accommodates the wide range of crimping applicators on the market.

Frame Design

Comparing the different frame designs further explains why the formed sheet metal design was chosen. Cast frames are very low cost and very rugged; however, volumes must be very high for the initial investment costs to be justified. Welded frame constructions are also very durable but the manufacturing process is relatively expensive. Similarly, using heavy, solid steel side plates has been proven as a very durable design. Unfortunately, the manufacturing process has proven to be too expensive due to the required milling and plating processes. Furthermore, it was determined that the solid steel side plate construction is overkill for forces up to 20 kN (2 tons). The force load distribution over the side plates does not require the same thickness throughout the entire width to achieve the desired results for the target applications.

The forces exerted by the crimping process on the side plates are opposing from front to back. High, outward forces are exerted on the front of the side plates (closest to the applicator). In contrast, lower inward forces are exerted on the back of the side plates. Between the front and the back, the forces cancel. Therefore, it is not necessary to have the same support structure, e.g. side plate thickness, throughout the entire side

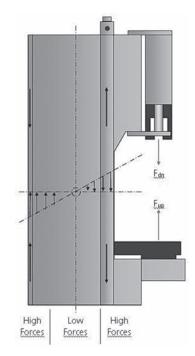


plate. The formed steel side plates support these forces where it is exerted, in the front and the back.

At first, building a crimping press out of formed sheet metal seemed to be a radical concept; however, it has been used successfully in other industries. One example is truck frames. Truck frames are made of formed sheet metal that support forces far greater than realized on a crimping press.

Drive Design

The traditional gearmotor drive design is effective, yet expensive. The gearbox, shaft and ram coupling must be aligned perfectly to prevent premature bearing wear. Tolerances need to be very

Continued on page 38



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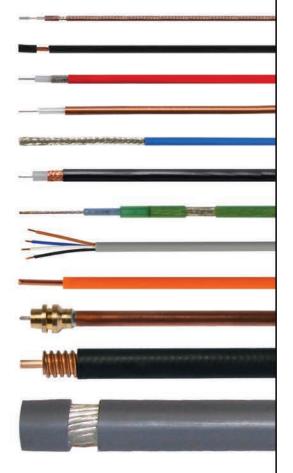


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"The CrimpCenter 36 S gives us the best accuracy and flexibility to run a wide range of wire types and sizes. Schleuniger gives us world class service to match the outstanding ability of the CrimpCenter 36 S. An unbeatable combination!"

Donnie Hill, Precision Manufacturing Co. Inc.



To Be Precise.



BURNDY® Announces Release of PATCUT4CUAL-LI 4.00" O.D. Battery Operated Cutter with Assist Handle

BURNDY®, a leading manufacturer and provider of connector and tooling solutions to the industrial, energy, construction, telecommunications, petrochemical, data center, and transportation industries, is pleased to announce the latest addition to its PATRIOT® family of premier and reliable battery powered installation tools.

The PATCUT4CUAL-LI, 11-Ton 18V Lithi-

um-lon battery powered cable cutter, is specifically designed to accommodate large copper and aluminum cables up to 4.00" diameter, typically seen in underground environments for power and communication applications.

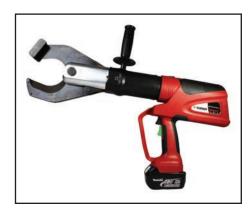
Built on the BURNDY® INFINITY DRIVE® transmission platform, the PATCUT4CUAL-LI offers a clean and consistent cut every time. Designed for reliability and long term use, the extra wide opening cutting jaw has hardened steel blades featuring a state-of-the-art scissor-action style jaw enabling the user to lift cable off the ground. An attached blade guide also maintains proper blade alignment during use.

A multi-position assist handle is included to help with balance, comfort, and operator control. An over-molded grip

area helps to facilitate better, more secure handling. Additional features include a 355° rotatable head allowing for maximum flexibility in confined work areas, and a built in safety trigger guard that helps to prevent accidental activation of the tool.

BURNDY® offers a lifetime warranty on the INFINITY DRIVE® transmission, a 5-year limited warranty (excluding blades) for the tool and a 1-year limited warranty on the batteries and charger.

Headquartered in Manchester, New Hampshire BURNDY has over 90 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



The PATCUT4CUAL-LI, 11-Ton 18V Lithium-lon battery powered cable cutter

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.

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

With an IP65 NEMA rating, the Brad Micro-Push connectors protect against ingress of solids and can withstand low-pressure 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 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



Give us a call today at 262.524.1100 or visit www.schaefer.biz

Molex, visit www.molex.com/link/ micro-pushm12.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.



Brad® Micro-Push® Connectors

The Molex website 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.

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 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 awardwinning 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."

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.

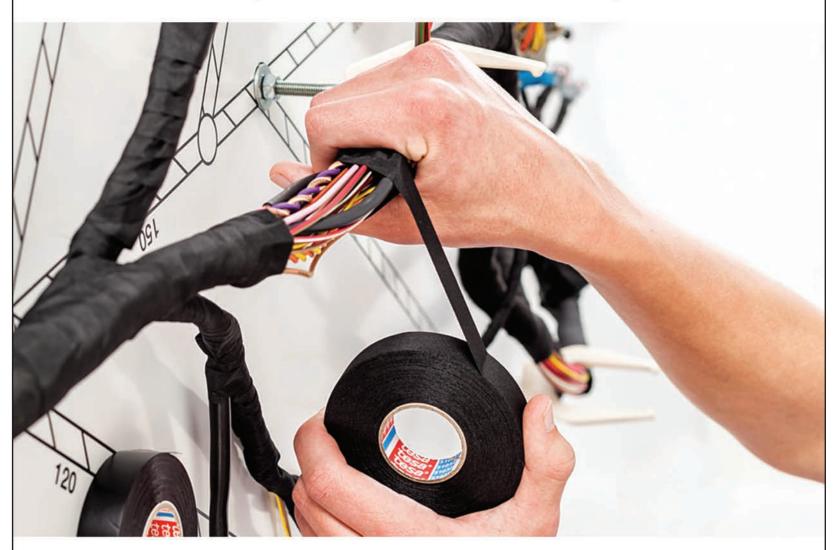
Nordson ASYMTEK, a leader in precision automated fluid dispensing, conformal coating, and jetting technologies, designs and manufactures dispensing and coating systems, supported by an award-winning global applications and service network for over 30 years.

To find out more, visit www.Nord-sonASYMTEK.com

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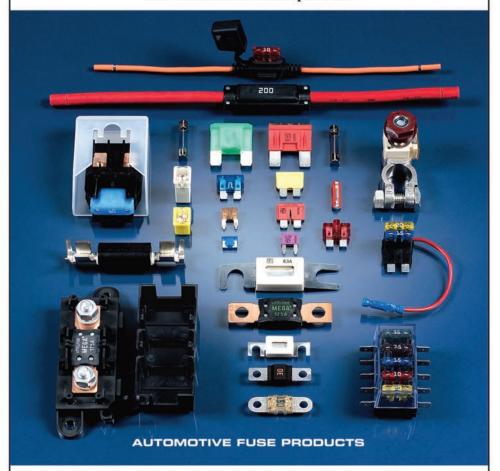
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A New Paradigm in Crimping Press Design

Continued from page 33

tight and these tighter tolerances mean higher prices. Furthermore, if parts are installed incorrectly, components will wear prematurely. Finally, as we all know, mechanical parts inevitably wear over time. After millions of cycles, excess play begins to degrade performance. The challenge in new presses was to design a crimping press that could achieve the same or better durability and precision with a simpler, lower cost design.

The implementation of a belt drive makes the design much simpler and, as a result, much easier to manufacture and assemble. Tolerances are less critical because the flexible timing belt will compensate. Because of the looser tolerances, parts are less expensive. An added benefit of this design is that servicing is much easier as well.

A simple spring was the key

So how do you get precision from a system that has relaxed tolerances? It is

true that relaxed tolerances inherently mean that there is more play in the system. However, the answer was quite simple: a spring. A spring mechanism that compresses all of the excess play at the bottom of the crimping stroke, where the precision is needed most, is key. This simple spring assembly provides considerably better process capability results. Throughout the life of the press, the spring mechanism continues to remove excess play as parts wear. Machine capability and precision remain consistent for a much longer period of time, therefore extending the lifetime of the machine.

Conclusion

Through external and long-term testing, the new design concepts have proven to provide world-class performance and durability over an extended period of time. Next time you purchase a new crimping press, be sure to take a closer look at the design first. It will ensure you get the most bang for your buck!

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A NEW DIMENSION IN ULTRASONIC SPLICING



TELSOSPLICE – New possibilities in welding splices at a station or on the harness board

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HE POWERHOUSE OF ULTRASONIC

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



business experience—highest-quality, U.S.A.built wire strippers and markers backed by dedicated people itching to solve your wire problems.

Call us today. We'll put this "can do" attitude to work for you till the cows come home.

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Amphenol OCS High-Speed Connectors

Amphenol OCS connectors (oval contact system) are the newest high-speed interconnects delivering data rates of up to 10 Gbps per pair. The Amphenol OCS series features improved signal integrity via reduced cross talk. OCS offers enhanced attenuation performance as compared to other industry-standard quadrax high-speed connectors.

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

Amphenol OCS Series Feature:

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



TLR2HW Metal Plate Chip Current Sense Resistor

For further information visi http://www.peigenesis.com/

NEW Flat Cable Configurator

Cicoil, a leading manufacturer of Flexible Flat Cables, is pleased to announce its NEW EZ-FlexxTM 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-FlexxTM cable 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 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/configurator.asp.

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

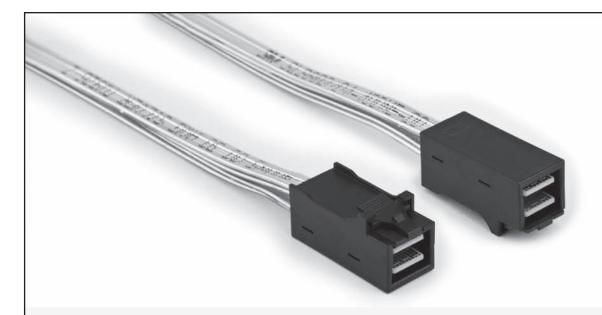
All cables are encapsulated with Cicoil's exclusive, crystal-clear Flexx-Sil™ jacketing compound, which clearly shows the purity and cleanliness of the material, as well as the precise placement of each individual cable component.

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-SilTM 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.





Your system should be built around performance, not around your cables.

3M™ High Routability Internal MiniSAS HD Cable Assembly

- Utilizes 3M's ultra low-profile, high-speed, high signal density 3M™ Twin Axial Cable SL8800 Series
- HD miniSAS (SFF-8643) form factor provides double the density when compared to 36P miniSAS (SFF-8087)
- Thin, low profile allows more routing options within a case, and enables many packaging configurations
- Foldable ribbon construction allows for extremely tight bend radii with minimal performance impact
- Ideal for space-constrained systems
- · Provides excellent transmission properties, allowing signals to go the distance
- Designed to meet SAS 2.1 (6 Gbps) and SAS 3.0 (12 Gbps)
- · Meets or exceeds SFF-8643 specifications

No compromises

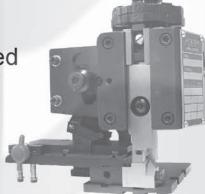


Crimping Applicators



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

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

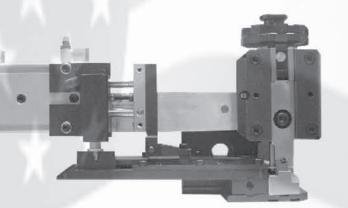


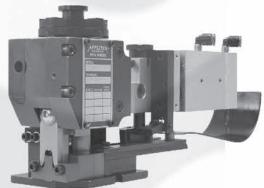


Model 1700

Model 2000

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

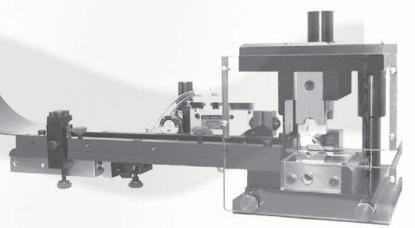




Model 1500

Model 2100

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

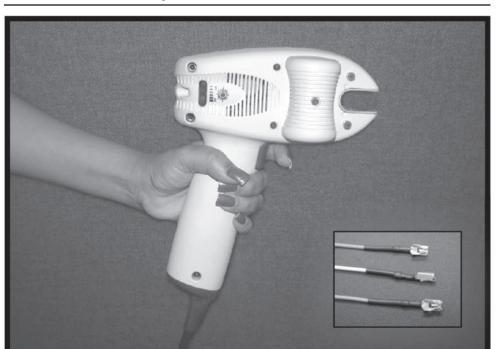


DSA Series

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

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

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



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

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

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

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

average energy expended by the bulbs to be delivered to the target zone. What you will see is an amazing difference in shrink time!

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







WIREwisdom" ANIXER.



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

LOW-VOLTAGE CABLE SHIELDING

WHY ARE SHIELDS USED?

Low-voltage cable shielding provides an efficient way to manage electromagnetic interference (EMI). All cables that carry electrical signals radiate, or leak, electromagnetic energy into their surroundings. Likewise, cables located in an area where electromagnetic energy is present can also "pick up" unwanted energy just as an antenna picks up radio signals. If the electromagnetic energy is not properly managed problems can arise. For example, process control circuits can malfunction or computers may lock up.

Shields protect the cable from EMI and help contain any EMI generated by the cable. Shield effectiveness depends on the type of signal being carried by the cable and the shield type.

WHAT ARE THE BASIC TYPES?

Many types of shields have been developed to meet the electrical and mechanical requirements of thousands of different cable applications. The most common types include the following.

- Copper braid shield a braid shield consists of small gauge copper wires braided into a mesh around the cable core. Typical coverage ranges from 65 percent to 98 percent.
- Foil shield foil shields are constructed of a metallic (typically aluminum) foil with a 1/2-mil thick polyester backing to increase mechanical strength. The shield can be overlapped with the foil fac-

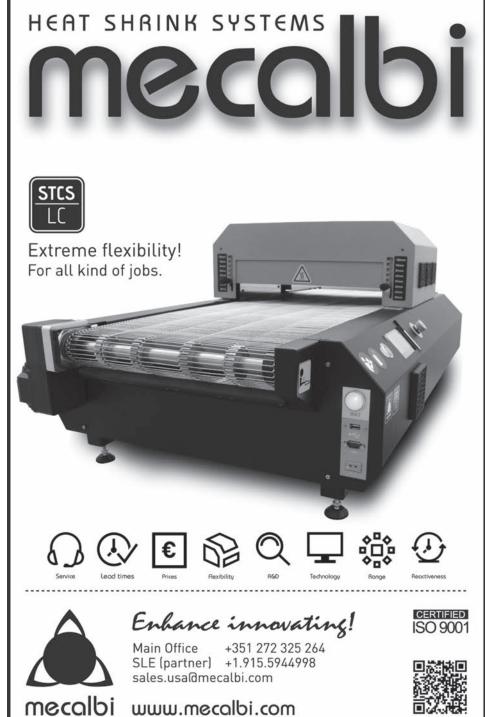


Figure 1: Foil and braid shield types.

ing in or the foil facing out. A drain wire is placed in contact with the foil side of the shield to provide easier grounding of the shield at cable terminations.

- Spiral (serve) shield these shields are typically constructed with bare or tinned small gauge copper wires that are helically applied in a flat or ribbon configuration. Spiral shields range in coverage from 80 percent to about 97 percent. These shields are used primarily in audio, microphone and retractile cord cables where extreme flexibility and a long flexlife are required.
- Foil and braid combination foil and braid shields are used together to provide shielding at both high and low frequencies while maintaining mechanical strength.
- Corrugated metallic tubes copper or aluminum that is thicker than foil but thinner than armor is formed into a corrugated tube around the cable core. It is typically used in applications such as electrical substations where large fault currents and induced noise are possible.
- Armor mechanical protection is the primary function of armor, although it does provide some level of shielding.





WHICH TYPES ARE MOST EFFECTIVE?

Shield effectiveness depends on the type of signal being carried by the cable. It also usually involves some compromises with regard to cable flexibility and mechanical protection. See Table 1 for an overview.

For low-frequency applications (up to about 1 MHz), braid or spiral wire shields are often used. At low frequencies, end-to-end electrical resistance of the shield is an important factor in shield effectiveness. Microphone cables are often made with a spiral wire shield because this type of shield is effective at audio frequencies, it has a low cost and has the desired flexibility and flex-life.

For medium-frequency applications (1 MHz to about 100 MHz), braid shields are often used. Braid shield effectiveness depends on the "coverage," i.e., the tightness of the weave. Coverage generally ranges from a low of about 65 percent to 98 percent. Higher braid coverage results in better shield performance, but also higher cost.

For high-frequency applications (above 100 MHz), braid shields are often used in combination with foil. This is because the little "windows" in a braid shield begin to "leak" energy at high frequencies. The addi-

tion of an aluminum foil shield under the braid effectively blocks this leakage.

HOW DO YOU PROPERLY GROUND A SHIELD?

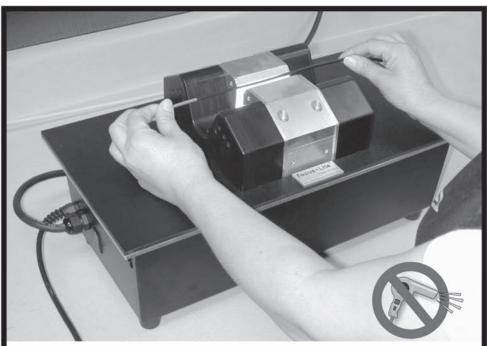
Proper grounding of a shield can have as much affect on performance as the choice of shield type. A few recommendations for maximum EMI control are as fol-

- At terminations, strip the shield back as little as possible to keep unshielded areas to a minimum.
- Carefully follow the recommendations of the manufacturer of the attached equipment regarding where and how to connect the shield.
- The shield should not be used as an electrical conductor. It is designed only to provide shielding (coaxial cable is an exception to this rule).
- The shield of each cable should be covered with an insulating jacket to prevent unintentional multiple grounding of the shield.
- The shields of grounded junction thermocouple circuits should be grounded at or near the thermocouple well.

More information is available in IEEE Standard 1143 Guide on Shielding Practice for Low Voltage Cables.

Table 1: Common Shield Type Characteristics

	Braid	Spiral	Foil
Percent Coverage	65-98%	80-95%	100%
Low-Frequency Effectiveness	Excellent	Good	Fair
High-Frequency Effectiveness	Good	Fair	Excellent
Mechanical Strength	Excellent	Good	Fair
Flexibility	Good	Excellent	Good
Flex-Life	Good	Excellent	Fair



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™ reduces the time necessary to shrink most types of heat shrink tubing. It also improves the process control and overall quality of your shrink operation. The The Focus-Lite™ can be used for high volume bench top applications as well as low volume prototypes and laboratory applications.

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

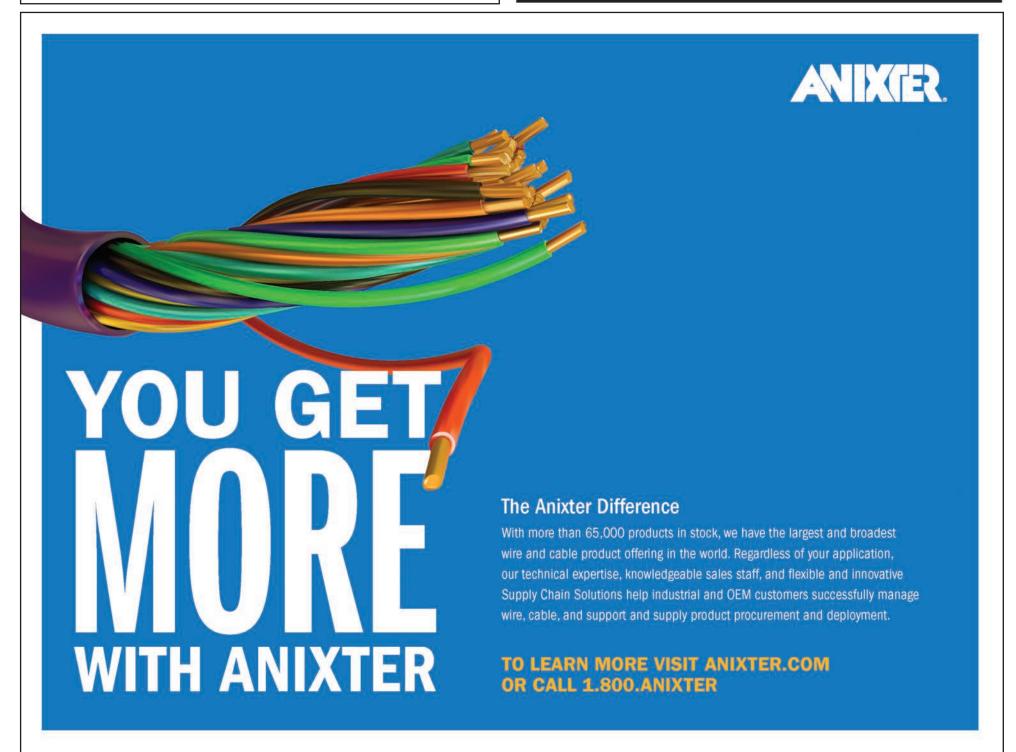
Here's why it works: Dual Quartz Halogen bulbs are focused to direct all of the usable radiant energy to the cable/wire diameter covered by shrink tube. This allows for 10 times the average energy expended by the bulbs to be delivered to the target zone. What you will see is an amazing difference in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













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

BURNDY®, a leading manufacturer and provider of connector solutions to the industrial, energy, construction, telecommunication, petro-



HYREDUCER™ Kits

chemical, data center, and transportation industries, announces the expanded line of HYREDUCER™ (YSR-TC) In-line Splice Reducer Product Line. Originally designed for the telecommunication industry to provide better wire management solutions when reducing conductors with irreversible compression connectors, other industries have seen the benefits and to answer these needs, BURNDY has expanded the line. These connector kits provide an in-line reduction of two conductors while keeping space requirements to a minimum.

The HYREDUCER™ kits are prepackage with the YSR connector, heavy duty clear Telcordia GR-347-CORE "Abrasion and Cut Test" approved heat shrink and an installation instruction sheet. All YSR-TC connectors have an inspection hole to visually check for a fully inserted conductor. All YSR-TC are UL Listed and CSA Certified when crimped with the approved tool and die combination, a part of the BURNDY® Engineered System.

For further information contact BURNDY, 47 E. Industrial Park Drive, Manchester, New Hampshire, 03109 or visit www.BURNDY.com

Since 2009, BURNDY LLC has been a key brand under the Electrical Systems Platform of Hubbell Incorporated. More information can be found at www.Hubbell.com

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

Amphenol OCS High-Speed Connectors

Amphenol OCS connectors (oval contact system) are the newest high-speed interconnects delivering data rates of up to 10 Gbps per pair. The Amphenol series features improved signal integrity via reduced cross talk. OCS offers enhanced attenuation performance as compared



Thermosleeve-USA offers a comprehensive range of tubing in various colors and shrink ratios. Our products are manufactured under TS16949 Quality System and ISO14001/IS9001 Environment System certifications and are produced to meet or exceed UL/224/MIL approval requirements. Thermosleeve-USA products are also certified under the following agencies F-Mark, TUV, VDE, UL/C-UL and are registered "Green Partners" with Sony and Samsung Electronics.

If you're manufacturing wire harnesses, rest assured Thermosleeve-USA probably offers a tubing to meet your project requirements. Meeting those requirements is important to us and we certainly welcome the opportunity to provide you with fur-

ther information regarding our selection of heat shrink and nonheat shrink tubing products, including value added capabilities such as custom printing, cutting, bagging and labeling to help you expand your tubing options and shrink your sourcing time.

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- Force-locking mechanism guarantees constant crimping depth
- . High-durability with up to 100,000 cycles
- Ergonomic design for fatigue-free operation

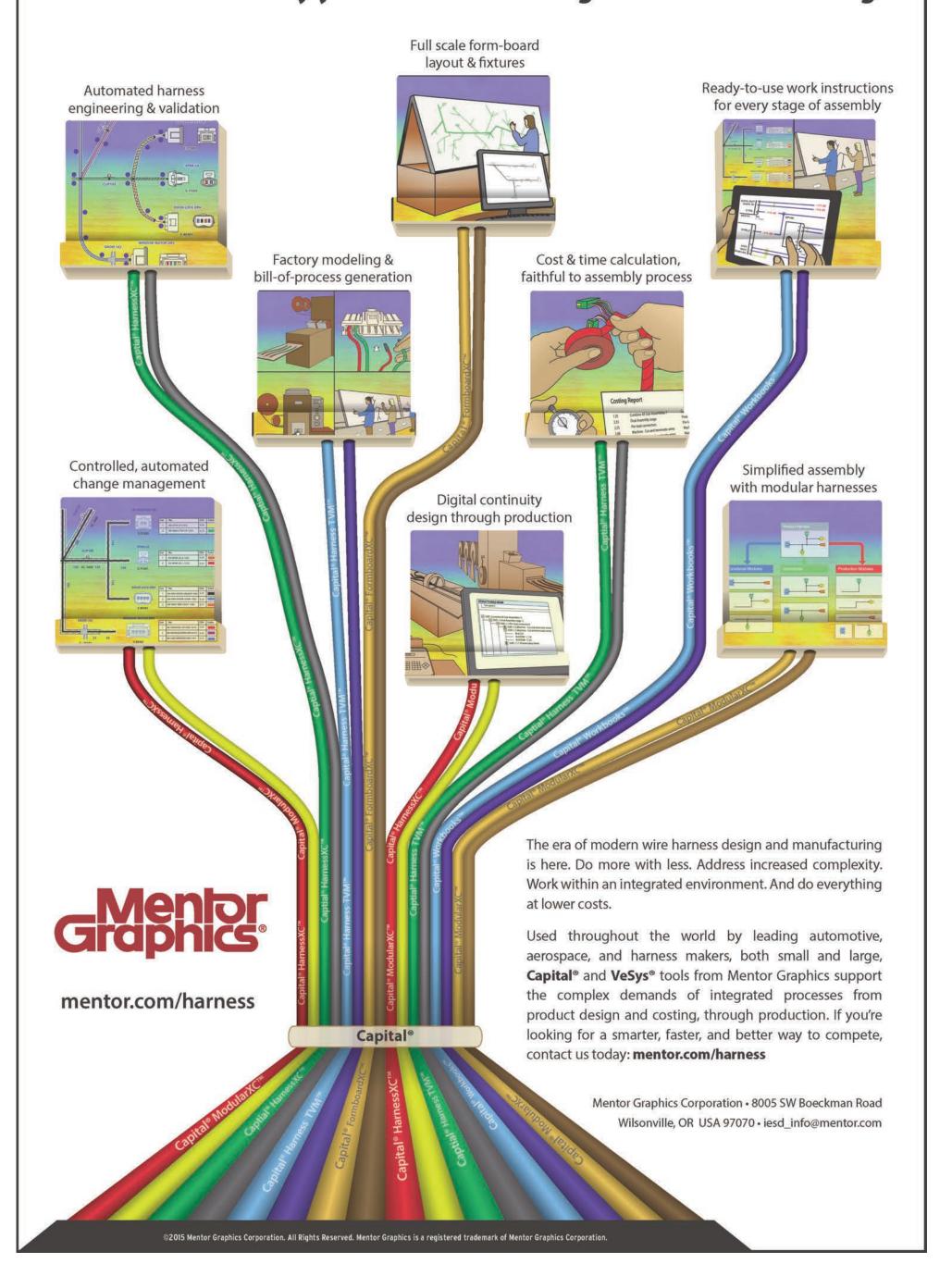
Phoenix Contact's wire cutters, cable strippers, and other hand tools will handle all your cutting, stripping, crimping, and assembly needs with a quality you can feel from the moment you pick them up.

Request a brochure and get a free screwdriver. Call 1-800-322-3225 or visit: www.phoenixcontact.com/ handtools



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Continued from page 44

to other industry-standard quadrax high-speed connectors.

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

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- Solder or PCB tail contacts available
- Meets environmental requirements of MIL-DTL-38999
- Uses off-the-shelf Mil Spec backshells

For further information visit http://www.peigenesis.com/

BURNDY Adds 100 Ft Open Spool Reel for Static Discharge Applications

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

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

For further information contact BURNDY at 47 E. Industrial Park Drive, Manchester, New Hampshire, 03109.

Molex OptoConnect™ Custom Optical Enclosures Integrate Sophisticated Fiber Circuitry

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

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

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



OptoConnect™ Custom Optical Enclosures

marketing, Molex.

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

Complementary products such as MPO and LC loopback connectors and MTP/MPO LC cable assemblies

_Continued on page 53

WIRE HARNESS ASSEMBLY STATIONS

Designed for the ergonomic assembly of wire harnesses

Surfaces tilt and adjust up and down Holds boards from 24" x 24" up to 48" x 96". Two models to choose from — Electric or Manual adjust Adjustable front lip holds boards from .250" to .750".





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- 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
- 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
- 1 **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
- 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)
- NOVEXX I.D. Tube Printer, Model TMS 2000Plus
- 1 SCHLEUNIGER CC36 CrimpCenter, 2010, w/MECHTRIX MPF-35 Prefeed
- 2 SCHLEUNIGER CP1500 Heavy Duty Coilers
- SCHLEUNIGER CS9100 Cut/Strip Machine with a PF2000 Prefeed
- 2 SCHLEUNIGER CT32 Crimp Presses, one New 2008
- 1 **SCHLEUNIGER** ES9320 EcoStrip Cut/Strip, 2006
- SCHLEUNIGER HS4140 Hot Stamper
- 1 SCHLEUNIGER OmniStrip 9450 Automatic Cut and Strip Machine w/PF2000 Prefeed
- 1 SCHLEUNIGER PF3000 Prefeed w/Dancer
- 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)
- 1 SPECTRUM 'Sienna 510' Laser Printer



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Winchester Electronics

Continued from page 1 ___

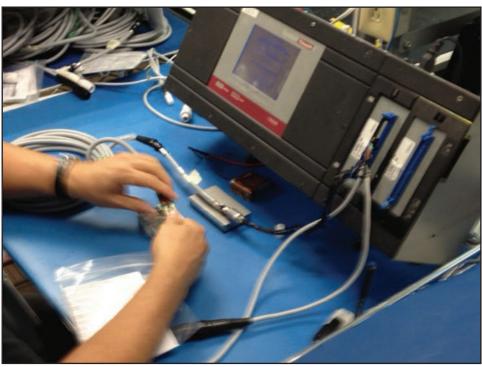
which was founded in 1941 by H.H. Burtt in New York City as a manufacturer of special connectors producing an AN5015-type connector for Sperry Gyroscope known as the Winchester 201 and 202 series. He noted Litton opened the Mexico plant in 1990, the Malaysia plant in 1999 and the China plant a year later.

Audax has a philosophy, strategy and practice of growth through acquisition. Winchester was expanded by buying Advanced Interconnect in Franklin,

Mass., in April 2007 and Kings Electronics Co. in Rock Hill, S.C., a month later.

According to Allen, Winchester showed little or no profit in 2009. Restructuring resulted in replacing much of the management and consolidating managerial positions. The most significant hire was Kevin Perhamus as CEO and president in July 2010, and by the end of the year the company was profitable again.

Prior to joining Winchester, Perhamus was the general manager of Amphenol PCD in Beverly, Mass., since September 2006. In 2004-06 he was the sales and



Electrical Testing





Machined plastics and overmolding is available at all four division plants.

marketing manager of Teradyne in North Reading, Mass., and the previous three years he was the GM of Teradyne in China.

The restructuring by Perhamus and his staff was effective. "Growth has picked up, especially in the last three years," Allen said. "It's been gratifying to take Winchester from a company near collapse in 2009 and turn it into a very profitable company. It's been a whole lot of work, but it's been a whole lot of fun, too."

Prior to joining Winchester, Allen, who lives in Arizona over the border from the Nogales plant, worked six years for Ansell, headquartered in Iselin, N.J.

He was in charge of Western Hemisphere health-care operations that made industrial gloves, surgical gloves and condoms.

The previous five years Allen managed the Latin America territory for FCI Electronics in Etters, Pa. Most of the manufacturing of cables, harnesses and connectors was in Juarez, Mexico. Earlier in his career he was employed in the aerospace industry and worked primarily at two companies. He has a degree in industrial engineering from Arizona State University.

__Continued on page 50

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Winchester Electronics

Continued from page 49

"Winchester is a marvelous company to work for and attracts good people," Allen said. "You're not under anybody's thumb. What I like best is being given the freedom to be creative. There are always lots of opportunities with customers to make a positive contribution to their businesses and make an idea become a reality. You can help customers become productive and profitable and quickly move ahead.

"Divisions were made when the structure of the company was changed beginning with Kevin Perhamus," Allen said. "Winchester used to be a central company where everything was done at corporate in Connecticut, and the plants only would do what corporate said.

Now the plants are flexible, and the GMs are free to make decisions and spend money. Everything has been decentralized, and there's no bureaucracy."

The approach is based on a company philosophy of leadership in providing customer value. The company abides by five values – entrepreneurship, collaboration, accountability, action and integrity.

"I'm most proud of all the positive solutions we can generate with our customer base," Allen said. "We help them reduce costs and keep them moving forward. Customers can be successful due to our efforts. Especially when you go through a new process with a company it puts you on the cutting edge and makes you an important part of the customer."

Harnesses and assemblies made by



Winston Electronics' Auto Vision Inspection Department

the Engineered Cables Division are for such markets as medical, which is 33 percent of division business; industrial equipment, 25 percent; data centers, 15

percent; and test and measurement, 10 percent. The remaining 17 percent is spread over other markets included in Winchester business segments. They are computing, broadcast, power management, alternative energy, military/aerospace, rail/mass transit, telecom/wireless, semiconductor and marine oil and gas.

Winchester products vary in lot sizes from one to 20,000, and the average production run is 50-100 units. The least costly item is \$1.50, and the most expensive is \$20,000. The largest harness measures 5x15 feet and has 250 breakouts. The average is 2x5 feet with 30 breakouts. Minimum order is \$250.

Orders for electromechanical assemblies and printed circuit boards are filled according to customer request. "We always ask about the next assembly that attaches to the harnesses and cables we build," Allen said. "But, that integration usually is done by customers inside their plants. They don't let go of that."

Winchester also has machined plastics and overmolding available at all four division plants. Materials are moved between China and Malaysia and between Mexico and South Carolina as well as Mexico and China, Allen noted, partly to keep a business continuation plan current.

Customers numbered 50-60 in 2014, Allen stated. They are located around the world. "Winchester has gone globally as customers move assembly opera-

FLIP LOCATOR HAND TOOL ACCESSORY

New Flip Locator for Premium CERTI-CRIMP II Hand Tools

TE Connectivity introduces a Flip Locator Hand Tool feature designed to provide the ultimate in terminal placement accuracy, increased efficiency and ease of use.

Function

The new wire size trends have translated into new operator, tooling, and application challenges. Small terminal handling is a particular challenge as terminals continue to miniaturize. In fact, TE is working on a terminal that has a crimp width of only 0.015" (0.38 mm). This creates an enormous problem handling the terminal and locating it properly into a hand tool's die set.

To help with the problem, TE is releasing its new "flip locator" on selected Premium CERTI-CRIMP II straight action hand tools. This TE flip locator system allows the operator to "flip" the locator approx 150 degrees, which provides exact placement of small terminals. After loading, the locator is "flipped" back into position and the terminal is properly located automatically. Now, with the terminal held in place, the operator can concentrate on proper wire placement and complete the termination process.

Product Features

- · Highly visible, easier to load terminals
- · "New" spring loaded retention feature
- Configured for CERTI-CRIMP II Heads
- Available with short and long handle tools
- · Accurately locates the terminal for a more consistent crimp termination







CERTI-CRIMP, TE Connectivity and TE connectivity (logo) are trademarks



tions," he said. "Customers want to keep the same supplier as they move around the world. We also need to be where industries are located. Certain places are key and strategic for business, and we need to have plants in those places."

Winchester differentiates itself from competitors by "our ability to take customer drawings and improve the design, reduce cost and solve problems," Allen said. "Hardly a week goes by that we don't fix customer drawings and improve cables. We clean them up and make sure the products work and are easier to make. Our preference is to work with engineers and participate in the design."

Policy prevents Allen from sharing names of medical customers, but he stated they include "the who's who of companies. Our products are used in heart pumps and MRI machines, for example."

Winchester products are part of com-

ponents made by Advanced Energy, headquartered in Fort Collins, Colo., and Eaton Corp., headquartered in Cleveland, Ohio. Cables from Winchester were installed at the Pirates of the Caribbean attraction at the Shanghai Disney Resort in China and in the Large Hadron Collider in Geneva, Switzerland, that was built by the European Organization for Nuclear Research.

Products are manufactured at the four division plants by 761 employees - 472 in production and 289 in management. Most of them work on the first shift five days a week. Nogales is the largest plant, followed by Malaysia, China and South Carolina.

Allen reported the direct-labor staff grown 10 percent in the last two years, and "efficiencies are up 15 percent from doing things differently." He related a manual operation at the Nogales plant for a medical product traveler tracking critical measurements that used to take four hours has been automated, cutting the time to four minutes. The technique will be shared with other plants.

Openness highlights the culture at Winchester, so employees are informed on a monthly basis about goals, how to achieve them and the progress being made. The plants have ISO, AS, OHSAS and ITAR certifications applicable to what is manufactured.

Six Sigma projects are undertaken as part of a continuous improvement program. For instance, all Nogales managers are green belts and all production employees are yellow belts. "It's better to have 50 salary people thinking than a few people on top," Allen said.

Compensation is relative to salary comparison reports for the cities in which Winchester plants are located. "We adjust compensation accordingly," Allen said. "We want to be above average here"

Allen considers the key people at each plant the general manager ("Having the right one is the key to success," he said), controller, production manager, purchasing manager and applications engineer. The latter spends most of his or her time traveling to customers' plants to troubleshoot problems and develop new concepts.

One unique aspect of the company is its Winchester University begun two years ago. The on-line courses are about company culture, policies, values, strategy, processes and products. The courses are used not only for employee training and advancement but orientation for salespeople.

Other on-line resources are plentiful at Winchester. Google Hangouts is used for staff meetings every Tuesday morning. Yammer, Google Docs and Smartsheet are other project coordination programs in use. Customers also have a portal through which they can look at part drawings, production methods, test readings, etc.

"These collaboration tools minimize server use," Allen said. "We've moved our MRP to the cloud and eliminated more of our servers. Then we're not hand-cuffed to grow by the need to have servers, we don't need a T-1 line from plant to plant, and special log-ins are not needed. All our files are backed up and accessible anywhere in the world."

Allen stated Internet connections



Wire Harness.

have been strengthened with higher baud rates. He noted engineering drawings and project data management documentation have not been moved to the cloud but remain on Winchester servers with global back-ups.

_Continued on page 52



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Winchester Electronics

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Quality at Winchester is measured internally and externally by the number of defective parts per million, and it averages 350 internally and 250 at the customer level. The goal is 250 internally.

Lead times vary. If everything is available to produce a part, it can be produced in two days from receipt of order. Standard quoted lead time is four weeks. That timeframe doubles if custom components items have to be obtained. Allen said some customers that have planned six months ahead are OK with a 12-week lead time.

Winchester has 600 suppliers but primarily uses only 25. "We want to reduce both numbers and do more volume with a lower quantity of them," Allen said. He

noted the Nogales plant cut the number of MRO items from 45 to 12 for a 15-percent cost savings.

Preferred suppliers are scored on ontime delivery, quality, flexibility and cost reduction. Delivery has become increasingly important, Allen emphasized. "Many companies in the cable and harness industry are competing on lead time," he said. "Customers will pay a premium price for it. Now suppliers are open to keeping safety stocks on key parts. Nobody keeps inventory after 2009."

The Engineered Cables Division is one of several Winchester divisions that have become brands. Besides the aforementioned Advanced Interconnect and Kings Electronics Corp., they include Clements National Co. of Broadview, Ill.;



Winston Electronics' Cable Medical Assembly Department

Continental Connector Co. of Hatfield, Pa.; Bomar Interconnect Products of Ledgewood, N.J.; SRC Cables of Santa Rosa, Calif.; Haverhill Cable and Manufacturing Corp. of Haverhill, Mass.; TRU Corp. of Peabody, Mass.; Source Technology of Houston, Texas; and SRI Hermetics of Melbourne, Fla.

Except for Advanced Interconnect and Kings Electronics, all of the companies have been purchased since July 2012. Included in the group is Electrical Specialty Products, which is part of the Engineered Cables Division. All the companies are Winchester divisions and total more than 1,000 employees.

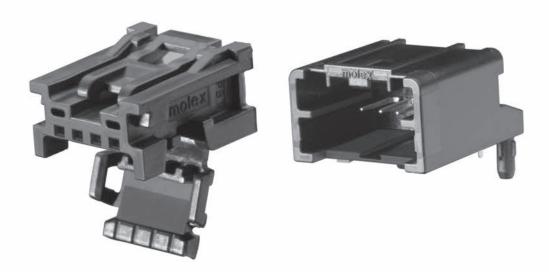
"We go for growth through acquisition because you have financial support for each facility," Allen said. "You have revenue coming in. It's a better way to grow than by scratch. Each plant is autonomous and a profit center. You can move quickly with such a set-up."

More acquisitions will complement organic sales as part of the Winchester strategy for growth, which is targeted at 7-10 percent annually. Allen considers growing Winchester the most challenging aspect of his job.

"This is a dynamic industry because there are life cycles to certain products," Allen said. "The world has changed. Margins that used to be wide are shrinking in all sectors, even the sacred cows of medical and aerospace. Everyone has to do more with less.

"Consolidation is occurring, and customers are going to vendor-managed inventories," Allen said. "There is a leveling out of the wages between China and Mexico, so there is a pulling back of business to Mexico from overseas."

For more information, call 203-741-5400, e-mail info@winchesterelectronics.com, visit www.winchesterelectronics.com, or write 68 Water St., Norwalk, CT 06854.



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The tremendous growth in automotive infotainment and safety options is the catalyst for car manufacturers demanding smaller interconnects from suppliers, as they need to fit more electronics in the same space. Mini $50^{\,\text{TM}}$ sealed and unsealed wire-to-board receptacles allow device manufacturers to package circuits in tighter spaces by utilizing smaller pin, terminal, and wire sizes while reducing costs.

The integration of multiple devices in today's transportation industry creates the need for harness with reduced weight, space and cost. Molex's Mini50 harnesses provide reliable performance in a limited space, making them ideal for applications within the infotainment, lighting and HVAC systems.

Applications include:

- Automotive Cameras / Sensors, Clusters / Navigation, HVAC, Headliners, Lighting, Mirrors, Power Steering, Radios / DVD - Entertainment, Switches
- Commercial Vehicle Cameras / Sensors, Clusters / Navigation, HVAC, Headliners, Lighting, Mirrors, Radio, Switches







Continued from page 47 _

fill out the offering to provide a complete optical interconnect solution set. Customers also have the option to have Molex design an enclosure to meet their product specifications or use their own internal design that complements their equipment styles.

For additional information about OptoConnect Custom Optical Enclosures with FlexPlane circuitry please visit www.molex. com/link/ optoconnect.html and www.molex. com/fiber/ flexplane.html. Please sign up to receive the Molex e-nouncement newsletter at www. molex.com/link/register.

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Rated for Class 1 Clean Rooms utilized in Semiconductor Wafer Fabs, Cicoil's Flexible Flat Cables are ideal for operational critical 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 StripMountTM 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 life-time 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 multiple flat cables can be placed side-by-side or even grouped into space saving stacked positions. For adhesion-free, continuous movement in a cable track, Cicoil offers low-friction GlideRiteTM and SlideRiteTM coating options by request.

As compared to bundled round

and podded flat cables, the EZ-FlexxTM 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.

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- Terminal Paper Winding Machines
- Terminal Applicators



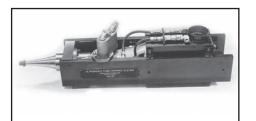


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Ultrasonic Vibrations Significantly Reduce Friction, Increase Production Speed and Improve Internal Surface Finish

onobond Ultrasonics Tube Drawing System and components are specially designed to accommodate manufacturers of fine metal tubing used in syringe needles, as well as for medical devices and tubing products used in many other industries to transport critical fluids.

"In conventional tube drawing systems, lubricants are used to reduce friction between tooling and metal tubing," explains Sonobond President Janet Devine. "With our ultrasonic system, high-frequency vibrations create a continuous cycle of increasing and decreasing pressure between tooling and work piece, resulting in less friction and a reduction of force needed for the draw and consequently significant improvement in the internal surface finish of the tube, which is absolutely essential for



Sonobond's Ultrasonic Tube Drawing System produces a superior internal surface finish in fine metal tubing—an essential requirement for medical devices and tubing products used in various industries to transport critical fluids. In fact, surface finishes on the ID of the tube can be improved to RMS values of 8 or better micro-inches.

critical fluid transmission. Optimum results are achieved when the ultrasonic activation is used in conjunction with 'best practices' such as lubricants."

In a standard rod draw operation, a controller first positions the tube to be drawn over a long, back support rod, terminated in a plug, so that the tube to be drawn can be loaded onto the machine. Draw carriage jaws then grasp the tube and pull it through a die, which is on the outside of the tube and aligned with the plug which is inside the tube, thinning the tube walls and achieving the desired wall thickness and internal diameter. Often multiple draws are required with progressively smaller dies and plugs to reach the desired tube size.

In an ultrasonic system, a power supply converts line power to high voltage, high frequency 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 the back support rod, which holds the die and/or plug - carry the vibratory energy from the transducer to the plug. The waveguides are designed to resonate at the frequency of operation of the power supply and transducer, usually in the range from 15 to 28 kilohertz

_Continued on page 56

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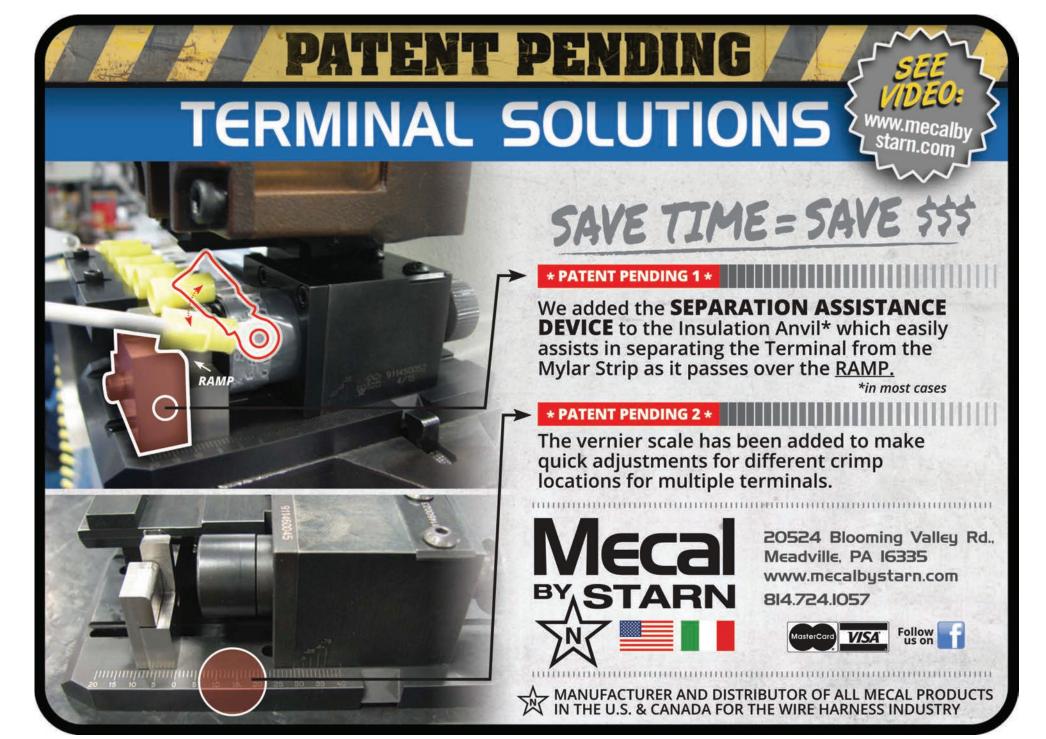
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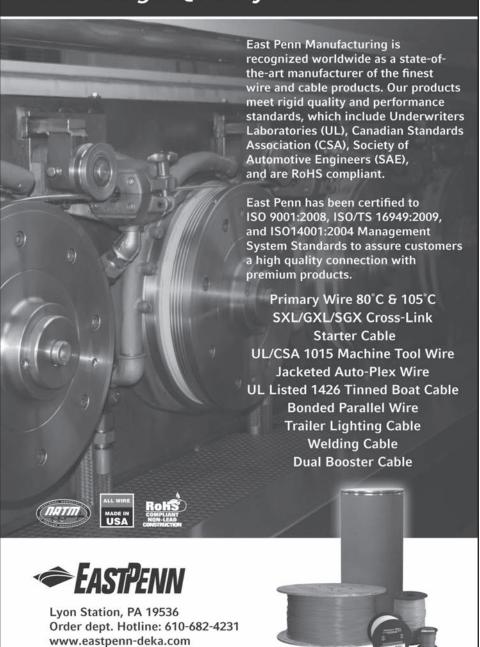




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Get a High Quality Connection



Ultrasonic Vibrations

Continued from page 55

depending on the size of the rod and the tube being drawn.

"The ultrasonic energy reduces frictional forces between the forming tools, and also increases the plasticity of the metal being drawn," Devine explains.

"Adding ultrasonic energy to a tubedrawing operation can reduce the draw force required, in some cases by up to 35 percent, and permit heavier reductions thereby reducing the number of draws required to achieve a finished product," notes Devine. Additionally, ultrasonic tube drawing eliminates sticking and slipping, also known as "chatter," which can lead to product loss. There's less breakage, especially at start-up when frictional forces are highest. Draw speed can be increased as much as 400

percent. Most significantly—especially for medical applications—surface finishes on the ID of the tube can be improved to RMS (Root Mean Square) values of 8 or better micro-inches.

Sonobond Ultrasonics' Tube Drawing System achieves superior tubing suitable for syringe needles and other sharps. Ultrasonically drawn fine tubing can also be used to produce implantable device components; in vitro diagnostic probes; bands for catheters and guidewires; heat-exchanger tubes for controlling blood temperature during surgery; micro-surgical tools; stents and other devices requiring tubing with a fine internal dimension finish.

Sonobond Ultrasonics can evaluate your existing tube drawing operation, recommend components, or design a complete system for your existing or

> new drawbench. From initial inquiry, through installation and implementation, we offer ongoing superior customer service.

For more information about Sonobond and its products please visit www.SonbondUltrasonics.com. For immediate assistance and information on ultrasonic tube 323-1269, 610-696-4710, or email jdevine@Sono bondUltrasonics.com.

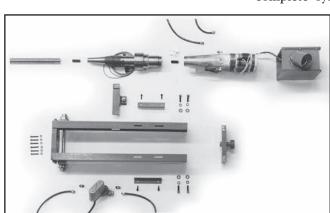
C-Based System Compatible with Win XP, Vista

8

10.

Demo

Units Available



Sonobond's Ultrasonic Tube Drawing components include a transducer, tapered coupler, back support rod, and a die or plug. This tube-drawing operation can drawing, please call 800reduce friction and the draw force by up to 35 percent, eliminate sticking and slipping (known as "chatter"), and increase draw speed by as much as 400 percent over conventional draw systems.

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6 M

5 M

AC

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Partex Marking Systems, Inc. Moves to New Location

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

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

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

may update their software to version 5-B1187 or later to acquire Japanese functionality. Upgrades from Version 4 or earlier software may be pur-

chased for \$295 (Item 726), or downloaded for free from our Customer Support site with a valid Warranty. Warranty

renewals start at \$160 for an M3U system without expansion modules and includes Cable-Eye's standard one year Warranty which is combined with free

tech support and free software upgrades. Contact sales@camire-search.com for more information.





CableEye® Multilingual GUI includes Japanese

CAMI Research Inc. (Acton, MA) has added a Japanese language option to its standard CableEye cable and harness testing system Graphical User Interface (GUI). The intuitive, graphicrich GUI provides a clear simple operator interface for production workers, and may now be user-set to any of seven global languages: ENG, ESP, DEU, FRA, TUR, CHN, JPN.

A leader in development of PC-based Cable & Harness Test Systems for over 20 years, CAMI offers the Cable-Eye suite of Low and High Voltage products complete with accessories. Users interact with any of its models through an identical GUI, as the systems are united by a common platform.

Translated by native speakers to ensure clarity, all seven language options are provided in CableEye's standard software as well as its PinMapTM, Connector DesignerTM, AutobuildTM, and Exporter software options.

The language setting affects anything presented on the screen (including associated print options), such as its 'standard' comprehensive reports, color-coded net lists, scripting, and user-defined/annotated cable database entries.

CableEye software allows customers to meet the most exacting reporting requirements of governmentcontracted and ISO 9000-style certified companies ... in seven languages.

All seven multilingual GUI settings come with the standard software shipped with any new CableEye test system. Users of older systems







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



Tamper Resistant Power Outlet

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@tlc-electronics.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.

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 protection 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,

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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, 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.

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



BURNDY® YG916BTC26

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.

BURNDY® is The Grounding Superstore™, offering all 3 major methods for grounding; Compression, Mechanical, and Exothermic. The YG916BTC26 is another addition to The Grounding Superstore™.

Headquartered in Manchester, 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.

Dynalab Test Systems Introduces Major Release 18

Dynalab Test Systems has been committed to continuously updating its products and capabilities. With over 25 years of experience and over 30,000 testers sold, Dynalab offers products that reflect the highest level of industry knowledge and experience. The company's systems, software, and services are designed to help customers develop solutions for their testing needs quickly, reliably, and economically.

Dynalab's release 18 includes several new features that increase accuracy and efficiency in programming. Specifically, the "Compare Connections" feature pro-

_Continued on page 61

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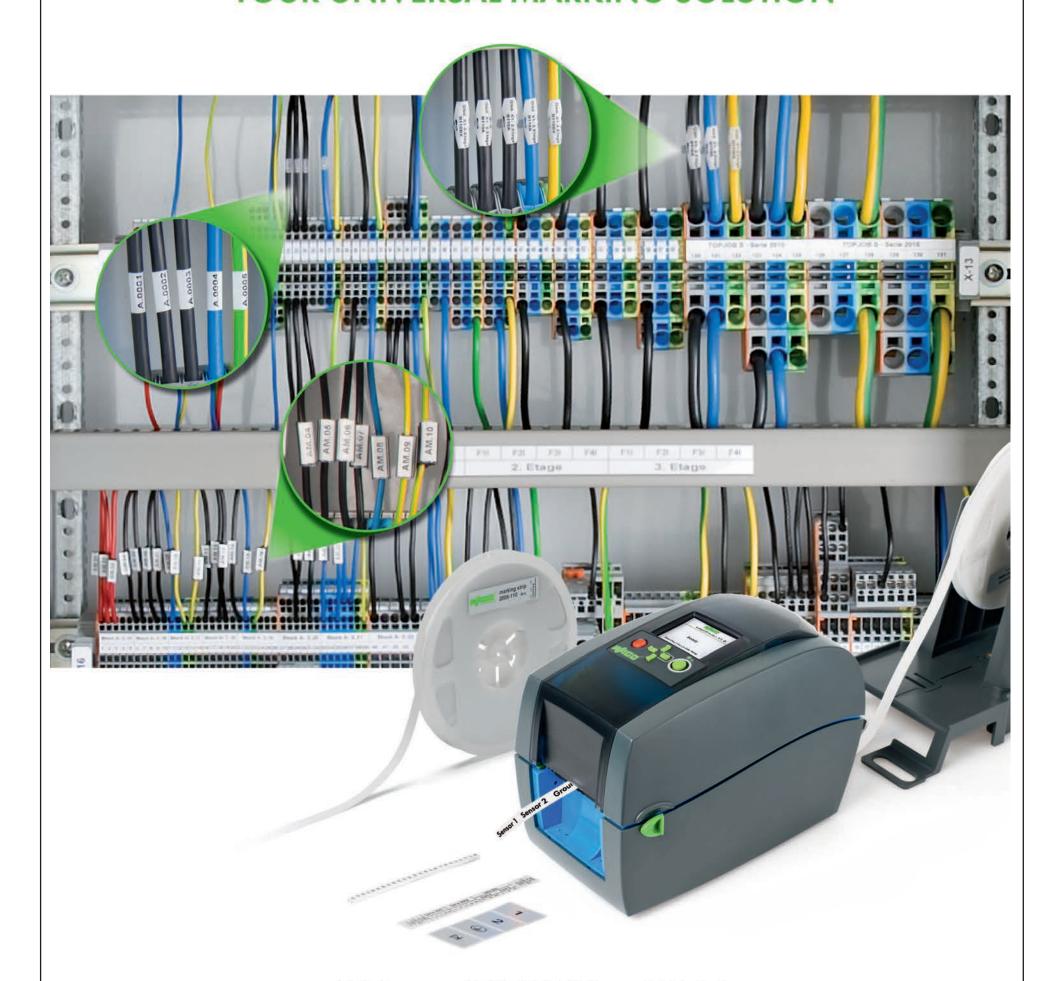
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Continued from page 59_

vides change control function when making program changes, therefore reducing the possibility of human error of accidentally deleting important data. Engineers



Dynalab's Major Release 18

may feel comfortable that they may audit their changes and undo a programming change if a mistake were made.

The NX Editor's importing and exporting data functions have been enhanced to make programming even easier. The new "Export Connections Data" function will export only the connections data to a spreadsheet. For multiple part numbers, a new tab is created for each part number for easier auditing and quality control.

Other functions include more control with programming functions, better reporting capability, enhanced relay testing and more.

For further information contact Dynalab Test Systems, Inc., 555 Lancaster Ave. Reynoldsburg, OH 43068. Visit www.dynalabinc.com.

New PV Connector from Amphenol Meets the Three Highest Certification

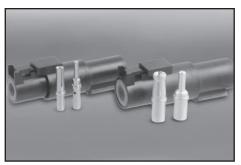
Standards on the Market

Amphenol Industrial Products Group, a global leader in interconnect systems, now offers a PV connector that meets all three of the highest certification standards on the market, allowing this one connector to be used globally. The new H4 UTX meets EN50521 TUV 1500V- Class A (All Access), UL6703 1000V (Americas) and JET 1500V (Japan).

These certifications make the connector ideal for use by all PV module manufacturers, installers, developers, electrical distributers as well as inspectors, combiner box companies and engineering procurement construction (EPC) firms worldwide. The H4 UTX is available in all AWGs, from 14 AWG to 8 AWG, and are fully matable with all existing H4 PV connectors and the typical PV industry standard connectors.

A larger version of the H4 UTX, known as the H4 UTX-XL, can accommodate 8 AWG PV wire, up to Ω kV. This larger version can mate with the H4 UTX as well as with all existing H4 connectors in all AWGs.

Martin Booker, general manager, Amphenol Industrial Products Group, said, "The connector's efficient design keeps costs low and improves flexibility, since it can mate with all PV wire sizes. The added benefit of meeting three of the highest global certifications in the solar market truly makes the H4 UTX a single, cost-effective device for use worldwide."



The H4 UTX is fully matable with standard H4s in all AWGs.

Amphenol's H4 UTX uses Amphenol's proven RADSOK technology to achieve higher current ratings and lower contact resistance, resulting in lower power losses.

Technical Specifications:

• Triple certified for global use: TUV 1500V Class A (All Access); UL 1000V; JET 1500V

- Fully matable with all AWGs and current H4
- H4 UTX lead time is 6 weeks ARO.

For more information, please visit http://www.amphenol-industrial.com or e-mail mfarrelly@amphenol-aio.com.

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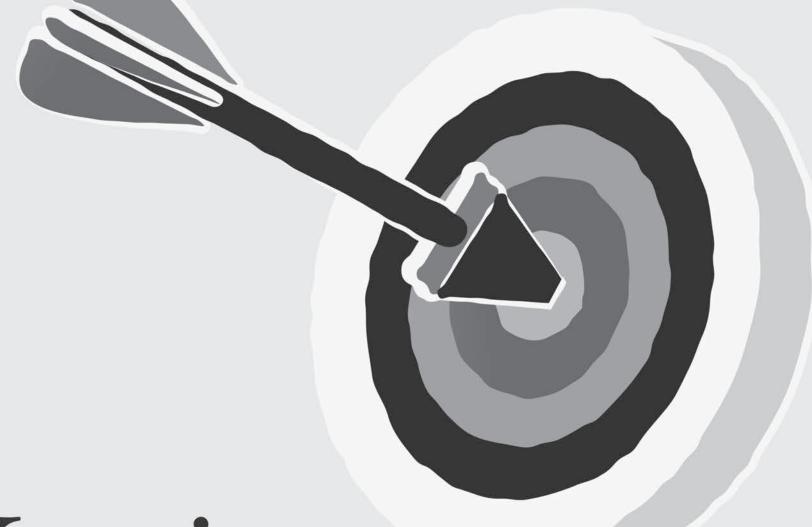


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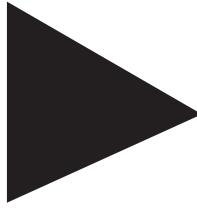
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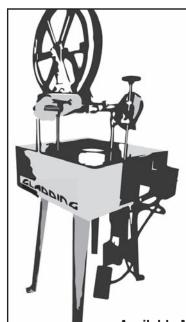
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