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Bunkers & Battle Stations

The wire and cable industry is retreating to the bunker. Many of the markets that use electrical, communication and mechanical wire and cable products are in a deep spiral, and everyone is wisely looking to protect cash. This means job loss, factory shutdowns, collection problems and reduced compensation. The mood of the “Average Joe” is bad. The current economic situation, the uncertainty of the future, the constant stream of layoff announcements, stock market volatility, corruption on every corner and the daily display of government incompetence have been joined by open hostility to capitalism, wealth, success, charity and individual freedom. These are not good signs. But the problem with taking the bunker mentality too far is that it can lead to self-inflicted paralysis, which leads to missed opportunity and poor performance.

The companies that survive these times are the ones that fight the hardest for the business that remains, and the ones that do not abandon innovation, discipline and logic. History is full of good examples of success stories that are written in bad economic environments. Microsoft, FedEx and CNN all started during recessions.

So what should wire and cable companies do? It is okay to go to the bunker, but prepare for a fight, not a nap. Fight for business, fight to become more efficient, fight for innovation, fight for virtue and fight the rising surge of government spending, control and intervention. I once had a boss who liked to ask, do we need to go to “battle stations”? whenever times were tough (i.e., low sales activity or lost orders). He had a military background, but he was talking about the battle stations of business. We should all be there now.

Fix It Again Tony, Again

The USA government is now neck-deep in the American car business, at least the weakest performing side of it. The automakers that are weathering the economic tsunami on their own—Ford and American transplant operations such as Toyota, Honda, Nissan, Subaru and BMW—are lucky to be out of range from the Obama administration's saving radar. Team Obama’s Auto Task Force spent a few weeks analyzing the GM and Chrysler situations, and then correctly determined that more cash without strings was not the way to go. Too bad the Bush administration didn’t say no to the automotive bailout last year. If it did, then the painful restructuring (i.e., court-ordered bankruptcy) would be well under way, and the USA taxpayers would have saved billions. Instead, the process is ordered bankruptcy) would be well under way, and the USA  had a military background, but he was talking about the battle stations of business. We should all be there now.

Taxes & Pirates

Self-created complexity, higher education and the shear volume of information passing along the different avenues—Internet, cell phones, TV, radio, print and face-to-face—sometimes have the effect of making it easy for us to miss simple solutions to big problems. For example:

- A shotgun wedding for Chrysler and Fiat (USA taxpayers will help an Italian company get a manufacturing and sales foothold in the biggest automotive market in the world, and Chrysler will lose whatever leverage it might of had).
- Production of parking lots full of tiny cars that most Americans don’t really want to buy or drive (taxpayers will subsidize loads of “green” cars, but consumers will keep buying what they like).

Why aren’t any auto manufacturing or sales experts leading the Auto Task Force? Which one of them decided that Fiat is the company to lead Chrysler, Dodge and Jeep out of the mud? Fiat gave up on the American market several decades ago because its cars were unreliable and not of interest to most Americans. The joke about Fiat, Fix It Again Tony, didn’t come out of nowhere. Fiat’s market share in Italy is only 30%, and it is less than 7% for all of Europe. Is this “Change we can believe in”?

The reality is that we now have an automotive strategy being decided by a bunch of Washington and Wall Street experts with fancy suits, impressive diplomas and no manufacturing or sales experience, all on the taxpayer dime. If we keep at it, then it won’t be long before we have the 21st century version of the Trabant or Yugo.

Michael J. McNulty, Editor mnulty@wiretech.com
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SPI Offers Incentives to **NPE2009** Exhibitors & Attendees

Declaring that “Extraordinary times call for extraordinary measures,” SPI President and CEO William R. Car- teaux has announced a “Stimulus Package” of discounts and incentives that reduces the cost of participating in the **NPE2009** international plastics event for every exhibiting company and attendee. **NPE2009** takes place June 22 to 26, 2009, at McCormick Place in Chicago, IL, USA. The event is produced by SPI, The Plastics Industry Trade Association.

The Stimulus Package being offered to **NPE2009** exhibitors and attendees provides a variety of incentives. Exhibitors with 4000 ft\(^2\) (371 m\(^2\)) or more of contracted space will incur the highest cost and so will receive the greatest benefits from the Stimulus Package. These exhibitors will be provided with a one-time move-in allowance to help offset the cost of installing and running the amount of equipment necessary for a booth of this size.

Exhibitors with less than 4000 ft\(^2\) (371 m\(^2\)) will receive an across-the-board credit of US$1.50 per ft\(^2\) of space toward the cost of general contracting services, paid by SPI directly to Freeman, the general contractor for **NPE2009**.

Individual attendees will pay the 2006 rate of US$60 (a US$20 discount). Buying teams with six or more registrants will pay US$50 per person. Companies registering more than 20 employees at a time will pay US$40. In addition, SPI has doubled the number of VIP passes available from exhibitors for complimentary registration from 170,000 to 340,000. SPI is also offering deep discounts to those who register for the co-located Business of Plastics Conference, by May 1, 2009.

“To make the Stimulus Package possible, SPI has lowered its margins and worked with our Chicago-based vendors to cut its own operational expenses so that savings can be passed through to exhibitors and attendees without compromising services,” said Gene Sanders, SPI Vice President of Trade Shows.

Sanders also noted that, in part because of SPI lobbying efforts, the recently enacted USA federal stimulus package contains a tax law provision that dramatically shortens the period in which companies can recover the cost of capital equipment purchases, allowing them to write off 50% of their investments before the end of 2009.

“This gives attendees at **NPE2009** extra incentive to shop for plastics machinery right on the show floor,” Sanders said.

“While this edition of the triennial **NPE** will occur amidst the worst economic conditions since before SPI founded **NPE** in 1946, we fully expect it to be a success,” said Carteaux. “We have worked to make **NPE2009** broader in scope and richer in content than any previous **NPE**.”

In addition to the world-scale **NPE** trade show, there will be seven co-located conferences organized by SPI and partner organizations that in combination will offer 1000 papers and presenta-
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tions on technology and business strategy. One of these co-located events will be the Society of Plastics Engineers’ ANTEC 2009, reportedly, the world’s largest technical conference.

Other innovative programs will include the first International Plastics Design Competition; multi-exhibitor pavilions focusing on elastomers, fluoropolymers, moldmaking, contract manufacturing and other industry sectors; and the innovative Emerging Technologies Pavilion, with four sectors devoted to sustainability, bioplastics, nanotechnology and energy. www.npe.org

IWCS & CRU Working Together
The International Wire and Cable Symposium, Inc. (IWCS, Inc.), of Eatontown, NJ, USA, and CRU Group of London, UK, have announced that they have agreed to a closer working relationship in matters related to the wire and cable industry. For nearly 60 years, IWCS has executed an annual symposium and conference where the latest technologies in the wire and cable industry have been presented by industry experts. In recent years, IWCS has expanded the program to include vital information on the economy and wire and cable market conditions. In this latter topic area, CRU has provided current, critical information for industry decision-makers and presented this data to the IWCS audience.

In 2009, CRU data and speakers will be a featured component of the IWCS plenary session, offering their most current market information to the broadest possible audience of IWCS attendees. CRU is the leading, and most respected, source of market information for many industries, including wire and cable.

In 2007, CRU launched an annual conference aimed at the senior management of the global wire and cable industry. Very well-supported by the industry, CRU is expanding its program to include Cable Production Economics where the efficient use of materials will be addressed by experts in the supply of critical materials to the manufacturers of wire and cable. IWCS, Inc., will chair this session, providing a link between the breakthrough technologies of the IWCS Conference and the practical, efficient application of materials being addressed in the CRU event. For more information on the CRU Global Wire and Cable Conference program, visit: www.wireandcable09.com

For further information on the IWCS conference, visit: www.iwcs.org

3rd Conference on Silicone Elastomers Announced
iSmithers recently announced the third international Conference on Silicone Elastomers, which will be hosted in Hamburg, Germany, from October 7 to 8, 2009.

iSmithers commented that silicone elastomers have many characteristics that are required throughout the automotive, electrical and electronic, domestic appliance, food processing and
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medical industries. The combination of strength through temperature extremes, chemical resistance, compression set resistance, good electrical properties, being nonirritant to humans and being biologically inert has made them an invaluable material. This conference is intended to bring together manufacturers, processors, designers and researchers having a common interest in silicone elastomer materials, applications and processing in order to inform all parts of the supply chain of current developments and offer extensive networking opportunities.

Smithers is currently recruiting speakers for the conference event and would welcome papers on the following subject areas: Silicone elastomer materials and properties (HTV, RTV, LSR); Fluoro LSR; Thermoplastic silicone elastomers; Fillers, other additives and compounding; Processing and fabrication; Equipment and tooling; Applications and their current and future markets; and Troubleshooting, testing and quality control. Presenting authors at Silicone Elastomers 2009 will be entitled to free registration on both days of the conference including lunches and refreshments as well as a copy of the conference proceedings.

If anyone in the industry is interested in presenting a technical paper at the Silicone Elastomers 2009 conference, please send a title, short summary, speaker name(s) and company name(s) to Gemma Robinson via e-mail at

Obituaries:

Bill Crossman
With sadness, the Wire & Cable Manufacturers’ Alliance (WCMA) reports the passing of William W. Crossman, a 1989 recipient of the Charles D. Scott Distinguished Career Award. William W. Crossman of New Canaan, Boca Raton, FL, USA, and West Addison, VT, USA, died Saturday, February 28, 2009. Mr. Crossman was a graduate of the University of Miami with a Bachelor of Science degree in engineering science and a Master of Business Administration degree. He was a retired Senior Vice President of the cable wire and communications division of ITT Corporation. Crossman served in the United States Navy Reserve and the U.S. Air Force. Mr. Crossman is survived by his wife, Mary; three children, William Jr., Lindsay and Michael; four grandchildren, Jesse and Dylan Crossman and Britney and Kelsey Borjeson.

William (Bill) F. Hankel
The founder of H&W Pressure Welding, Bill Hankel of Warminster (Philadelphia), PA, USA, died February 6, 2009, at age 84. A World War II veteran serving in the United States Navy, Bill was previously employed as a theater manager for Warner Brothers in Philadelphia. He was then employed for 35 years by the Heintz Corporation in Philadelphia, before starting his own business, H&W Pressure Welding. In 1984, he became the sole USA distributor for British company, PWM (Pressure Welding Machines). Following a very fit and active life, Bill never really submitted to retirement, convinced that the next day he would be back at work. A keen follower of thoroughbred horse racing, Bill enjoyed nothing better than a day at the races. Bill was the father of a son, William F Hankel Jr., and three daughters, Carolyn Schermerhorn, Suzanne Davidson and Jennifer Schermerhorn. Bill also had eight grandchildren. He was predeceased by his wife Constance J Hankel.

Continued...
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NEMA Publishes New Cable Standards

The National Electrical Manufacturers Association (NEMA), which is located in Rosslyn, VA, USA, recently published and released RV 1-2008 Application and Installation Guidelines for Armored Cable (AC) and Metal-Clad (MC) Cable and RV 2-2008 Application and Installation Guidelines for Nonmetallic-Sheathed (NM-B) Cable and Underground Feeder and Branch (UF-B) Circuit Cable.

Both cable standards have been updated to reflect changes in the National Electrical Code® (NEC). RV 1, which was last revised in 2004, contains information on the latest installation, application and construction requirements for types MC and AC cables. RV 2, which was last revised in 2005, focuses on types NM-B and UF-B cables.

George Straniero, Chair of the committee responsible for the revision of RV 1, commented, “The information provided will be useful to designers, specifiers, contractors, electricians, apprentice programs and to anyone that wants to be sure that the proper armored cable product is specified for the proper application and that the cables are properly installed to ensure a safe and trouble-free electrical installation.”

Dave Mercier, who is Chair of the committee responsible for the revision of RV 2, stated, “These application and installation guidelines offer practical information on correct usage and industry-recommended practices for the installation of Type NM-B and Type UF-B cables.”

The RV 1 standard may be downloaded at no charge, or a hardcopy purchased for US$69, by visiting the website below. RV 2 may be downloaded for free, or a hardcopy purchased for US$62, also by visiting the website below.

NEMA is the association of electrical and medical imaging equipment manufacturers. Its 450 member companies make products used in the generation, transmission and distribution, control and end use of electricity. These products are used in utility, industrial, commercial, institutional and residential applications. www.nema.org
Designing overhead transmission lines is a highly technical process. Having the correct machine to manufacture these products is equally as important. The Cortinovis Machinery Spa High Speed Tubular Strander was designed to meet the environmental design constraints of AAC, AAC/TW, AAAC, ACSR and ACSR/TW cables. All the experience of Cortinovis Machinery is in this efficient and reliable machine:

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- compacting heads with shaped rollers for steel strands, copper and aluminium conductors.
The LEAN Side

by:
Roy St. Andre
Executive VP & GM
EIS Wire & Cable Co.
775 New Ludlow Road
South Hadley, MA 01075 USA
www.eiswire.com

What’s your plan for continuous improvement? Well, we’re going to implement a number of improvement ideas.

Who’s going to do it? Everybody.

Where will you make these improvements?
In every department.

When will you do it? It’ll be ongoing.

OK, now that everyone knows the plan, let’s get to work!

If this is your company’s idea of a plan, I can already tell you how it’s going to turn out because there was a time when this was our plan. Next, the phone’s going to ring, a customer’s going to be in trouble and everyone will shift into firefighting mode. In the mean time, this well-intentioned plan is going to move to the back burner because nobody is responsible for anything.

You notice the plan is verbal because no manager worth his salt would put this plan in writing. It’s too transparent—it’s just a concept and there really isn’t a plan.

Strike 1
No names are attached to the plan so nobody is actually responsible for doing anything to move the plan forward.

Strike 2
There are no times or dates showing when milestones need to be reached and action items need to be completed, so there’s no accountability. Strike 3 and You’re Out!

If there’s one thing I’ve learned about continuous improvement, it’s that it doesn’t happen just because the concept makes sense. There needs to be a very clear and concise plan that spells out Who is going to do What by When! Without meeting these simple criteria, “it’s not a plan”.

One of the best methods I’ve found for developing plans that will actually be implemented is the Shewhart cycle, developed by Walter Shewhart. It’s a continuous improvement plan of Plan-Do-Check-Act (PDCA). We use 9 steps for the PDCA Methodology (FOCUS PDCA):

• Find a process that has room for improvement.
• Organize a team that knows the process.
• Clarify knowledge by observation/data collection.
• Uncover problems or barriers by brainstorming.
• Start by choosing a single modification to the process.
• Plan objectives in writing using the PDCA format.
• Do the improvements.
• Check results, verify the process was actually improved.
• Act on the results. Modify where necessary.

Here’s my interpretation of the 9 steps:

1) Nobody likes a complainer. But pointing out an area that needs improvement is not complaining if you also offer suggestions on how You could help Them implement a change for the better. Let’s stop our complaining and start improving!

2) It’s important that several people on the team know the process but not everyone needs to be an expert, someone needs to think outside the box and ask the dumb questions. But, if someone is wrong for the team, get them off the bus (critical).

3) Data related to the process must be collected by using one or more of the following: value-stream mapping the process, video taping the process or observing the complete process several times to understand the current situation.

4) Go to the Gemba first. That’s where the solution is.

5) It is important for the group to determine the effect of the changes so we’re not making people do extra work that may not improve the process. In fact it may make it worse.

6) The plan must be put in writing so everyone involved / everyone affected (even other departments) will know what the plan is. Who is going to do What by When?

7) Once everyone in the group has seen the plan and knows what their role is in implementing the improvements, they must be held accountable to do their part.

8) Did we achieve the expected results that had been stated in the original Plan-Do-Check-Act? If not, a written corrective action is required.

9) Make any necessary modifications to the original plan by implementing corrective actions. Standardize, so the solution becomes part of everyone’s daily routine to prevent the problem from occurring again.

The best thing about this plan is that it comes with a guarantee! I guarantee that: If it’s not in writing, if every action item isn’t specific and if it doesn’t state Who is going to do What by When, It’s Not a Plan!

To quote Michael Levine: “Those tentative about making plans are often unsure of their ability to show up.”

Roy St. Andre, Executive Vice President / General Manager of EIS Wire & Cable Co., has 30 plus years of manufacturing experience.

EIS Wire & Cable, based in South Hadley, MA, USA, is a niche manufacturer of custom cables specializing in Military, Audio Broadcast and OEM markets. www.eiswire.com
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Timco Opens New HQ & Manufacturing Facility

In an effort to better service its customers, Timco, Inc., has constructed and opened a new headquarters with expanded offices and machining operations. The company is now located at 2 Greentown Road, Buchanan, NY 10511, USA. The telephone numbers for getting a machined part quotation, or for seeking answers to part engineering questions remain the same and are +1 800 792 0030 or +1 914 736 0206.

Timco’s new 50,000 ft² building houses state-of-the-art fabrication equipment on a 12-acre property. With many extra acres at its disposal, Timco anticipates further expansion in the future. The additional shop floor space is immediately increasing Timco’s large panel saw capability and capacity.

“We designed the manufacturing operations area, warehouse and offices for maximum efficiency and productivity,” said Greg Waack, President. “With more room for equipment and newly installed technology, Timco can process a larger volume of orders on a daily basis, and is positioned for rapid growth.”

Timco specializes in engineered plastic parts for industrial equipment. Timco has supplied components and parts engineering services for more than 40 years. Parts are machined to customer specifications using only the best virgin, tempered and inspected plastic materials. Components Timco supplies to its customers include sheaves, wheels, wire guide pulleys, bushings, bearings, wear pads, slide liners, filler plates, cribbing plates, gears, gear wheels, guide plates, cams, wiper plates and outrigger pads.

Materials made by Timco include cast nylon (PA), copolymer and homopolymer acetal (POM), PET, HDPE, UHMW-PE, polypropylene (PP), PVC, PTFE, PVDF and molded fiber (HGW). www.timco-eng.com

Extrusion Tooling Production/Tech Support; New Website

Brochure from B&H Tool Company, San Marcos, CA, USA, describes B&H Tooling’s engineering, production and technical support for companies who use extrusion tooling including adjustable center, fixed center and multilayer crossheads as well as in-line die assemblies.

The brochure discusses how B&H Tool Company works collaboratively with manufacturers of wire, cable, tubing, hose, pipe and profiles to optimize extrusion performance by eliminating extrusion instabilities. Strategies for reducing set-up times, reducing scrap...
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- Version available for take-up reels from 1250 up to 2000 mm
Mary Fournier of Teknor Apex Receives Northwire Award

Mary Fournier of Teknor Apex Company, Pawtucket, RI, USA, who is the company’s Senior Representative in charge of customer service for cable manufacturer Northwire, Inc., Osceola, WI, USA, has received Northwire’s Whale Award for outstanding service.

Northwire Purchasing Manager, Rod Larson, cited Fournier for her reliability in ensuring that the Teknor Apex vinyl and thermoplastic elastomer (TPE) compounds required by Northwire are in stock and ready to ship when the customer needs it, and for her skill in working with freight carriers to arrange for on-time delivery. “Consistently short lead times and on-time delivery greatly help us to serve our customers in the marketplace,” Larson said in his presentation to Fournier. “You have played a key role in enabling us to do so.”

In addition, Larson noted, Fournier now supports Northwire’s international operations by providing the same fast and reliable service for shipments to the company’s facility in Suzhou, China, where Teknor Apex also manufactures vinyl compounds.

The name of the Northwire award refers to the “Whale” graphic that for several years was a symbol for the company and is still used in honoring excellence. The symbol commemorates an incident in the 1990s that received worldwide attention, as Northwire power cable played a role in special de-icing equipment set up to free three whales trapped in the Arctic ice.

Northwire is an industry leader in the design and manufacture of industrial-grade technical cable. Custom design choices include paired, nonpaired, triads, various and meeting production goals such as better wall control and faster line speeds are also covered.

Also, the new website for B&H Tool describes B&H’s engineering, production and technical support for companies who use extrusion tooling including adjustable center, fixed center, and multi-layer crossheads and in-line die assemblies. B&H tooling is used for the extrusion of thermoplastics, fluoropolymers and silicones throughout the wire and cable industry, in medical device manufacturing as well as for the manufacturing of industrial tube, hose and pipe.

The brochure and website discusses how B&H Tool works with manufacturers of wire, cable, tubing, hose, pipe and profiles to optimize extrusion performance by eliminating extrusion instabilities. www.bhtool.com

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Multi-Motor Rod Breakdown Machines with Controlled and Minimised Slip

The technology of the Frigeco multi-motor rod breakdown machines with minimised slippage, introduced at the beginning of the nineties, is strongly developed in these last years. In comparison with a traditional machines, the Frigeco rod breakdown machine allows have the following advantages:

- Excellent wire surface quality
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Madem announces launch in Bahrain; Environmental Protection

On February 8, 2009, Madem Reels Group, one of the largest wooden cable reel producers in the world, showcased its latest innovations at the largest wire show in the Middle East. At the show, Madem Reels Group introduced its newest member, Madem Gulf Industries WLL, located in the Kingdom of Bahrain.

Leandro Mazzaccato, Madem Group Sales Director, said, “Our new plant will streamline our Middle East operations and provide our customers with lowered inventories while optimizing their logistics. We are absolutely confident in the eminent success of our new manufacturing unit, and our Middle East customers are looking forward to our start-up. Production will begin May 2009.”

Madem Gulf Industries will initially produce 50 truckloads of reel kits per month, increasing to 100 truckloads per month by June 2009. A third shift has not been counted out. Mazzaccato stated, “We could achieve 150 truckloads per month at our Bahrain facility alone, but we could also launch another manufacturing unit in another Gulf country. In the last 15 years, Madem has enjoyed the steadfast support of our loyal Arab customers, supplying more than 80% of all imported reels in the Middle East to over 15 customers. With our new local production capability we’re hoping to boost our market share of locally produced reels as well.”

Today, Madem owns 12,000 hectares (30,000 acres) of pine forests, two lumber mills, one plywood plant and many state-of-the-art automated reel manufacturing lines. Madem is one of Brazil’s largest forestry groups, with manufacturing operations in the USA, Spain, Romania and Bahrain. Madem produces approximately 500 containers of unassembled wooden reels per month, and supplies more than 200 customers in 40 countries.

With 800 employees worldwide and 110,000 m² (1.2 million ft²) of indoor manufacturing space, Madem calls itself the largest wooden reel manufacturer in the world. Today the Madem name represents 60 years of industry experience. The Madem team constantly strives to build trust and confidence by offering customers a superior, quality product.

Also, since the 1970s, with the launch of the Rio Negro operation, the Madem Group has been committed to sustainable development and the preservation of the environment.

Today, the company still believes in “Going Green”, and recently demonstrated this commitment to the environment by acquiring a large tract of forest beside its manufacturing plant. The 91,000 m² (970,000 ft²) tract of pine forest shelters hundreds of species of flora and fauna, making the area very interesting from a conservationist perspective.

Continued...
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The company goals are to create a leisure and recreational space to enriching the quality of life of its visitors, through the conservation and planting of native tree species, sustaining a permanent home for the local fauna. Madem also wishes to develop environmental awareness through the proper usage of the community’s special environmental qualities. The Madem Eco Park has a 3000 m (9850’) trail, suspension bridge, and harbors hundreds of species of flora and fauna within the Parana Pine forest, and will be open to the public with a permit from the Agriculture and Environment Secretary.

www.madem.com.br


Ft. Wayne Wire Die, Inc., Ft. Wayne, IN, USA, publisher of the first and widely used wire drawing reference guide, has released the guide’s latest edition, completely updated and available in English, Chinese and now a new Russian version.

Wire drawing professionals can now specify and procure their wire dies more precisely and efficiently having the most current information on hole size tolerances, available polycrystalline diamond materials and dimensions, die material comparison tools and more.

Originally written and produced in 1986, Ft. Wayne Wire Die’s aptly named Blue Book has become a wire industry reference standard for identifying and optimizing the right dies for virtually every possible wire drawing application. And according to Ft. Wayne Wire Die, since then, the market has continued to anticipate and rely on a new edition roughly every two years.

Other content includes wire gauge
charts, detailed wire die technical drawings and nomenclature, die recutting options, mathematical wire drawing principles and more, all constructed and organized to guide engineers through a logical die selection process.

Fort Wayne Wire Die, Inc., designs and manufactures high-precision wire drawing dies and hard-material components for the wire and cable industry. For more than 70 years, the company has been a scientific leader and innovative source for high-quality wire drawing dies that offer a multitude of value-added advantages.

**www.fwwd.com**

**Nextrom Selected as CGCRI Supplier**

**Nextrom Oy**, with its headquarter in Finland, is a global supplier of optical fiber and cable manufacturing equipment. Nextrom was recently awarded a contract from **CGCRI**, Kolkata, India, to supply an MCVD and a rare earth vapor phase doping system for academic research and industrial research and development projects.

CGCRI said that the technical competence and reputation of Nextrom were big factors behind Nextrom’s success in winning the supply contract.

CGCRI is one of the premier R&D organizations in India particularly devoted to class and ceramics. The Institute has about 600 employees, students and trainees, and is actively working on a variety of local and international research projects in the fields of special glasses, optical fibers, engineering and bio-ceramics, ceramic membrane, electroceramics and sol-gel technology. The **CGCRI Center** is reportedly one of the most advanced facilities in the world when it comes to the development of specialty optical fibers for various emerging applications. Many major programs have also been initiated in key areas such as fiber laser, optical amplifier and grating-based sensors.

The Nextrom MCVD and NHS are scheduled to be delivered and installed before June 2009. The unit contains many special features, designed and fabricated as per CGCRI’s requirement.

**www.nextrom.com**

**Huber on Schedule With EU Guidelines; China Plant Nears Completion**

In compliance with the new **EU REACH** chemicals regulation, **Huber Engineered Materials (HEM)**, Atlanta, GA, USA, a division of J.M. Huber Corporation, has announced as a member of the **Silica and Silicates Consortia**, that it has developed the Technical Dossier and Chemical Safety Report to successfully register synthetic amorphous silica with the **European Chemicals Agency** in Helsinki, Finland.

The substance was registered by the lead registrant by order of the Consortia in...
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Huber Engineered Materials develops engineered specialty ingredients that enhance the performance, appeal and processing of a broad range of products used in industrial, paper and consumer-based applications. Its inorganic expertise has resulted in advancing the art in specialty silica and silicates, alumina trihydrate, magnesium hydroxide, barium sulfate and natural calcium carbonate. Huber Engineered Materials has offices in 15 countries.

Huber has announced construction of its new dental silica plant is nearing completion in the coastal city of Qingdao, China, in the Shandong Province. Production of the first silica sample is scheduled for June of this year.

While the new Qingdao plant has been under construction, Huber entered the China and Asia Pacific region last year with an agreement with Changzhou City Mingfan Fine Chemical Co., Ltd., to purchase its production-related assets, technology and know-how for the manufacture of various grades of precipitated silicas for the oral care industry. The strategic move accelerated Huber’s manufacturing presence for dental silica in China and helped the company to gain a better understanding of local supply chains, markets and customers.

www.hubermaterials.com

Summit City Enterprises Celebrates 10 Years “On Top of the World”

In January 2009, Summit City Enterprises, reached the 10th anniversary of its incorporation in January 1999 as a full line supplier of diamond, PCD and carbide dies to the wire industry.

“We started Summit City during a generational contraction in the North American wire industry,” said Craig Martenson, founder of Summit City. “And we appear to celebrate our 10th...”

www.heatbath.com

Heatbath Announces Key Territory Appointment

Heatbath/Park Metallurgical, Indian Orchard, MA, USA, a leading manufacturer of heat treating and metal finishing products, has announced the appointment of Brock Fleming as Technical Sales Representative for the full USA state of Indiana. He is based in Fort Wayne, IN, USA.

Fleming has six years experience managing chemical services operations for a Tier 1 chemical management firm. He will rep Heatbath/Park Metallurgical for heat treating and metal finishing products.

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Alternative Rubber & Plastics, Inc. is pleased to announce their appointment as authorized distributor for Keliren® CPE which is produced by Hangzhou Keli Chemical. They are the largest producer of aqueous-process CPE in the world. The Keliren® CPE rubber-grade products are known world-wide for their superior quality.

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Alternative Rubber & Plastics, Inc. is an ISO 9001 certified distribution and development company with a strong focus on rubber, plastics and specialty polymers. We are committed to providing quality products at competitive prices, as well as working with our customers to ensure their complete satisfaction. Some of our other products include: EPDM  •  NBR  •  SBR  •  PBR  •  TPR (SIS,SBS,SEBS)  •  Styrene Resins  •  Adhesives(Chemlok®)  Poly-separator sheeting  •  Mold Releases(Crystal®)  •  and many other related products.

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anniversary during another severe contraction. Summit City has enjoyed ten consecutive years of record sales and/or earnings thanks to the continuing support of our growing list of customers. 2009 may be our first year without a new sales record.”

According to Martenson, one question that has come up over the years is, “Why do you call Fort Wayne the “Summit City” when it is in the flat state of Indiana? The fact is that Fort Wayne is essentially located on a continental divide. Unlike the more famous divide along the Rocky Mountains where waters on the west flow to the Pacific and the east flow to the Mississippi, the divide here separates water to the west going to the Mississippi and the east to the Atlantic. In the 16th and 17th centuries, the fur traders had to portage across the heights of Fort Wayne from the east-flowing Maumee to the west-flowing Wabash River to go west in search of beaver pelts.

“So we at Summit City Enterprises say that we have enjoyed 10 years of business growth on ‘top of the world’,” said Martenson. www.summitdie.com

Lubrizol Introduces New Estane® TPU Products

The Lubrizol Corporation, Cleveland, OH, USA, recently introduced new Isoplast and Pellethane Thermoplastic Polyurethanes (TPUs). This year also marks the 50th anniversary for the Estane brand and Lubrizol as a global leader in TPU technology.

Lubrizol recently acquired the two new brands as a part of the TPU business asset purchase from The Dow Chemical Company. The new product additions to the Estane TPU product line span the continuum between elastomeric and rigid TPU properties. The two key brands representing the business at the show include Pellethane™ Thermoplastic Polyurethane Elastomers used in a variety of high-value elastomer applications including footwear, medical tubing, automotive, film and industrial/engineering applications; and Isoplast™ Engineering Thermoplastic Polyurethane Resins used in a variety of niche, specialty applications that require the unique combination of high-end engineering plastic properties including clarity, impact strength and chemical resistance.

Lubrizol markets thermoplastic elastomers products under the Estane Thermoplastic Polyurethane brand name. Estane TPU is an engineered, highly versatile thermoplastic elastomer that is utilized in film extrusion, tubing, cable jacketing, injection molding, calendaring and solution processes for applications such as textiles, wire and cable, hose and tube, optical, industrial, agriculture and others. www.lubrizol.com

TROESTER at wire Russia 2009

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Teknor Color Sells PVC Colorant Business

Teknor Color Company, Pawtucket, RI, USA, has sold the PVC segment of its colorant business to Breen Color Concentrates, Lambertville, NJ, USA. The sale, for an undisclosed sum, includes Teknor Color formulations and customer lists for PVC colorants produced at the company’s facility in Attleboro, MA, USA. The business will be merged with the PVC colorant business of Breen as part of the formation of East Coast Colorants, a new company established by Spell Capital Partners, LLC, which has purchased Breen.

The sale does not affect Teknor Color’s other manufacturing locations in Henderson, KY, USA and Jacksonville, TX, USA, according to Jonathan Riley, Teknor Color Vice President and Business Director, who noted that the Attleboro plant is Teknor Color’s oldest. Last month, the company completed a roughly US$1 million project that doubled the size of the Henderson plant.

Teknor Color will produce PVC colorants for Breen at Attleboro until transfer of the business to the plant in Lambertville has been completed. Manufacturing will then cease at the Attleboro plant, which is located a few miles from the world headquarters of corporate parent Teknor Apex Company, also in Pawtucket. Because of its rail access, the Attleboro facility will be used for offloading of chemicals.

PVC colorants are used for many applications, ranging from toys to wire and cable. Teknor Apex is a leading manufacturer of vinyl compounds and will continue to supply pre-colored compounds to customers that require them.

Teknor Color Company produces color concentrates for use in all thermoplastic processes, supplying many standard colors and able to formulate an unlimited number of custom products.

www.teknorcolor.com

Alternative Rubber & Plastics to Distribute Hangzhou Keli Products

Alternative Rubber & Plastics, Amherst, NY, USA, has partnered with Hangzhou Keli Chemical to become
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Few products today are as versatile in a wide range of markets as Estane® TPUs. From running shoes and cable protection to garden hoses and automobile applications, you’ll find Estane TPUs in action just about anywhere you look. And after 50 years, we’re still growing, with potential applications in more industries than ever before.

www.estane.com
that company’s authorized distributor for chlorinated polyethylene (CPE) products in the USA. Alternative Rubber & Plastics is an ISO 9001 distribution and development company with a strong focus on rubber, plastics and specialty polymers. www.altrubber.com

**Radyne Delivers Bright Annealing System**

Radyne Corp., Milwaukee, WI, USA, reports that it recently shipped its new Oxygen Free Copper Wire Bright Annealing System to a leading supplier of electrical grade copper and aluminum wire. Radyne says that normal annealing will damage wire by allowing impurities to oxidize the surface leaving it brittle and lacking shine and therefore offers inline atmospheric bright annealing systems maintain the highest quality surface finish and interior strength for copper wire by eliminating traces of alkali, minimizing carbon deposition and stress relieving.

The system recently shipped anneals copper wire in sizes ranging from 10 to 2 gauge (0.102" to 0.258") diameter up to 700 fpm or more. The power supply used for this application is a newly designed TFN induction power source.

Radyne is one of 40 companies making up the Inductotherm Group. www.radyne.com

**Beta LaserMike SRL Specs Offer Economies**

According to Beta LaserMike, Dayton, OH, USA, ensuring that your category and coaxial cable meets SRL (Structural Return Loss) performance specifications is essential. Off-line testing is one way to determine whether the wire is made properly, but can end up being costly when the cable fails.

Beta LaserMike’s SRL Pro allows detection of periodic variations in wire diameter, insulation diameter and capacitance. These cyclical variations cause impedance variations on finished cable, causing SRL failure. SRL Pro is equipped with eight analog input channels. It can perform Fast Fourier Transform (FFT) on any sensor with analog output such as, Beta Lasermike’s LaserSpeed gauge, tension gauge, accelerometer, temperature gauge, current sensor to detect variations in extruder screw driver. It can also predict SRL performance of the finished cable.

SRL Pro is equipped with useful features, such as up to 13 graphs per channel (FFT, SRL, Impedance, Trending and many others), simultaneous displaying of multiple channels in the same graph, warning and reject tolerance setting for external alarm, spectrographs for trending FFT and SRL for entire reel, a look-up table to automatically identify sources of spikes, hardware and software anti-aliasing filtering to eliminate false spikes, harmonic (false spike) identification, digital input for automatic end of reel reporting, live line speed input for accurate frequency calculation, simulation mode, for training of personnel and remote Alarm display via OPC server. www.betalasermike.com

**InnoVites Implements CableBuilder© at Relemac**

InnoVites B.V., an independent software vendor with offices in India and The Netherlands, has announced Galvanized Steel Strands and Cable Armouring Wire
ASTM, IEC, BS Standard

**Anbao (Qinhuangdao) Wire & Mesh Co., Ltd.**

Add: No. 231, Gangcheng Street (west), Qinhuangdao, P.R.China, 066004 Tel: +86-335-3893680 Fax: +86-335-3870760 Email: anbao@anbao.com Website: www.anbao.com
that Relemac Cables, Delhi, India, has selected InnoVites as its partner to implement CableBuilder®, the cable design software offered by Cimteq Ltd. Relemac Cables selected CableBuilder to improve the quality and efficiency of the design and quotation processes. www.innovites.com
www.relemaccables.com
www.cimteq.com

SMS Demag to Become SMS Siemag

As of the end of March 2009, SMS Siemag is the new name of the company that has until now been known as SMS Demag, which is a leading supplier of metallurgical plant and rolling mill technology for the steel and aluminum industry. SMS Siemag is the largest company in the SMS group in terms of order intake and sales, which is why the range of products and services will remain the same, while the new name recalls the roots of the company founded more than 130 years ago by the Weiss family of entrepreneurs.

Given that all the shares in the SMS group are once again under the control of the Weiss family, the Chairman of the SMS group, Heinrich Weiss, stated, “By taking this step, my family is continuing the tradition of our family-owned company.”

www.sms-group.com

Rosendahl Turns 50

Ongoing development and technological progress are fundamental values that Rosendahl of Austria can look back upon on its 50 years’ history. Within those 50 years, Rosendahl has grown to a global supplier of manufacturing technology for the production of power-, automotive and fiber optic cables, RF, datacom and coaxial cables. With excellent products, competent consulting, competitive know-how, experience and great service, Rosendahl is a leading partner in the industry.

It was 1959 when Walter Rosendahl had the ambition to become a high-tech cable equipment manufacturer for a variety of industries. He worked hard on his first developments in various segments and he managed to achieve the goals he had in mind already in 1965. A historical milestone was the development of the first extrusion line. The extrusion technology, which has been continuously developed over the years forms one of the expertises and strengths of Rosendahl. A second large step in the year 1971 was the introduction of SZ-stranding technology, which since then has been implemented in a large number of lines. The technological development in foaming and in the fiber optic segment also called Rosendahl to enlarge its product range to serve the evolving market. Later, also RF welding and corrugation technology solutions were developed and completed Rosendahl’s current fields of expertises.

The opening of the facilities in Pischelsdorf, Austria, in 1973 was meant to enlarge the manufacturing capacity of Rosendahl. The increasing demand also led to continuous expansions of office and production facilities on site and throughout the world.

In 1997, Rosendahl became a member of the globally active Knill Group. Since 2005, Nexstrom has also become
Gauder Extends Contract With Maillefer

Gauder Group, Chêneé (Liège), Belgium, has announced the extension of its contract with Maillefer SA Moscow, Moscow, Russia, to represent its range of new rotating machines in all CIS countries. Well-known for many years by POURTIER and SETIC customers throughout the Russian Federation, Ukraine and Belarus, Maillefer SA Moscow is from now on the representative office for Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Tajikistan, Turkmenistan and Uzbekistan markets as well as in direct collaboration with Philippe Letout, Sales Manager, Rotating Machines.

Mr. Borisevich & Mr. Letout work together to represent Gauder Group in the CIS countries.

POURTIER and SETIC, both of the Gauder Group, design and manufacture complete solutions for power and larger cables as well as for communication cables.

www.mailleferextrusion.com
www.gaudergroup.com

New Mill from SMS Meer Commissioned in Brazil

Siderúrgica Norte Brasil SA, Sinobras, Brazil, commissioned the wire rod and bar mill for an annual production of 250,000 tons supplied by SMS Meer, a company of the SMS group, of Germany. The plant is located in the district of Maraba, Para State, Brazil.

The main components of the mill are eight cantilever and six housingless stands in horizontal/vertical arrangement, a ten-stand wire rod block with new drive equipment, a loop laying head, a loop cooling conveyor (LCC®), the complete coil transport facility, a high-speed delivery system (HSD®) and a cooling bed with bundling and tying facilities. The company’s product mix is comprised of rebars in diameters from 6.35 to 25 mm via the cooling bed, and
wire rod in diameters from 5.5 to 12 mm in coils via the loop laying head. All dimensions up to 16 mm are rolled via the ten-stand wire rod block.

SMS Meer acted as system integrator, supplying all the electrical and electronic equipment, controls and software for the mill automation.

www.sms-group.com

Tenova’s Core Furnace Systems & LOI Combine

Core Furnace Systems, Pittsburgh, PA, USA, a multi-business unit company of the Tenova Group and LOI Inc., the USA unit of Tenova LOI Italiaimpianti, combined their business operations on March 31, 2009. LOI Inc. will be merged into and become another business unit of Core, along with Core’s existing metal making and furnace business units. The employees of LOI Inc. have moved to Core’s current Pittsburgh-based headquarters near the Pittsburgh International Airport.

Concurrent with this merger, Thomas Bovalina, who is LOI Inc.’s Vice President of Operations, has been named Vice President of the new business unit. Bovalina will report directly to Dominic Faccone, Chairman, President and CEO of Core Furnace Systems. William Wolfe, LOI Inc.'s President has retired.

Core Furnace is a leader in the design and supply of reheat, heat treating, specialty and carbon processing furnace equipment as well as melt shop equipment, technical services and automation systems. LOI is a leader in industrial furnaces for the steel, aluminum and automobile industries for North America. Annealing, stress relief and carburizing are just a few of the processes for which LOI can be of service. The Tenova Group designs, produces and supplies advanced technologies, products and services for the metals and mining industries.

www.corefurnace.com
www.tenovagroup.com

Successful Commissioning of POURTIER Stranding Line at Oman Cables

POURTIER–Gauder Group, Paris, France, recently celebrated the successful commissioning of its Concentric Stranding Line “COS 1200-2” for the production of a 37 wires concentric Cu/Al strand, 240 mm² at 500 RPM.

M.S. Abdul Nageeb, Project Manager at Oman Cables Industry, SAOG (OCI), where the line was commissioned, said, “This machine is the first in the world to use the system of winding three wires onto one coaxial bobbin (spinning on the center line of the machine), from external coil baskets and thereafter standing from this single bobbin. This makes the machine very compact and fast, and with two bobbins per module, allows six wires to be run from each individual module. OCI’s machine has five modules and can have an additional seven nontwisted wires fed into the machine at the beginning of the process giving us 37 wires in total. In their new machine, POURTIER uses

POURTIER COS 1200-2 line commissioned at Oman Cables Industry.
CORPORATE NEWS

Borealis Re-Assigns Roles in Polyolefin Leadership

Borealis, which is a leading Vienna, Austria-based provider of innovative, value-creating plastics solutions, has made two changes to its Polyolefins Leadership Team in line with its strategy to further develop its leadership across the firm.

As of April 1, 2009, Hans-Christian Ambjerg, who was the former Vice President of Borealis’ Wire & Cable Business Unit, has taken over the position of Vice President Film & Fiber from Marc Hubert, who succeeds Hans-Christian as Vice President Wire & Cable.

“Marc and Hans-Christian have contributed significantly to Borealis’ business development over the last few years, leading to a major turnaround in the film and fiber area and putting the wire and cable business on track to a solid global leadership position,” commented Lorenzo Delorenzi, Executive Vice President Polyolefins.

Hans-Christian Ambjerg is of Danish origin and joined Borealis as Vice President Wire & Cable in 2005. He has more than 12 years experience in senior management positions, heading up divisions and Business Units.

Marc Hubert, who is of Dutch nationality, joined Borealis in December 2002 as Marketing Manager in the Business Unit Moulding. From September 2005 until December 2006 Hubert held the position of Director Commercial Excellence, responsible for raising the commercial capabilities in the Polyolefin Business Group. Hubert was appointed Vice President Film & Fiber in 2007.

www.borealisgroup.com

Borouge to Further Expand Polyolefins Operations in Abu Dhabi

Following the successful completion of a feasibility study announced last year, Borouge, a leading provider of value-creating plastics solutions, has decided to enter the FEED (front-end engineering and design) stage of its Borouge 3 project. The company is thereby continuing with its plans to significantly expand its polyolefin operations in Abu Dhabi, in the United Arab Emirates, by adding approximately 2.5 million tons per year of capacity by the fourth quarter of 2013.

The expansion will let Borouge, which is a joint venture between the Abu Dhabi National Oil Company (ADNOC) and Borealis, Vienna, Austria, meet the growing demands of the high-value polyethylene and polypropylene markets in the Middle East and Asia. The addition of low-density polyethylene (LDPE) capacity will also enable Borouge to grow in the wire and cable infrastructure market.

www.borouge.com
www.borealisgroup.com

a motorized control system to ensure the uniform tension of each wire and can thereby guarantee a more regulated length in each bobbin.”

Explaining the preferability of POURTIER’s solution for OCI, Najeeb said, “Other machine manufacturers have used central stranders which only wind one wire at a time onto the bobbins. This allows discrepancy between the lengths on each bobbin and leads to more scrap during the feeding on process.”

OCI said that it performed an analysis of the COS 1200-2 equipment capabilities and became convinced that this would be the solution to cope with the company’s production projections. Several trials were conducted on POURTIER’s prototype, developed in 2006, which OCI personnel were invited to attend. As a result, a joint development relationship was born.

Assembled in France in June 2008, OCI witnessed a successful ‘no load’ trial of the machine, after which the company took delivery of the complete equipment line in October 2008, with final commissioning taking place in January 2009.

The range of concentric strander COS types is constantly under further development at POURTIER in order to enlarge the field of application for this product line. Benefitting from a joint development with a major cable maker like OCI, this line is responding to actual cable makers’ more stringent requirements.

www.gaudergroup.com

Continued...
The International Wire & Cable and Connectivity Symposium, scheduled for November 9 to 12, 2009, in Charlotte, NC, USA, will feature a 100-150 company exhibition that offers a unique opportunity for suppliers to present new and established products, processes and services to a highly qualified audience of 1000 or more potential customers...

Visit www.iwcs.org/exhibitor.html to download details and see the current exhibitor list

Exhibit @ the IWCS FOCUS SUPPLIERS’ EXHIBITION

The IWCS Conference, scheduled for November 9 to 11, 2009 at the Charlotte Convention Center, Charlotte, North Carolina, USA November 8th to 11th.

About the IWCS, Inc. and the IWCS Conference

The International Wire & Cable Symposium, Inc., a nonprofit organization whose mission is to provide a forum for the exchange of information among suppliers, manufacturer’s and users in advancements in material, process and products for transmission systems of voice, data, video signal and electrical current. The IWCS Conference is organized by the IWCS, and it contains five major components: The Technical Symposium, a Focus Suppliers’ Exhibition, several Professional Development Courses, an Executive Forum, and the Plenary Session. Held annually in November, IWCS is the world’s premiere venue for the presentation of new and original wire and cable and connectivity technologies and trends related to designing, manufacturing, processing and using products in the telecommunications, data, electronics, power, industrial, automotive, aerospace and specialty wire and cable segments.

Focus Suppliers’ Exhibition™ Product Categories

About the IWCS, Inc. and the IWCS Conference

The 58th International Wire & Cable and Connectivity Symposium will take place in 2009 at the Charlotte Convention Center in Charlotte, North Carolina. Exhibit setup will take place on November 9th from 6:00 am to 12:00 pm with exhibit hours as follows: November 9 November 10 November 11

Exhibit Open/Refreshments Exhibit Open/Refreshments Exhibit Open/Refreshments

November 9 1:00 pm to 6:00 pm
November 10 10:00 am to 6:00 pm
November 11 9:00 am to 12:00 pm

Each IWCS Exhibitor with 10’ x 10’ space receives the following:

- Pipe and drape, skirted table, chairs, wastebasket
- Two Booth Passes for personnel
- Two IWCS Technical Symposium Passes
- Reduced registration rate for the Executive Forum
- Two digital copies of the Conference Proceedings
- Free listing in the Suppliers Directory
- Free listing in Conference Brochure and at www.iwcs.org
- Refreshments in the Exhibit Hall
- Exclusive access to present new technology in the IWCS New Product Presentation Session

Exhibit Fees

Single or double exhibitor packages are available at:

- $2,500 per 10’ x 10’ booth
- $4,500 per 10’ x 20’ booth

International Wire & Cable Symposium, Inc. is a non-profit organization. The purchase of a booth in the exhibition supports the wire and cable and connectivity industry research and development by helping sustain the IWCS and its annual IWCS Conference™ which helps direct and encourage wire and cable industry research and development.

58th International Wire & Cable and Connectivity Symposium

Charlotte Convention Center
51 South College Street
Charlotte, North Carolina, USA
November 8th to 11th.

Focus Suppliers’ Exhibition™

Charlotte Convention Center
51 South College Street
Charlotte, North Carolina, USA
November 8th to 11th.

IWCS Focus Suppliers’ Exhibition™ Sales Management

In 2009, sales for the IWCS, Focus Suppliers’ Exhibition™ are managed by Doug & Ray Zingle, Billingslea & Zingle, Inc., Phone: +1-804-688-1098; Fax: +1-205-745-8100; Email: zingle@outlook.com. All inquiring and account management is handled directly by IWCS, Inc., Email: phtala@iwcs.org.

Wire & Cable Technology International will publish the 2009 Official Directory of the Focus Suppliers’ Exhibition™ which contains exhibitor listings, descriptions, a product directory, product showcases, company logos and advertisements. For the exhibit directory or the magazine, contact VP of Sales: Tom Hutchinson, dfh@wiretech.com. Editor: Mike McNulty, mcnulty@wiretech.com.

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Visit www.iwcs.org/exhibitor.html to download details and see the current exhibitor list

Exhibiting at the 2009 Focus Suppliers’ Exhibition™

The 58th IWCS Conference™, Focus Suppliers’ Exhibition™, is an outstanding venue for suppliers to the wire and cable and connectivity industries to present their latest products and technology. The Conference draws more than 1000 key technical managers from the industry who participate in the technical program as well as visit the exhibition.

The IWCS Conference™ draws visitors from all over the US and from more than 25 other countries. The Conference addresses the latest technologies in communications, data, networking, power, aerospace/automotive, connectivity and other applications.

The IWCS Conference™ also includes a New Products session where the latest developments are showcased by the exhibitors. The Exhibition is positioned so that the traffic from the entire conference is encouraged to visit.

Prime exhibition space is going fast, with many of the exhibitors from the 2008 event already committed to space for 2009.

The IWCS Conference™ is organized by the International Wire and Cable Symposium, Inc. (IWCS), headquartered in Eatontown, New Jersey, in cooperation with the International Institute of Connector Technology and the Communications Cable and Connectivity Association.

Editor: Mike McNulty, mcnulty@wiretech.com.

Advertisements. For the exhibit directory or the magazine, contact VP of Sales: Tom Hutchinson, tlh@wiretech.com; Sales/Marketing: Sue Atkinson, satkinson@wiretech.com. The Conference draws more than 1000 key technical managers from the industry who participate in the technical program as well as visit the exhibition.

The Conference draws more than 1000 key technical managers from the industry who participate in the technical program as well as visit the exhibition.
Over the last month, a certain confidence has started to return to the global cable making industry. An optimist might even say that the fog has lifted, so that at least companies worldwide have more visibility in their business, but pessimists will mention that there is still no sunshine in their business. If we look regionally, there are clearly still some tough markets, in terms of cable demand in volume terms and margins. In the USA, western and eastern Europe and Japan, demand for wire and cable products particularly electronics and magnet wire has been hard hit, as tends to happen at the leading edge of a recession. This has hit the Chinese, Japanese and Taiwanese cable markets hard. Power cable demand globally has also been hit, but in some regions, some ambitious government investment projects have buffered some parts of the power cable market. Power cable demand, is driven by fixed investment, and in many cases, projects have a certain lag to any downturn.

One region where this is notable is the Middle East, where demand for power cable boomed during the 2005-2008 period, but that pace has eased through the first few months of 2009, as many private developments have been cancelled or delayed. Yet, there are still many government contracts, which require power cable, and in the case of Saudi Arabia, large government-led mega projects. In response to this increase in demand, there has been a great deal of additional power cable capacity added to the region, much of which is due on stream through 2009 and 2010. Many of these operations will supply cables to engineering groups and construction companies that have won large contracts to build projects in and around the King Abdullah Economic City (abbreviated as KAEC; pronounced CAKE). This is a mega project revealed in 2005 by Abdullah bin Abdulaziz Al Saud, the king of Saudi Arabia, and will include a number of building projects that include massive housing and city centre developments. In addition, there is going to be a great deal of infrastructure linking KAEC with Jeddah and Riyadh, including roads and a high-speed rail link.

In response, there has been a very large increase in power cable capacity in Saudi Arabia. Two new entrants include Bahra Cables (part of CPC) and Red Sea Cables, which is based at Yanbu Industrial City, on the Red Sea Coast. Leading Egyptian and global cable maker El Sewedy Cables also announced that it would open a factory in Yanbu Industrial City in Q3 2008 with an initial investment of US$150 million. Two years ago, El Sewedy had signed a memorandum of understanding with partner Mada Company for Industrial and Commercial Investment (a subsidiary of Al-Raghy Group). It appears that El Sewedy has a 60% stake in the new plant. The Energya Group, which also controls Jeddah Cable (JCC) is setting up a new power cable plant in Rabigh. The 160,000 m² factory buildings will include medium and high-voltage power cable operations. Established players Riyadh Cable, Saudi Cable and Alfanar Electrical Systems have also expanded capacity. Alfanar Electrical Systems is setting up a new cable operation near Riyadh.

It is often difficult to tell when a project has moved beyond the licensing phase, and when a company breaks ground on a project to build a cable plant, but as far as Integer can tell, these are the key projects that will come on stream through 2009 and 2010. Certainly the pace of activity has slowed from last year. Given that many of these projects were planned at the height of the oil price back in 2008, we believe that the number of new projects that actually break ground through 2010-2011 will be much less, and that this will have an impact on demand for machinery orders from the region through 2010-2011.
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www.howarequipment.com

The plasma surface and heat treatment process is an efficient and effective alternative to chemical surface treatments for use on continuous copper alloy wire, strip and foil.

**Plasma Surface Treatment**

The effect of plasma treatment on a copper alloy surface is threefold as seen in the following:

- **Plasma Deoxidation**—Under the ion bombardment in the plasma chamber, the oxide layer breaks up. Plasma effectively removes surface oxides from copper alloys, making it a dry cleaning alternative to traditional acid based deoxidation.

- **Plasma Degreasing and Surface Cleaning**—In a low pressure plasma chamber, wet lubricants disintegrate and evaporate leaving the metallic surface dry and free of lubricants.

- Plasma treatment removes organic and inorganic surface deposits, leaving the surface free of agents that act as catalysts for surface oxidation. This slows down the process of subsequent surface oxidation. So a plasma-treated surface is considerably less prone to subsequent oxidation. This was confirmed in an experiment in which acid and plasma-treated samples of copper were stored in equal conditions. The acid-cleaned and rinsed sample visually oxidized in two weeks. The plasma-treated copper wire reached the same level of oxidation in six months, which is 12 times slower oxidation.

- **Surface Activation**—Ion bombardment in a plasma chamber increases surface energy to prepare the surface for plating. With the right selection of process gas and power input, the plasma treatment increases surface roughness to further increase surface wettability, and in turn strengthens inter-metallic bond in a subsequent plating process.

**Plasma Heat Treatment**

A heat treatment or annealing effect can be achieved if sufficient power input is supplied to the plasma. The degree of annealing can be accurately controlled through power input to achieve any required softness. Plasma annealing can achieve complete re-crystallization, equivalent to annealing in a traditional bell annealer. Annealing with a high degree of accuracy can be achieved, which can benefit many applications. For example, final drawing or a skin pass used to target required tensile strength can be avoided when the plasma process is used to target appropriate tensile in the last stage of the production process. Production of silicon bronze welding wire and brass battery pin wire are two such examples.

**Inline Product & Process Control**

The plasma process is powered by a high-voltage power supply that results in current flow between the plasma chamber and material (i.e., wire running through the chamber). The plasma is ionized gas, which under normal operation takes the form of glow discharge plasma—the conductive gas in the chamber. Glow discharge is only possible when the atmosphere is clean and homogenous (i.e., when there is no major contamination in the process atmosphere). Contamination in the chamber initiates arc discharge—a form of current bursts between the plasma chamber and the wire. Any occurrence of arc discharge is clearly visible as a dip on the voltmeter, hence indicating compromised surface quality.

**Surface Quality Control**—Frequent measurements of voltage during the plasma process (usually 30 times per second) are an effective indicator of surface cleanliness. Surface quality of the material can be measured inline during the process. A computer alerts the operator when surface quality of the material is compromised. The sections of the finished product are logged by the computer and can be subsequently examined for quality if required. This provides the Quality Control Manager with a computer-based in-line surface quality control. Such in-line quality control is not possible in a traditional chemical-based surface treatment.

**Material Softness Quality Control**—Wire softness is a function of the power supplied to plasma. Constant control of power input hence allows for in-line targeting of specified softness. Degree of heat treatment can be adjusted in-line to meet specific product requirements. Similarly, required softness is maintained during acceleration and deceleration to minimize scrap. In practice, plasma heat treatment allows wire softness (elongation and tensile) to be targeted to ±1% accuracy.

**Machine Maintenance Alarms**—Plasma heat and surface treatment machines can be equipped with computer-controlled alarms that alert required maintenance. Maintenance frequency is subject to the application, but usually machine up-time can be higher than 95% on a 24/7 operation.

**Hot Dip Tinning of Copper Strip, Wire & Tube**

The plasma heat and surface treatment process can be incorporated into hot-dip plating lines (Figure 1). In examples mentioned below, a vertical plasma machine anneals and cleans the surface of the copper alloy wire, strip or tube prior to plating. The process replaces acid/alkaline cleaning, rinsing and fluxing. It runs inline with the tinning bath per
the following process order:

**Payoff >>> PlasmaPREPLATE >>> Hot Dip Tin Bath >>> Tin Coat Drying >>> Spooler**

The process includes computer controlled inline surface quality control. A summary of the plasma process features in a hot dip tinning line is as follows:

- Dry surface preparation for plating process without acid or alkaline treatment.
- Flux-free surface activation.
- No flux contamination in tin bath.
- No rinsing/drying/waste disposal; no water treatment.
- Increased plating speeds up to 4 mps.
- Production uptime above 95% for 24/7 operation.
- Simultaneous annealing to any elongation from 3% to 45%.
- Reduction in tin bath temperature due to superior surface quality.
- Lower contamination of tin bath with copper due to lower tin temperature.
- Low operating/maintenance costs vs. chemical processes.
- Computer enabled, inline process and surface QC.

Example applications of vertical plasma process are (a) Photovoltaic ribbon—tinned copper strip for solar panels and (b) Capillary tubes—tinned copper tubes used in refrigerator, air conditioning, heat exchange and hydraulics systems.

**Electroplating of Copper Alloys**

A horizontal plasma heat and surface treatment process was designed for electroplating lines and is used to anneal and clean the surface prior to plating (Figure 2). Plasma-treated wire requires no acid/alkaline cleaning nor rinsing prior to electroplating. A horizontal machine runs inline with an electroplating line and drawing line if required per the following:

**Payoff >>> Drawing >>> PlasmaPREPLATE >>> Electroplating >>> Spooler**

The process includes computer controlled inline surface quality control. A summary of plasma process features in an electroplating line is as follows:

- Dry surface preparation for plating process without acid or alkaline treatment.
- No rinsing/drying/waste disposal; no water treatment.
- Inline with electroplating process and drawing if required.
- Production uptime above 95% for 24/7 operation.
- Simultaneous annealing to any softness with high degree of softness accuracy.
- Low operating/maintenance costs vs. chemical processes.
- Computer enabled, inline process and surface QC.

Example applications of horizontal PlasmaPREPLATE machine are (a) Nickel plated copper conductors—for high-temp applications, e.g., aviation and (b) Silver plated copper alloy conductors—for electronics.

**Degreasing & Deoxidation of Copper Alloys**

Plasma surface treatment is an effective alternative to acid or alkaline-based cleaning (Figure 3). The process includes computer-controlled in-line surface quality control. The plasma surface treatment machine designed for surface cleaning and deoxidation of nonferrous wires, tubes or strip can be used in a number of applications such as superconductor wire and copper alloy strips or foils.

www.plasmait.com / www.howarequipment.com

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**Company Profiles: Plasmait GmbH** is a supplier of heat and surface treatment solutions for the wire, cable, tube and strip industry. Plasmait solutions are built around a plasma treatment process that offers great advances in wire production efficiency, wire surface quality and process ecology. Plasmait plasma heat and surface treatment shows benefits on a range of applications and materials including medical wire, welding wire, heating alloys, nickel alloys, high-temperature materials and heating alloys, precious metals, steel and stainless steel, plated wire, copper and copper alloys, magnet wire and superconductor surface cleaning. www.plasmait.com

**Howar Equipment Inc.** services the needs of the wire and cable manufacturing industry by providing the high-quality machinery and accessories needed to manufacture and process wire and cable. The company has partnered with the highest quality and service-oriented companies to supply the North American industry with the best quality products and services. These partners include GMP-Slovakia, ACM, OMF, METAVAN, Plasmait, UNITEK, WTM Srl and Rolf BOCK GmbH. www.howarequipment.com
Simple Add-On Tool Lowers Production Costs & Improves Runnability

by:
Patrick Fitzgerald,
Wire Industry Business Development Manager
Michael Jordan,
Wire Industry Sales Representative
Sealeze®, A Unit of Jason Inc.
8000 Whitepine Road
Richmond, VA 23237 USA
www.sealeze.com/wire_descaling.html

A tremendous amount of money is spent on drawing machinery and wire forming equipment, and when they are not producing at the volume required or the quality expected, people get frustrated, angry or both. Which is followed shortly by the blame game—usually focused on the operator, the equipment, the vendor and so forth.

Enemies of Runnability

Often however, the real culprits are not the equipment or operator, but the raw material itself or the inherent side-effects of the process. In the process of drawing or forming wire, scale and residual lubricants are inevitable. And if not managed effectively, they can have a significant impact on the overall operation of the line. The most common are:

- Incomplete scale removal or clinging fine particulates.
- Residual lubricants gumming up dies or wire straighteners.

All of these can affect forming, final finish or prematurely wearing out of dies as well as force line-speed reduction and more frequent shutdowns to change worn parts or clean critical points.

The impact of scale and residual lubricants on wire runnability and quality is greater than realized. On the plus side, these problems are relatively easy to manage without huge expense or re-engineering.

Simple Victory

Wire descaling and cleaning brushes come in a variety of materials, sizes and textures to optimize the condition of the wire surface, pre or post-process. It is not expected that the brushes alone will replace existing descaling equipment or methods. They are however a proven, cost-effective complementary tactic that increases process efficiency and final product quality. Depending on your objective, the brushes:

- Quickly remove excess scale to improve traditional mechanical descaling processes.
- Extend die life.
- Easily remove excess lubricants and residue.
- Improve uniform lubricant adhesion.
- Enhance drawing and bending machine performance and reliability.

Residual lubricants and incomplete scale removal on wire can cause wire processing and performance problems.

Spiral design wire descaling and cleaning brushes are a quick, low-cost way to optimize wire finish and increase line speed. Spiral design brushes can be installed in seconds with no special tools needed.

- Optimization of the wire product’s surface finish and brightness.
- Reduction of the costs that are associated with chemical descaling.

Mechanical vs. Chemical Descaling

Many plants are moving away from chemical descaling (also known as pickling) due to the process’ high relative cost (approximately twice that of mechanical descaling). This is also the case because of the additional work required to handle the spent acids to minimize environmental impact and concerns regarding operator safety.

The oxide scale by-products that result from the mechanical descaling process are dry and easily contained and can be safely disposed.

In some cases, pickling is required. Brushes that are specially designed for use in combination with the chemical descaling process can remove excess scale prior to the pickling process and add a mechanical descaling function while in the bath. This reduces immersion time, thereby increasing the line speed and lowering processing costs by extending the life of the chemicals.
Range of Function
There are specific spiral design brush types that are designed for each type of wire, material and size as well as the finish requirements, drawing operation or final product configuration.

A few examples of this are spiral brush designs for applications including:

- Heavy to light scale removal.
- Bright wire, plate grade finishing.
- Low and high carbon steel, copper, stainless steel, aluminum and other alloys.
- Soap/lime/lubricant removal.
- Very light talc, copper dust or fines removal.
- Continuous scouring.
- Wet or dry environments.
- Acidic or neutral baths.
- Line speeds in the range of 200 fpm (60 mpm) to 6500 fpm (2000 mpm).
- Cable and chain.

Easy to Install
Another advantage to the in-line spiral brush design is that the design facilitates brush change-outs rapidly in just seconds, with the wire kept in place.

Most production operations allow the brush to ride freely on the wire, while other production operations involve the clamping of the brushes to a fixture.

www.sealeze.com

Company Profile...
Sealeze® is an original equipment manufacturer of brushes for the wire drawing, forming and cable industries. Sealeze has been manufacturing brush solutions for industrial applications for over 30 years. The company’s brush products are found in applications ranging from shielding on machine tools, guides on conveyor systems, environmental control for energy efficiency in data centers and buildings, to sensitive electronics and military applications. Extensive custom-forming capabilities enable the company to make shapes and designs specific to the needs of the application.

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This article presents a new concept for cleaning wire-drawing soap residue from wires (desoaping) in preparation for hot-dip galvanizing. This recent development by the company Sirio Wire, will be explained through the results of Sirio’s work at the company Swedwire, a Swedish producer of galvanized steel rope. In particular, this article will focus on the benefits that have been realized in terms of energy savings and improvement in working conditions. Sirio Wire is a specialist in the design and manufacture of chemical treatment systems for wires.

The equipment used at Swedwire was a classic desoaping-galvanizing line that consisted of desoaping by molten lead bath (or in very few cases an open fired furnace or a fluidized bed), a water-quenching bath, a pickling bath (typically HCl), rinsing (multiple steps in some cases), fluxing, drying and hot-dip galvanizing in molten zinc bath.

The first step in the lead bath is customarily, but incorrectly, called “desoaping”. Because the lead is normally at a working temperature of approximately 450°C, it is not removing the soaps from the wires, but simply burning them in place. The HCl pickling that follows actually removes the burned soaps and the oxide present on the wire. Finally, the rinsing steps dilute the residual acid present on the wire and the flux bath prepares the wire for the hot-dip galvanizing process. This hot-dip galvanizing process presents several concerns for wire manufacturers, specifically:

- Lead bath operation is regulated due to health and environmental concerns.
- High energy consumption to keep the lead bath molten.
- HCl acid bath presents maintenance and operational concerns in controlling corrosive and hazardous fumes.
- Furthermore, neutralizing the rinse waters is expensive.

Chemical desoaping has been an interesting alternative to the lead bath for many years. Two types of technologies can be used for this including ultrasonic or electrolytic cleaning.

The best results of desoaping of the dry drawings lubricants are obtained with electrolytic cleaning in alkaline solution or ultrasonic cleaning in phosphoric acid based solution. Both technologies can adequately replace the lead bath and improve the cleanliness and performance of the product.

A Brief Review of the Two Technologies

Ultrasonic cleaning is the use of high-frequency sound waves to mechanically “scrub” the wire surface. The mechanical action is due to a process called cavitation where micro-size bubbles form, grow and implode due to alternating positive and negative pressure waves. Just prior to the bubble implosion, there is a tremendous amount of energy stored inside the bubble itself. When the implosion occurs near a hard surface, the bubble becomes a jet, which travels at around 400 km/h toward the hard surface. Due to the inherent small size of the jet, ultrasonic cleaning has the ability to reach into small crevices removing entrapped soils very effectively.

The basic components of an ultrasonic cleaning system include some ultrasonic transducers, an electrical generator and a tank containing the cleaning solution. The ultrasonic generator creates the high-frequency electrical impulses required to drive the transducers. The higher the frequency, the smaller the bubbles created during the cavitation will be. The transducers consist of PZT elements (Pb-Zr-Ti), which convert the electrical energy into mechanical vibrations by piezoelectric action. The transducers are located inside a watertight stainless steel box submerged in the cleaning bath just below the wire field. A watertight cable connects the transducer assembly to the generator.

The working temperature of the bath has a profound effect on ultrasonic cleaning effectiveness. In general, higher temperatures will result in higher cavitation intensity and therefore better cleaning. However, if the solution temperature nears the boiling point, the liquid will boil in the negative pressure areas of the sound waves, thus reducing or eliminating the cavitation effect. A working temperature around 60°C (140°F) offers an excellent compromise.

In the electrolytic process, the wire passes through an electrolyte in a processing zone divided in different chambers. Electrodes are located in each chamber and adjacent electrodes are connected to opposite poles of a direct current supply source. Electrical current is constantly passing between the electrodes in the adjacent chambers through the electrolyte and the wire while the wire travels through the chambers in the processing zone. In this way, the wire is alternately polarized negatively and positively as it travels through the processing zones. The resulting migration of ions of the electrolyte will cause chemical reactions to take place quickly at the surface of the wire resulting in formation of hydrogen or oxygen bubbles. Because the bubbles are formed at the actual surface of the wire, beneath the layers of soap and dirt, they will tend to mechanically lift the material away from the wire.

As previously mentioned, replacing the lead bath by an ultrasonic or electrolytic cleaning bath has already been applied successfully in different plants. For the new concept in particular case study, we had a second goal: the complete removal of the HCl pickling bath.

Our Specific Application

In the Swedwire case, the wires are coming from dry drawing machines in the same building as the galvanizing line, so the wires are free from oxide (rust) at the entrance of the line. If the wire is free of oxide coming to the line and we are no longer creating oxide on the wire in the lead bath or furnace, there is no longer a need for the HCl pickling bath. After desoaping the wires in a low acid bath, such as the phosphoric acid used in the ultrasonic cleaning system, no additional surface activation is required for proper galvanizing.

We can in fact replace the lead bath, the quenching bath and the HCl pickling bath by only one bath: the ultrasonic cleaning bath of a phosphoric acid based solution. The advantages in terms of ecology and energy savings are substantial, as we will describe herein.
Solutions for solid and tubular welding wires (MIG/MAG, flux cored, stainless steel, aluminium, bronze, titanium)

EXPERIENCE, KNOWHOW AND RELIABILITY IN THE HANDLING OF FERROUS & NON-FERROUS WIRE
Highly versatile, no-twist coiling of wire into drums.
Round, square, octagonal drums, up to 1000kg.

WET DRAWING & COPPERING for steel wire.
WET DRAWING, SHAVING & CLEANING for aluminium wire.

Extremely flexible semi-automatic precision layer respooling, with versions available for sub-arc wire and for spoolless coils. Digital control with multilanguage touch screen user interface, possibility of ethernet or modem connection, and highest degree of flexibility in terms of wire or spool types and sizes.

Totally automated precision layer respooling, designed for high speed and maximum production. Capable of handling plastic and fibre spools as well as wire baskets. No operator required. Digital control with multilanguage touch screen user interface and possibility of ethernet or modem connection.

High speed no-twist coiling of wire into drums. Round, square, octagonal drums, up to 1000kg.
After the cleaning operation, it is necessary to thoroughly rinse the wire in order to remove any chemical residue. To achieve a superior rinsing effect along with efficient use of rinsing water, we incorporated a final rinsing section with five counter-flowing rinsing baths. Sirio Wire has developed a special system that works with water under pressure to allow the optimum rinsing effect. Furthermore, all Sirio Wire equipment is provided with special mechanical drop traps and very effective air wiping devices to minimize the liquid drag out between baths. As we had liberated lots of space on the factory floor by removing the lead bath and HCl pickling, the extended length of the rinsing section presented no problems.

Because of the special design for efficient water use, fresh water is added in the last rinsing step only. Overflow from each rinse tank flows into the previous tank. And since the ultrasonic cleaning bath operating at 60°C requires significant makeup water due to evaporation, this water is taken from the first rinse tank. This system allows the complete cleaning operation to function with zero rinse water effluent. The neutralization/treatment plant that was required to treat the HCl pickling rinse water is no longer required. This offers substantial savings in terms of operation cost.

A New More Cost-Efficient Line

Swedwire had a galvanizing line consisting of an electrically heated lead bath, a quenching bath, one HCl pickling, rinsing and fluxing bath working with 25 wires in the diameter range of 1.5 to 4.5 mm. (0.059” to 0.177”). The operating speed of the line was limited by the length of the HCl pickling bath. The first step was to install and operate a single-wire pilot plant for six months to prove the project’s feasibility. In the summer of 2008, the complete desoaping/pickling line was replaced by one ultrasonic cleaning line with five rinsing steps. A calculation of the return on investment for the line has been made considering the following:

In the old line:

- Lead: 10 Tons
- HCl Acid: 100 Tons
- Energy: 700 MWh
- Water: 3000 m³ (790,000 gallons)
- NaOH: minor amt.-scrubber

In the new line:

- Phos Acid: 12 Tons
- Energy: 250 MWh
- Water: 600 m³ (160,000 gallons)

Actual pay back for any particular line will depend on the local costs of energy and consumables. In all practical cases, this is a very agreeable return on investment calculation. Coupled with lower total operating cost, in this particular case, the total production capacity of the line has been improved by ~50%. The final result is a huge potential reduction in costs per ton produced. Also, the improvement in working conditions for the line operators has been incalculable.

When ecology concerns and energy savings are the focus of every wire producer, this case study shows us that innovation is the key to success. To learn more, contact the author or Swedwire.

www.siriowire.com / www.swedwire.se

Company Profiles...

Sirio Wire Srl offers chemical treatment lines including ultrasonic and electrolytic cleaning, coating and drying, bronzing for beadwire, chemical and electrochemical pickling, chemical and electrochemical phosphating, plating (zinc, copper, nickel, tin, bronze), tanks, scrubbers for exhaust fumes, etc. www.siriowire.com

Swedwire AB has produced galvanized steel products since 1917 in Varberg, Sweden. The firm’s main specialty is the production of galvanized steel rope used for road barriers. www.swedwire.se
Mechanical Wire Rod Brushing

by:
Chris Hauer, General Manager
Howar Equipment Inc.
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Concord, Ontario, L4K 1X8, Canada
www.howarequipment.com

Wire surfaces are prone to various degrees of oxidation depending on their surroundings and on the methodology used for their storage.

OM Frigerio, based in Italy and represented in North America by Howar Equipment, supplies the wire industry with a range of mechanical wire rod descalers and brushing equipment (as seen in Figure 1).

Using equipment made by OM Frigerio, a special project was run successfully with a bearing manufacturer who needed to descale wire rod prior to final drawing. The descaler used for the project was processing 6.5 mm (1/4") oxidized rod constructed from 100Cr6 material (oxidized surface seen in Figure 2).

The Required Cleaning Capability Was Provided Via Mechanical Wire Rod Brushing

A FASO 1T SCL machine manufactured by OM Frigerio, which featured seven reverse bending rollers with fused tungsten carbide rollers, along with a subsequent wire brushing unit, was used for the project. The manufacturer involved in the project reported that the FASO 1T SCL machine produced the required cleaning capability. After processing on the FASO 1T SCL, the finished wire rod went directly into the final drawing machine using a dry soap lubricant designed for mechanically descaled product.

The final descaled and brushed material, running at a line speed of 2 mps on a single brushing head, had a bright finish that was clear of any rust and oxide (as seen in the micrograph in Figure 3).

This mechanical method of descaling wire rod with the added brushing function provides for an economical means of cleaning the material prior to wire drawing. Also, the mechanical brushing process requires very little maintenance as compared to chemical acid pickling processes.

To learn more about the mechanical wire rod brushing process for descaling material prior to drawing, contact the author or visit: www.howarequipment.com

This economical means of cleaning wire rod prior to wire drawing requires very little maintenance compared to acid pickling.
It seems like everyone claims to offer superior quality, service and delivery. But at Harwick Standard we have it in writing. You see, we ace virtually every one of our customers’ quarterly performance reports, earning the highest ratings in every category. Our in-depth knowledge and experience based on more than 75 years of supplying the polymer industry, and company-wide dedication to service put us at the top of their list.

Take their word for it.

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**Quarterly Supplier Evaluation Form**

Client: Harwick Standard

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<tr>
<th>Performance Categories</th>
<th>Performance Rating</th>
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<td>Service:</td>
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</tr>
<tr>
<td>Quality:</td>
<td>✔ Excellent</td>
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<tr>
<td>Delivery:</td>
<td>✔ Outstanding</td>
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<tr>
<td>Technical Support:</td>
<td>✔ Valuable</td>
</tr>
</tbody>
</table>

**Total Performance Rating: 100%**

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Simulation of Breakless Multi-Pass Drawing of Thin Size Wire

— Part 1: Theoretical Study

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Recently there have been quite a lot of different articles in numerous western European scientific periodicals about a phenomenological theory of metal fracture, developed by Russian scientist, V. L. Kolmogorov. However, the recent article by Polish researchers about simulation of fracture during wire drawing has data that to a certain extent distort the main idea of this theory and therefore cannot ensure results veracity during calculations. The above-mentioned article gives a general overview of fracture phenomenological theory application to simulate thin wire drawing, taking into account the margin of plastic properties of a finished wire, which is necessary to make successful check tests.

Development and realization of metal forming technology by methods of metals pressure processing without fracture have large significance. The process of cold wire drawing is not exception. In cases where the wire workpiece has even dimensionally insignificant continuity ruptures, it is difficult to guarantee that the wire of final size will have the required properties. Often, even the possibility of drawing to demanded size can be doubtful.

During traditional cold wire drawing in dies, inner workpiece defects such as continuity ruptures do not generally disappear. The prevalence of tensile strain and deformation of elongation contribute to change any kinds of hollows or pores in the metal to an oblong shape. If elongation is large enough, it is even possible to observe contact of hollows’ and pores’ walls, but it does not lead to the welding or healing of defects, and metal continuous failure does not disappear. And if drawing conditions are far from optimal, then further growth of damage is possible. And the augmentation of damage in wire generally leads to a break during drawing or later, and the reasons for this phenomenon are interesting for both the wire manufacturer and consumer.

During multiple wire drawing, the augmentation of summary deformation to larger values leads to the appearance of inner damages and metal continuity ruptures, which if develop further without control, can finally cause plastic fracture. Such damage and its prevention, taking into account properties of initial material and the parameters of the technological process is not an easy task at the wire manufacturing level. That is why corrective actions during the manufacturing process consist only of cutting out defective parts and quality control of several wire winds according to the results of its tests.

Properties of wire manufactured in multiple drawing operations are influenced by the history of accumulation of strains. That is why the proper choice of the parameters of all technological processes can be carried out only relative to the order of all straining, because the individual arrangement of passes cannot be made only from the point of view of the local transformation of straining. It is also necessary to take into account the preceding and following steps. The influence of deformation conditions during initial stages of drawing on the properties of wire metal can appear only in the following stages. That is why the wrong parameter choice will result in defects that will become evident later—either a break in the following passes, during later manufacturing processes or during the service life of the final product.

The final drawn wire size has to have definite mechanical and processing properties. Thus when choosing the diameter of the initial wire workpiece, it is necessary to know not only initial plasticity and strength coefficients, but also the character of their change during drawing. The absence of an integrated metal plasticity index does not allow the calculation of wire drawing routes taking into account plastic properties of the rough workpiece.

In this work on the basis of a phenomenological failure model, the attempt was made to create the mathematical apparatus to calculate the accumulation of damage during wire drawing from rods in dies and the control tests of the final wire size in accordance with the required standards.

Accumulation models of micro and macro damage in metallic materials are offered by Russian scientists, A. D. Iliushin, V. V. Novogilov, U. N. Rabotnov, L. M. Kachanov, et al. This work considers only phenomenological theory of destruction and only as applied to one stage of metals processing by pressure—meaning to cold wire drawing, which in Russia was developed in works by V. L. Kolmogorov,1, 2 A. A. Bogatov and S. V. Smirnov.3 It is based on studies of materials plasticity relative to the factors influencing it (temperature, deformation speed and degree, type of strained state, number of defects and forms as a result of preliminary processing, etc).

The Model of Fracture

Works1-3 on the basis of modern physical concepts of materials failure laws offer a phenomenological model of metals failure under large plastic deformations, in particular, for metal forming. This model is based on the concept of progressive accumulation of micro damage in the metal as the deformation develops. A scalar \( \Psi \) is used in the model and its value is served as the measure of damage during metal deformation. This measure completely characterizes the level of metal damage at every moment of time. For undamaged metal value, \( \Psi = 0 \) is accepted. Elastic deformations are neglected. Fracture begins with the occurrence of a macrocrack at some point in the deforming body, which may be determined visually by the naked eye. It is accepted that this moment corresponds to the value \( \Psi = 1 \).

Fracture is considered as a process of sequential develop-
ment of damage with time $\Psi = \Psi(t)$. Quantity $\Psi$ is called the exhaustion of plasticity reserve and is analytically expressed as the following equation:

$$\Psi_i = \sum_{i=1}^{n} \left( \frac{A_i}{A_p} \right)^{a_i}$$

The condition of deformation without fracture is analytically presented in the form $\Psi < 1$, which means that until the shear deformation degree, $A$ accumulated by fraction does not achieve its extreme value $A_p$, the fracture will not occur. This refers to a process of essentially nonmonotonic deformation, consisting of stages of a deformation of constant sign and where $a$ is a coefficient that takes into account the healing of damage during the deformation of the opposite direction and $i = 1, 2, ..., n$ are the stages of monotonic strain. The rate of change of the function at some moment depends on the current significance of a parameter characterizing, for example, the stress state of a metal particle under deformation. The shear deformation by the fracture moment $A_p$ is called metal plasticity and is determined by experimental methods. In general:

$$A_p = A_p(k, \mu_\sigma)$$

where $k$ is the stress state parameter, $k = \sigma/T$, $\sigma$ is the mean stress, and

$$T = \left( \frac{1}{2} S_y S_y \right)$$

is the intensity of shear stress, $S_y$ are the stress deviators and $\mu_\sigma$ is the Lode variable. The values $A_p$ and $a$ are material constants, determined by experiment. The methodology of making plasticity diagrams is described in detail in works. There are also plasticity diagrams for various steel types. However, it is necessary to specify that these diagrams are made on the basis of tests of special samples manufactured by means of machine processing. To simulate the initial state of metal, they are often subjected to recrystallization annealing. This introduces into the methodology of making plasticity diagrams, some measure of inaccuracy that is difficult to take into account.

Research that was carried out to find out the influence of metal wire surface conditions on their mechanical properties showed that a change of the state of near-surface layers causes a change of material properties on the whole. In particular, the topographic structure of the surface, which is understood as surface microgeometry, very largely determines materials mechanical properties and contains the information about particularities of the processes of structure self-organization in near-surface layers. One of the widespread methods of topographical surface texture change is mechanical processing. There are facts that removal of superficial micro defects (micro cracks, scratches, etc.) increased, while their artificial creation reduced the yield strength of many metals. At one Russian factory, during manufacturing process it was noticed that resistance to destruction of wire made of 27G2R and 30G1R steels after the mechanical removal of scale from the rod was higher than in the case of removal of scale by chemical pickling. Many researchers consider that the dominant cause of a material’s mechanical property changes after the change of topographical surface texture are the result of dislocation structure evolution and the appearance of micro-cracks in the near-surface layers. The above-mentioned explains the necessity of making plasticity diagrams on the basis of facts received during tests of samples selected from the rod in the initial state after the removal of scale by chemical method, whether by means of mechanical scale breakers.

Let’s apply the kinematically admissible velocity field for the description axisymmetric movements continuous perfect plastico-rigid body ($T = \tau = \text{const}$) in the conical converging channel (Figure 1). The flow in the deformation region is divided into three zones, in which the velocity fields are continuous.

In zones I and III, the velocities are $V_o$ and $V$, respectively, and in either case have only axial components. In this study, the boundaries between the deformation zone II and neighboring rigid zones at the input I and output III of the die are the velocity discontinuity surfaces $(J_1$ and $J_3)$. The flow pattern is described by the flow line $abcd$ shown in Figure 1. The flow lines are the straight lines parallel to the wire axis to the left of the input cross section and to the right of the output cross section. Let us accept that the flow lines in the deformation region are also rectilinear. In zone I, the material moves parallel to the symmetry axis in the die direction at a constant velocity of $V_o$ until the discontinuity surface $J_1$ is reached. Then, this velocity abruptly changes its direction and magnitude, and the material enters the deformation region where it moves to the cone top until it reaches the discontinuity surface $J_3$. Here, the direction and magnitude of the velocity change again, and the material enters zone III and moves parallel to the symmetry axis with a constant velocity $V$.

**Exhaustion of Plasticity Reserve in Wire Drawing**

We will consider the scheme of wire drawing (seen in Figure 1). ABCD is the trajectory of movement of a particle. We will define the approximate strain state, having accepted a hypothesis of plane section.

For the die with a right line forming radius of wire in an arbitrary section with abscissa $X$ as seen in Equation 1:

$$r(x) = r_o - (l - x)tg\alpha \quad (1)$$

where $l$ is the length of the deformation zone. From the condition of constancy of mass flow, it is possible to accept Equation 2:

$$V_x = -V_o \left[ r_o - (l - x)tg\alpha \right]^2 \quad (2)$$

therefore, we accept that the longitudinal velocity of metal over a certain section will be constant. The elongation rate is
Simulation of Breakless Multi-Pass Drawing of Thin Size Wire – Part 1 ...continued

as seen in Equation 3:

\[
\frac{\partial V_x}{\partial X} = \frac{2V_r r_o^2 \tan \alpha}{r_o - (l-x)g \alpha}
\]

The radial component of rate is defined from the incompressibility condition as seen in Equation 4:

\[
\frac{\partial V_r}{\partial \rho} + \frac{V_r}{\rho} + \frac{\partial V_x}{\partial X} = 0
\]

Joint integration of Equation 4 and Equation 3, taking into account that \( V_o = 0 \) when \( \rho = 0 \), gives expression as seen in Equation 5:

\[
V_r = -\frac{V_o r_o^2 \tan \alpha}{r_o - (l-x)g \alpha}
\]

Other strain rate tensor components are defined from Equation 2 and Equation 5 as seen in Equation 6:

\[
\xi_{rr} = \xi_{\rho \rho} = \frac{V_o r_o^2 \tan \alpha}{r_o - (l-x)g \alpha}
\]

\[
\xi_{\rho x} = \frac{3V_o r_o^2 \tan^2 \alpha}{r_o - (l-x)g \alpha}
\]

The intensity of shear strain rates \( H = (2\varepsilon_0/\varepsilon_1)^{1/2} \) according to Ref.3 is expressed as:

\[
H = 2\sqrt{\xi_{xx}^2 + \xi_{xx} \xi_{rr} + \xi_{xx}^2 + \xi_{xx}^2}
\]

therefore the shear strain rate on a trajectory BD is counted as seen in Equation 7:

\[
A_{BD} = \int_0^t t g \alpha \sqrt{12 + 9 \rho^2 \varepsilon_2^2 \alpha/[r_o - (l-x)g \alpha]}
\]

The amount of shear deformation due to the movement of a particle along the trajectory from the point B up to point D (except for these points) is seen in Equation 8:

\[
A_{BD} = \int_0^t H d\tau = \int_0^t H d\phi
\]

This results in Equation 9:

\[
A_{BD} = \int_0^t t g \alpha \sqrt{12 + 9 \rho^2 \varepsilon_2^2 \alpha/[r_o - (l-x)g \alpha]}
\]

On the surface of velocity discontinuity at the points B and D, the particle attains the final degree of deformation equal to Ref.9 as seen in Equation 10:

\[
A_b = \bar{T} t g \alpha \quad \text{and} \quad A_D = \bar{T} t g \alpha
\]

where the coordinate \( T = \rho/\rho \) varies from 0 up to 1 and determines the location of a line. Values \( A_b \) and \( A_D \) reach a maximum on the surface of the wire (\( T = 1 \)) and are equal to zero on its axis (\( T = 0 \)).

The exhaustion of plasticity reserve of a particle of metal, which in the section of the wire is located by the parameter \( r_o \), is calculated for each drawing draft as given in Ref.4, seen in Equation 11:

\[
\Delta \Psi_{\text{draw}} = \left[ \frac{A_{BD}}{(A_p)_{BD}} \right] \left[ \frac{(A_{BD})^{(l)}}{(A_p)_{BD}} \right] \left[ \frac{(A_{BD})^{(r)}}{(A_p)_{BD}} \right]
\]

where \( A_p \) is determined by means of diagrams of plasticity that take account of the stress state at the entry in the zone of deformation (index B), in the zone of deformation (index BD) and at the exit from it (index D), respectively. Thus, the trajectory of deformation is conditionally divided into two parts AB and BCD. For all processes of drawing, the degree of the exhaustion of the plasticity reserve is calculated as seen in Equation 12:

\[
\Psi_{\text{draw}} = \sum_{i=1}^n \Delta \Psi_{\text{draw}}
\]

where \( n \) is the number of reductions in the drawing. The Lode variable in wire drawing is \( \mu_0 = -1 \).

Use of the given mathematical apparatus for the calculation of drawing routes taking into account of plastic properties exhaustion of metal demands knowledge of the plasticity diagram for the given metal \( A_p = A_p(k, \mu_0) \).

**Conclusion**

On the basis of metal fracture phenomenological theory while metal forming the mathematical apparatus for calculation of exhaustion of the wire workpiece, plasticity reserve during multiple wire drawing is presented. Definitions have been given of the main metal plasticity characteristics. For the description of axisymmetric motion of a perfectly rigid plastic solid body in conical converging channel of a die, a kinematically possible discontinuous velocity field is applied. This field allows the description of the motion of any point of the body in the deformation zone of the inner die’s parallel surface. For the calculation of optimal drawing routes allowing for use in a rational manner the ductile properties of wire rod, it is necessary to know the plasticity diagrams that have been determined by experiments.

In the Part 2 of this article, we will consider the construction methodology of plasticity diagrams for a wire rod and present the mathematical apparatus for calculation of exhaustion of the plasticity reserve during control wire tests. The results of the practical use of the presented fracture metal theory for performing a breakless multi-pass drawing process of thin sizes wire will be considered in the Part 3 of this article.

**References:**

In Part 1 of this series we discussed the “classical” idea of an optimum die angle, namely an angle that minimizes the contributions of friction work and redundant work to the drawing stress, thus minimizing the drawing stress. We illustrated this with a mathematical model of Siebel and Kobitzsch, namely:

\[ \sigma_d = \sigma_o \ln(A_o/A_t) + \sigma_o (\mu/\alpha) \ln(A_o/A_t) + \sigma_o (\frac{1}{2} \alpha), \]

where \( \sigma_d \) is the draw stress, \( \sigma_o \) is the average wire strength or flow stress, \( \mu \) is the coefficient of friction, \( \alpha \) is the die semi-angle in radians and \( A_o \) and \( A_t \) are the entering and exiting cross sectional areas. The first term on the right side of the equation represents the uniform work per unit volume, the middle term represents the friction work per unit volume and the last term represents the redundant work per unit volume. The optimum die angle from this equation can be given as:

\[ \alpha_{opt} = [(1.5) \mu \ln(A_o/A_t)]^{\frac{1}{2}}, \]

where \( \alpha_{opt} \) is in radians.

In Part 2 of this series we noted that the coefficient of friction is in many cases a function of the die angle, tending to become lower as the die angle decreases and hydrodynamic or thick film lubrication modes become established. With a reasonable illustrative model, we came up with a new, generally lower optimum die angle expression of

\[ \alpha_{opt} = [(0.15) \ln(A_o/A_t)]^{\frac{23}{3}}. \]

In this column, we will examine the issue of redundant work. The contribution of redundant work to the drawing stress is not easy to model in a truly rigorous sense. The Siebel and Kobitzsch expression (above) is simply \( \sigma_o (\frac{1}{2} \alpha) \), making redundant work proportional to the die angle, since it is the reversing deflections in the drawing cone that most simply indicate the nature of redundant work. The most quantitative characterizations of redundant work are experimental, such as published by Wistreich and by Backofen.

The important point about redundant work (or redundant strain) is that it stays in the drawn wire. That is, while friction is a largely transient phenomenon, redundant work causes extra strain in the drawn wire, particularly from the mid-radius outward to the wire surface. Backofen has revealed this effect quite convincingly by measuring microhardness as a function of radial, or through-the-thickness position in drawn wire and strip. For example, annealed copper strip was drawn with an initial Knoop microhardness (KHN) of 85. A 16% reduction with an \( \alpha \) of 5° resulted in a uniform KHN of 104, throughout the strip thickness, and in this case no redundant work was indicated. However, when the same strip was drawn 16% with an \( \alpha \) of 20°, the centerline hardness remained at 104 (no redundant work), while the surface hardness came out at about 120 KHN (substantial redundant work). This happens to indicate that the strain at the surface after the high angle pass was roughly twice that of the centerline. This extra strain is of course the redundant strain.

The presence of redundant strain in the outer portion of the wire increases strength and causes radial variations in annealing response and microstructure. Moreover, mechanical responses to torsion and bending can be grossly affected, as can be responses to straightening, and efforts at cast and pitch control. It is an important consideration that redundant work patterns are not always radially symmetric due to die and wire misalignments and vibrations, frustrating efforts to “manage” the effects of redundant strain.

As we approach the bottom line, it should be clear that wire that is significantly affected by the items in the previous paragraph may well benefit from drawing with reduced die angles, even if such die angles do not minimize the drawing stress. Fortunately there is a limit below which further die angle reduction is not necessary. Such die angles correspond, for a given reduction, with \( \Delta \) values approaching one. For wire drawing reductions in the 20% to 25% range, included die angles of 8° effectively minimize redundant work. In principle, even lower die angles would be needed for the cases of lower reductions. However, this may be impractical for most die designs, and one may simply have to combine as low a die angle as possible, along with the realization that low reductions produce significant redundant work.

Some of these same die angle considerations are relevant to die wear and center burst frequency. We will address such points in the next column. Good luck!!!!
Degree of Crosslinking

The hot-set (hot-creep) measuring method is used essentially to determine longitudinal stretching under defined test conditions. Many industries where crosslinked polymers, copolymers, rubbers and elastomers are currently being used, apply this measuring system.

The hot-set test method is particularly effective in determining the degree of crosslinking. Alternatively, a chemical gel-sol measuring method can be used. The measuring results from both methods correlate with each other and can be ascertained by means of a material specific calibration curve. Depending on the material, only one calibration curve can do the job.

Crosslinking Processes

In the case of cross-linked products, a basic distinction has to be made between a physical process and a purely chemical one. Physical polymer crosslinking can be carried out with efficient electron accelerators. In-house crosslinking or crosslinking at irradiation service centers with electron energies of approximately 0.3 to 10 MeV, allow the crosslinking of cable insulation or (heat-shrinkable) tubing up to 10 mm wall thickness or even more.

A well-known alternative crosslinking process is the silane crosslinking method, which is often utilized in the manufacture of polyethylene water pipes, heat-shrinkable tubing and wire and cable.

Another process is crosslinking by using peroxide. This process has become established mainly in injection molding and extruded products with in-line CV, salt bath, IR or other crosslinking equipment.

Quality & Process Control

There is a permanent requirement for quality control in this wide spectrum of crosslinked products to check the custom designed material characteristics. The demand for rapid and accurate test methods is increasing in order to better monitor crosslink processes.

The drive towards worldwide harmonization of standards and for international quality assurance certification is continuously increasing.

Well-introduced test methods will prevent complaints and returns from customers. Quality helps to save money. Quality must be monitored rapidly, safely and by easily reproducible methods.

The hot-set test method is such a method because of its accuracy. Easy-readable and high-precision instruments are available. These measurement instruments are integrated in the oven that meets requirements like precision temperature control, measurement accuracy by using an integrated calliper (±0.01 mm) and specially developed opto-electronic laser line diode. A data cable can be connected to a computer system for Excel spreadsheets. The oven should have a controlled air exchange rate and low air speed, meeting the requirements for aging ovens in IEC 811 for aging tests for cable materials. Preferrably, the measurements are made through the window with the laser line that is mounted on a moving measuring scale placed on the door of the oven.

Hot-Set Compared to Gel-Sol

Measuring results have to be available very quickly. The hot-set method is vastly superior to the gel-sol method. It requires only a 15-minute measuring period to determine the measured value of thermal expansion $\delta_{\text{wd}}$. Compared to the gel-sol method, which requires a minimum period of 24 hours, the hot-set method is an excellent method to monitor a crosslink process. The hot-set method is a physical measuring system that uses only electric energy. The chemical gel-sol measuring method requires 24 hours of heating and a relatively expensive process to prepare and recycle the solvent. Gel-sol and thermal expansion behavior measurement data can be compared with each other as shown in Figure 1.

Other Areas of Application

The long-term aging behavior of polymers is being measured in the continuous process to develop and improve compounds and plastic materials.

It is well known that polymers will degrade under thermal and mechanical stress. The addition of stabilizers usually prevents thermal degradation. This test method enables manufacturers and research and development specialists to find an optimum of the quantity and quality of the stabilization package.

Observation of the thermal stretching behaviour over a very long test period has shown that the thermal stretching value $M_{\text{wd}}$, which in theory approximates asymptotically to a final value, actually creeps linearly away from it. The gradient of this curve corresponds to the thermal degradation of polymers and over time finally leads to disintegration. It is possible to accelerate this process by changing the test...
temperature (temperature increase), thus creating a kind of artificial aging.

The hot-set procedure results in high disintegration, so it is extremely simple to determine the quantity of stabilizers required for specific products and/or applications. In principle, the results are presented in the form of a family of curves (Figure 2).

A gentle gradient means high stabilization. A steep gradient means that a compound is only slightly stabilized or not stabilized at all.

The hot-set measuring method is widely used in the manufacture of heat-shrink products (both thick and thin wall, shrink sleeves and heat-shrinkable moulded shapes). In these cases, the process ability can be deduced directly from the test results. Their model character with regard to the large-scale expansion and processing of shrink products permits the results to be transferred 1:1.

Hot-set testing not only provides data about the degree of crosslinking, which directly affects shrinkage performance, it also provides information about the expansion rate of specific polymer compounds. Crosslinking homogeneity, in parts with extremely varied geometry, is also a very important factor as far as processing is concerned.

The hot-set method can also be used in a modified form to measure contraction and/or shrinkage during manufacture of sheets and foils in a wide variety of polymers and compound formulations.

**Defined Test Conditions**

Temperature and oxygen substantially affect the aging of plastics, which also includes the hot-set test method. In the case of heating ovens in particular, a distinction also has to be made between natural and forced ventilation. As the temperature rises, the forced air accelerates all chemical reactions in a plastic compound. The atmosphere has an oxidative effect, while the air speed encourages the transfer of heat onto the sample and the degradation of the diffusion layers on its surface. However, oxidation does not play an important role because the hot-set test lasts for only a relatively short time (approximately 15 minutes).

The decisive factor in hot-set testing is the temperature. Homogeneous spatial distribution as well as short recovery times after the sample has been inserted into the preheated oven are important for accurate and reproducible measuring results. Specially built hot-set heating ovens (like the PTL-brand hot-set oven seen in Figure 3) meet these stipulated requirements and are suitable for determining the hot-set properties.

Temperature deviation at test temperatures of 200°C or 250°C in the region of the sample, amounts to ±3 K at the most (Figure 4).

Heat recovery time at 98% of the initial value is approximately five minutes following a door opening time of 30 seconds (Figure 5).

Oxidation is also taken into account by defining pre-set air change rates at eight to twenty times per hour. The air change rate determines the inflow of fresh air into the interior and it is this inflow which governs the oxygen content of the test area atmosphere, in the final analysis.

An (optional) airflow regulator and meter will result in a precise control and monitoring of the airflow. Continued...
Which Oven is Right for the Job?

The ventilation system is an important feature of the oven. The tempered air by design has to create a kind of “air jacket” so that the sample is always in a homogeneous temperature field without being exposed to a direct airflow. This means that the test conditions are similar to those in naturally ventilated heating ovens, although electric fans have to be used for forced air circulation in order to shorten recovery time, to start the hot-set test.

The major considerations when buying a hot-set oven include the following points:

- A large glass observation panel should be present to detect the final length of the specimen, because the thermal stretching of plastics can exceed 200%. This especially SnO₂-coated glass observation panel in the door should have no significant negative effect on the heat distribution in the oven.

- Homogeneous heat distribution in the interior and short heat recovery time after insertion of the test specimen.

- Once the test temperature has been reached, a provision should be present to switch off the air circulation if required, ensuring that the test result will not be affected by forced air convection.

- A side-mounted access port, preferably a minimum of 50 mm in diameter, should enable you to introduce additional measuring instruments and tools into the interior without opening the door.

- Availability of an airflow meter and regulator in case specific tests require precise regulation of the airflow.

- Availability of data cable to be connected to a computer system.

- Presence of an opto-electronic laser pointer on a moving measurement scale.

- Compliance with international standard IEC 811-2-1.

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Special Thanks:
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Company Profile:

Inhol/PTL is a worldwide operating source for PTL-brand hot-set ovens and special compounds for wire and cable and heat shrink products.

The heat-shrink activities include technology and equipment. The PTL-branded compounds are based on polyolefins, elastomers and fluoropolymers. All PTL compounds and materials are RoHS and REACH compliant.

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RELIABILITY  FLEXIBILITY  COST EFFECTIVENESS
With times so tough, AMI Conferences of Bristol, UK, said it was pleased with record support from the cables industry for its Cables 2009 conference in March 2009. Attendance at the ninth international conference on cables equaled Cables 2008, which was the most successful event ever. The Maritim Hotel venue in Cologne, Germany, was again packed out, despite a move last year to an even larger conference hall.

Kerry Satterthwaite of AMI Consulting in Bristol, provided attendees with a comprehensive overview of the European cable industry. According to Satterthwaite, AMI Consulting has identified growth niches for the cables industry, even in the depths of recession.

Raising Productivity

A main focus of the event was increasing productivity to improve cost competitiveness. Dr. Michael Geck, Technical Manager of Wacker Chemie, described how Wacker silicone performance additives can save money for cable extruders while adding value to their final products. Gerd Allermann, Exxonmobil Chemical’s wire/cable global market segment team leader, also outlined how cable performance can be improved with specialty polymer modifiers.

Dr. Laurent Gervat of Arkema, explained how to optimize compounding conditions for flame retardant cable formulations in partnership with Arkema’s project collaborator, Buss AG.

Flame Retardance Performance

Flame retardant performance under the new European Construction Products Directive (CPD) was another focus at Cables 2009. Wire and cable is considered a building material under EU law. This legislation classifies cables by fire safety performance and the testing protocols were described by Terry Journeaux of Prysmian Cables & Systems. The challenge is to develop repeatable and reproducible standards so that accredited laboratories all give the same fire classification for the same cables. He detailed the latest progress on the CEMAC II project—CE marking of cables for reaction to fire under the CPD in 2009.

Power Cable Market Outlook

While acknowledging that demand from capital intensive industries such as residential construction and automotive has collapsed in Europe over the past few months, AMI Consulting is cautiously optimistic about continuing public investment in projects such as energy infrastructure refurbishment in mature markets and new energy infrastructure in industrializing markets. In the medium and high-voltage power cables session of AMI’s conference, Dr. Mohamad Nabih Al Saati explained how water tight cables produced under accelerated aging were performing in the Saudi Arabian market.

Alan Lico of Lico SpA outlined his company’s dosing solutions for medium and high-voltage power cables, and Oliver Hissmann of OCS Optical Control Systems showed how his company’s tape test could be used to improve high-voltage cable quality control.

New Wire & Cable Compounds

Many kilometres of cable are used in modern buildings and cars and as electrical failure can be a common cause of ignition, cable fire performance and flame retardancy is critical. Claus-Peter Keller of DuPont de Nemours gave an overview of new high-performance products and technologies for wire and cable including highlights of DuPont fluoropolymers’ superior heat resistance. His paper examined potential future trends in flame retardants for cable applications. Elastogran also has new materials for cables—Oliver Muehren described how the company is working on flame retardant TPUs with balanced properties.

Maryline Desseix of PolyOne, talked enthusiastically about the design of PolyOne’s solutions for photovoltaic applications. Markus Kemmler of Kemmler Consulting also outlined the requirements for photovoltaic cables in the European market.

Dr. Chris Howick described how REACH affects PVC and PVC compounds used in cables and Dr. Koehnlechner of Hamos GmbH illustrated how his new separation techniques allow fast, profitable cable recycling.

Dr. Gunter Beyer of Kabelwerk Eupen has been working on nanocomposite flame retardants for the cable industry. In his 30-plus years of experience, he has found that layered double hydroxides have a major synergistic effect with halogen and nonhalogen flame retardants. Beyer said they appear to act by altering the degradation pathway and imparting barrier properties. He depicted his latest progress with nanostructured fillers as flame retardants for cables.

Dr. Andrea Minigher followed up by describing the fire retardant properties of Cimteclab’s nanocomposites.

Conference in 2010

Cables 2010, AMI’s special tenth anniversary conference, is staying in its new larger capacity conference hall following the record attendance this year. It has been scheduled for March 9 to 11, 2010 at the Maritim Hotel in Cologne. The conference will be a celebration of the success and resilience of the cables industry over the past ten years, with many special presentations and events.

To learn more about Cables 2010, contact Rebecca Merriott, Conference Manager at AMI Conferences, www.amiplastics.com.
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Improving the Throughput Linearity of Extruders

This article defines throughput linearity in measurable quantitative terms. Nonlinear models of the variables in the relationship of extruder throughput and screw speed are presented to determine maximum throughput relative to constraints on linearity/melt temperature.

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The throughput of an extruder should increase linearly with screw speed, but the relation is never absolutely linear. This results in variations in product properties during ramp up, which implies more scrap. It is therefore desirable to minimize, or at least limit, the lack of linearity. To be able to minimize it, we need a quantitative measure, which can be measured or calculated from experiments and modelled as a function of process variables.

If the throughput increases linearly with screw speed, the throughput at 10 rpm should be twice that at 5 rpm. However, the throughput $F$ at 10 rpm is always less than twice that at 5 rpm. We defined a quantity:

$$
\frac{2F(5) - F(10)}{25}
$$

which we may call the linearity of the throughput. More accurately, it is the nonlinearity of the throughput, an approximated second derivative of $F$ with respect to the screw speed, at a screw speed of 5 rpm. The higher the value, the less the linearity. This number is usually positive.

This work was done on Maillefer’s NMR 120/12 extruder (Figure 1). The extruder is designed for processing thermally sensitive plastics and elastomers at low temperatures. Typical materials are sheathing and insulation rubber in strip and granular form. The barrel material is a nitrided steel. The feed section is equipped with smooth exchangeable bushing. Rubber strips are fed with a feeding roller. Each zone in the extruder barrel has an individual temperature control. The barrel is heated by resistors located inside cast aluminum heating elements. The pressurized and closed cooling water system includes cooling pipes and proportional valves. The cooling pipes are wound around the barrel. Temperatures in each zone are measured by thermocouples located tangentially close to the inside surface of the barrel. This thermocouple arrangement reacts quickly to any changes in the process conditions providing fast feedback control for heating and cooling. For control of heating and cooling each zone is equipped with a PID-type controller. The feed box has a separate cooling water circulation.

Mathematical Modelling

Mathematical models are quantitative descriptions in terms of variables. They contain concise knowledge of a system about the quantitative effects of selected variables. Such models try to emulate reality and can be used instead of experimentation, if they are of a sufficiently good quality. Mathematical modelling is performed with several different approaches.

Physical models are developed by writing laws of nature in a mathematical form. For processes like extrusion, a physical model could consist of partial differential equations of heat transfer, mass transfer and fluid dynamics. These models usually require plenty of assumptions and simplifications. The viscosities of the plastic or rubber material at different temperatures and different shear rates are poorly known. It takes a lot of time to solve these equations, making them impractical for determining good values of process variables.

Empirical and semi-empirical modelling describe the reality as observed without the need of any major assumptions or simplifications. It requires observations either from production data or from experiments. Empirical modelling is usually carried out with linear statistical techniques that are not very efficient at describing nonlinearities in the effects of variables. Nothing in nature is very linear, and hence it makes sense to take nonlinearities into account by using the new techniques of nonlinear modelling.

Nonlinear Modelling

One of the main purposes of this article is to improve the awareness about the new techniques of nonlinear modelling. Many readers of this magazine have probably seen a couple of articles on nonlinear modelling in 2001 and 2002. Nonlinear modelling is empirical or semi-empirical modelling which takes at least some nonlinearities into account. The older techniques include polynomial regression, linear regression with nonlinear terms and nonlinear regression. These techniques have several limitations unlike the new techniques of nonlinear modelling based on free-form nonlinearities.

The new techniques of nonlinear modelling include feed-forward neural networks, series of basis functions and multivari-
ate splines. Among these new techniques, feed-forward neural networks have turned out to be particularly valuable in process modelling primarily because of their universal approximation capability. It is usually possible to produce nonlinear models with some extrapolation capabilities with feed-forward neural networks. Artificial neural networks consist of neurons or nodes, usually arranged in layers and directionally connected to others in the adjacent layers. The multilayer perceptron (Figure 2) is a kind of a feed-forward neural network.

Nonlinear modelling has been successfully used in several industrial sectors including plastics, metals, concrete, glass, pharmaceuticals, medicine, mineral wools, power, semiconductors, biotechnology and food. It has been utilized for a variety of purposes including quality control, product development, process guidance, software sensors and fault detection. Process modelling for process development, however, is the most common purpose.

Experimental Data

As mentioned in the previous section, experimental or production data is needed to develop nonlinear models. During this work, an experimental approach was preferred.

A total of 14 experiments were carried out on a NMR 120-12D extruder with EPR rubber material from Teknikum Oy, with a Mooney viscosity of 35. A smaller number of experiments would have sufficed for model development, but this research was also supposed to provide us a better background for studying the variation in linearity.

Melt temperatures and throughputs were measured in each of the 14 experiments in addition to pressure and the current used by the motor. From the first five experiments, in which the screw temperature and the barrel temperature were the same, it was easy to see that the throughput does not increase very linearly with screw speed. The linearity for this rubber material on this extruder was of the order of 0.5. The data was meant to develop nonlinear models with the configuration shown in Figure 3. The throughput linearity depends only on the two temperatures and not the screw speed.

Results

Nonlinear models were developed for throughput and melt temperature from the 14 available observations using our NLS 020 software. It was easy to get fairly low prediction errors or high correlation coefficients. Figure 4 shows plots of predicted and measured values of throughput and melt temperature. Most of the points are almost on the ideal line, where the predicted values equal the measured values. Statistical characteristics of the prediction errors are as follows.

For throughput:
- rms error: 4.159
- mean |error|: 3.533
- max |error|: 8.035
- Correlation coefficient: 0.9959

For melt temperature:
- rms error: 0.7734
- mean |error|: 0.5298
- max |error|: 2.021
- Correlation coefficient: 0.9767

Development of these models is now automated in our software, referred to as LUMET systems. These software systems contain different components for different applications and may require a small amount of customizing. One software component allows the user to create the models of these two variables from experimental data.

The effects of input variables can be plotted easily. Figure 5 shows a plot of throughput against screw speed at different

![Fig. 2](image-url) — A typical feed-forward neural network has an input layer, an output layer and one or two hidden layers.

![Fig. 3](image-url) — Nonlinear models predicting throughput, melt temperature and linearity use screw speed, barrel temperature and screw temperature as input variables.

![Fig. 4](image-url) — A comparison of measured and predicted values of throughput (top) and melt temperature (bottom).

![Fig. 5](image-url) — Plot of throughput against screw speed at different screw temperatures as predicted by the nonlinear model.
screw temperatures as predicted by the nonlinear model. The nonlinearity in the curves is clearly visible. Figure 6 shows a plot of throughput linearity against barrel temperature in zone 1 at different screw temperatures as predicted by the nonlinear model. The throughput linearity in this case seems relatively insensitive to the barrel temperature, but is strongly affected by the screw temperature. Higher screw temperatures cause more nonlinearity, but are usually favorable in terms of higher throughput. This however, varies from material to material.

Figure 7 shows a plot of melt temperature against screw speed at different barrel temperatures in zone 1 as predicted by the nonlinear model. Higher screw temperatures lead to higher throughputs, but also increase the melt temperature, thus imposing an upper limit on the screw speeds. Figure 8 shows a surface plot of melt temperature against barrel temperature and screw speed. It is thus not trivial to determine the best values of the screw and barrel temperatures, and the screw speed.

Efficient Use of Nonlinear Models

Once these models are created using the LUMET software systems, and are ready for use, throughput linearity is also calculated by the system, and one can carry out various kinds of calculations with the nonlinear models including optimization. For example, one can quickly calculate the minimum throughput linearity. This however, does not usually turn out to be in favor of high screw speeds or high throughputs.

What is of greater interest is to determine the best values of process variables which result in desired consequences. For example, one might want to determine a way to produce the insulations such that the throughput is at least 200 kg/h, the melt temperature stays below 105°C and the throughput linearity no more than 0.4. The LUMET system finds one suitable answer as shown in Figure 9.

However, this is not the best in terms of throughput. It is more interesting to know how the extruder should be operated so that the melt temperature stays below 105°C, the throughput linearity is no more than 0.4 and the throughput is maximized. It is easy to carry out such calculations also in the LUMET systems. Figure 10 shows the results of such a calculation. The throughput now is 235.4 instead of 206.6. The screw temperature is higher, while the barrel temperature is lower.

Conclusions

Better throughput linearity permits ramp-ups with less scrap. The lowest value of throughput linearity however, may not be favorable for a good production rate. The optimal way to operate an extruder for rubber insulations of power cables could be to maximize the throughput while keeping the melt temperature under a specified limit, as well the throughput linearity below a specified limit. For some rubbers, a high screw temperature and a low barrel temperature is preferred for the highest throughput, while for some other rubbers, both these temperatures should be low.

It is therefore not easy to guess the best way of operating an extruder. A few hours of experimentation produces the data necessary to develop nonlinear models. With nonlinear models of throughput, melt temperature and throughput linearity in combination with suitable software like LUMET systems, it is possible to determine good ways of operating an extruder.
Fig. 10 — Finding the best way to operate with a maximum throughput, such that the melt temperature does not exceed 105°C, and with a throughput linearity not exceeding 0.4.

References:
6. A. Bulsari et al., “Nonlinear modelling paves the way to bespoke polymers”, British Plastics and Rubber, December 2002, 4-5.
With the launch of its innovative measuring system X-RAY 8000 NXT, SIKORA AG, Bremen, Germany, provides the tool for an efficient concept in quality control, production optimization and reduced material consumption in power cable production.

The company reports that the X-RAY 8000 NXT presents itself as the evolutionary successor of the X-RAY 8000, the industrial standard device for a reliable measurement at CV-lines. The X-RAY 8000 NXT is suitable for permanent quality control in the production of MV, HV and EHV cables in CCV, VCV and MDCV lines.

High-Performance Measuring of Large-Diameter EHV Cables

SIKORA holds an outstanding precurser position in the field of EHV-cable production. Specifically developed for this application area, SIKORA offers the X-RAY 8000 NXT for extremely large cable diameters up to 180 mm for CCV lines and up to 220 mm for VCV lines. The X-RAY 8000 NXT measures the wall thickness and eccentricity as well as diameter and ovality with an optimum measuring accuracy and repeatability. Only one scan is necessary to calculate all measuring values.

The X-RAY 8000 NXT provides the operator with fast centering of the extrusion tools as well as optimum control of the production line in automatic mode. Multi-sensor semiconductor detectors are incorporated into the high-end variant of the X-RAY 8000 NXT. This multi-sensor technology ensures reliable readings in case the cable vibrates and provides four measuring values at each scanning process for a high-precision measurements.

Advanced engineering provide the integration of patent-pending ceramic windows that separate the scanners from the pressure of the CV line. The surfaces of these ceramic windows do not react with any by-products resulting from the cross linking process and always remain clean.

Cleanliness Scanning Ensures High Quality

Along with reliable measuring systems, the cleanliness of the insulating material is one of the most important requirements for compliance with quality criteria in the production of high-voltage cables. SIKORA offers an intelligent solution to recognize contamination in the PE insulation in real time—as the cable is produced.

Utilizing the CSS 2 camera system, which is available from SIKORA, the total XLPE material is supervised for purity in the flow channel directly before the crosshead. The CSS 2 reliably shows when production can begin, and it informs about contamination and detects combustion particles in the material such as amber and scorches. A quantitative and graphical display of the faults guarantees a high degree of cleanliness for the highest quality and long cable life.

About the Manufacturer

SIKORA is an experienced manufacturer and a worldwide vendor of advanced measuring, controlling and testing equipment for the wire, cable, plastics and rubber industry. The equipment produced by the company is certified according to the industrial quality standard ISO 9001.

Founded in 1973 by Harald Sikora with the first noncontact position sensor (sag control) for CCV lines, SIKORA has grown to become one of the largest companies in its international markets. Seven international branch offices combined with the support of more than 30 regionally based representatives ensure worldwide commissioning and support.

SIKORA says it is dedicated to producing equipment that delivers the most accurate and long-term measurement values in the industry.

The USA division, SIKORA International Corporation, is located in Peachtree City, GA, USA.

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ONCODE, Inc. was created by two leading product identification companies joining forces to provide superior products, services and support. GEM GRAVURE, a manufacturer of ink and marking equipment for the wire and cable industry since 1952, and KBA-METRONIC, specialists in the design and production of printing and coding equipment since 1972, have come together to offer the highest quality product-coding solutions. Now your printing equipment ink and world-class support come from one company — ensuring better quality, faster service and printing made easy.
Spotlight On Bows

Our observations and informal survey of bow suppliers shed some light on the critical requirements for bows. Wire and cable makers expect their bows to last a long time and stand up to damage from wire or cable breaks. They also want them to provide lower energy consumption, reduced downtime and higher production speeds, all at a fair price. We are also told that there is an increase in demand for bow products that have the ability to perform well in the handling of aluminum, plated and taped conductors.

Much is expected of the bow, and suppliers aim to please with standard and customized products for all wire and cable manufacturing situations. Today, bow designs can even be tested outside of your factory on a device that simulates rotating processing machines with different take-up reel diameters. Throughout the years, bow suppliers have provided innovations that have helped wire and cable makers meet the above requirements. In the following sections, we explore the background, materials, cross sections, guidance methods and failures of bows.

Bows Background

Rotating machines such as stranders, bunchers, twiners and cablers use flyer bows to produce helically twisted wires, conductors and cables. All products being processed on these machines come in contact with the bow. More than half of the power required to run the corresponding machine goes towards rotating the bows. In addition, a good amount of the noise generated by a rotating machine comes from the bow, and less aerodynamic bows usually make more noise. Consequently, these bows are pretty important, and they are a main factor in determining the level of success in your rotating equipment operations.

Depending on the machine style, one or two curved bows are attached to the rotating element of the machine. Bows get their name from the way they "bow" out in a curved path when installed — similar to the shapes of bows for hunting. Wire and cable bows, however, rotate at very high speeds, and wires or cables to be twisted travel along the path of the bow before being guided to the pulling capstan and/or take-up reel. The wires or cables are guided along the bow by varying means: eyelets, tubes, strips, rollers, bushings and grooves. With the exception of rollers, all other guiding devices are stationary. For machines that use two bows, the active bow processes the product and the other bow is only used for balance purposes. In a single bow machine, balance is achieved in other ways.
Bows need to stand up to the rigors of stranding, bunching, twinning and cabling. There are multiple forces being placed on the bows during wire and cable processing. These include the following:

- Centrifugal force generated from the rotating bows.
- The force of the wires or cables being pulled through the bow.
- Frictional force on guiding surfaces (eyelets, strips, etc.).
- Forces generated from air resistance.

These forces are fairly complex and vary at different points on the bow. For example, centrifugal force is highest at the center of the bow, and it approaches zero at the points where the bow is attached to the machine body. This is evident when looking at the corresponding formula for centrifugal force:

\[ F = mV^2/r \]

where \( F \) is force, \( m \) is mass, \( V \) is velocity and \( r \) is the distance from the rotation axis to the bow edge.

Friction changes depending on the materials being processed, the guidance systems employed and the amount of surface contact. Air stream forces are obviously a function of speed and bow design (profile/cross section, for example). Heat is also generated by friction and air resistance. All of this complexity not only means that resources and attention need to be spent on bows, but that many opportunities exist to differentiate operations and levels of performance. For example, power consumption can drop or rise dramatically, depending on the bow used. Because of this, a good amount of research and development is devoted to bow design and manufacture.

There is a wide array of wire and cable designs, sizes and applications as well as the many different types and manufacturers of stranders, bunchers, twiners and cables. Because of this, bow design and constructions are very diverse. This means that selection is not simple, but suppliers of bows can help you sort through the options. Major design variations can be grouped in three categories: bow materials, cross sections and guidance methods.

**Bow Materials**

In selecting a bow material, a balance between weight, strength, flexibility, durability and cost must be struck. Obviously, weight and cost are desired to be low while the factors need to be as high as possible. The resulting balance point will likely be dependent on many factors including product type and quality level, machine style and performance and manufacturing capabilities.

I have heard of the use of wooden bows on older machines, but in general, bows today are made either from metal or a composite material, and some designs combine the use of both. Common metals used are steel, titanium and aluminum. These are well known materials, each with its own distinct advantages and drawbacks that are well documented. Developments in special alloys include increasing strength while reducing weight. Composite materials are an area of extreme developments over the last few decades. Driven by the aerospace industry and other high-attention areas like sports (golf, skiing, biking and car racing, for example), high-performance composites are widely available and used extensively in bows.

Composites are defined as engineering materials made from two or more components. One component is often a strong fiber such as carbon fiber, fiber glass or kevlar which gives the material its tensile strength, while another component (matrix) is usually a plastic or epoxy resin that binds the fibers together. In terms of stresses, the fibers serve to resist tension, the matrix serves to resist shear and all materials together serve to resist compression. There are different methods for assembling the composite materials that are used in bow construction. Examples include braiding, weaving, molding, laminating and layering. Another technique is to use a strength member—a steel core, for example, within a carbon fiber composite to increase strength. A
main goal of using a composite is to reduce weight and increase strength at the same time.

Cross Sections
If you take a bow and cut it in a direction perpendicular to the wire path on the bow and look at the end, then you would see the bow cross section. The options range from a simple rectangle with rounded corners to an engineered profile that resembles an aircraft wing.

Several designs are patented. Some bows are open—the wires and cables and related guiding hardware are exposed to the air stream—others are closed—the wires or cables are shielded completely—and still other bows employ a channel so that the wires or cables are mostly or partially enclosed and out of the path of air flow. Once again, selection is dependent on many factors, but bow suppliers often have experimental data related to power consumption, friction drag, noise levels and expected speed that can help direct your choice. In addition, internal experimentation is common at wire and cable manufacturing operations, and customized bow sections can be developed.

Guidance Methods
As the ultimate bow would never come in contact with the wire or cable as it was being processed, it is no surprise that there are many different methods for guiding the material along the bow. Low coefficient of friction materials like ceramics, carbides and hardened or coated metals are used to make the eyelets, tubes, rollers, wear strips and bushings that are used in bows. Hardware should be easy to install, last long and not harm the surface of the wire or cable. In addition, drag should be kept to a low level, and string-up should be easy.

Bow Failure
Bows can fail for a variety of reasons including wire breaks, improper balance, tools or other foreign objects left in the machine, poor tension control, wrong size bow, machine problems and improper string-up. Breaking a bow is not desired, but if it happens, then it may break something else. This point should be considered when selecting a bow. There are many good bow suppliers, and some interesting product development and research is under way. Stay in touch with the experts and improve the performance of bows in your operations.

Article References:
• www.en.wikipedia.org.
• Websites listed in the Spotlight Ads in this article.
Developing a cold welder to join large rod sections and a die to bond very fine wire are just two of the milestones in the history of PWM (Pressure Welding Machines Ltd.), which is located in Bethersden, Kent, UK. The company is celebrating 25 years of service to the international wire and cable industry in May 2009.

PWM, which designs and manufactures high-performance cold pressure welding equipment and dies, has been at the forefront of cold weld technology since 1984. The company’s product range includes machines for a wide variety of applications from hand-held manually operated welders for joining fine copper/aluminum wire from 0.08 mm (0.003145") diameter, up to large heavy-duty electro/pneumatic and electro/hydraulically powered rod welders with capacities of up to 30 mm (1.181") diameter.

All machines offered by PWM are precision engineered in PWM’s own British workshops to stringent quality control standards.

A Pioneer in the Cold Welding Process

The company pioneered the process of cold welding very large rod sections with the introduction of its first rod welder in 1985. The electro/pneumatic EP500, developed to meet industry demand for a machine that could accommodate copper rod up to 12.50 mm (0.492") in diameter and aluminum to 15.00 mm (0.590"), is still in production today as one of PWM’s best-selling machine models.

At the other end of the scale, PWM’s ongoing research and development has enabled the company to develop dies that are capable of joining wire as fine as 0.08 mm (0.003145") diameter.

Recent product innovations by PWM include the P1000, which is an extremely compact yet powerful rod welder, and an automatic version of PWM’s best-selling portable HP100 air/hydraulic model. Like all PWM cold welding systems, these energy-efficient machines provide users with a reliable permanent weld that is stronger than the parent material, helping to reduce material wastage and cut costs.

Customer Service & Support a Priority

Customer service has always been a priority at PWM. The company’s UK-based specialist staff offers between its members more than 35 years experience in cold weld technology.

The staff is always happy to advise customers on applications. PWM provides a personal service through its global network of authorized agents, as well as full back-up and after-sales service for all of its products.

The Next 25 Years

As the company looks toward the future, PWM’s Managing Director, Steve Mepsted, made the comment, “Despite the challenging market, we enjoyed record sales growth last year. Cold welding continues to provide a consistent, reliable and cost-effective method of welding nonferrous materials, and we are confident that we will be able to meet the changing needs of our global wire and cable industry customers in the years to come.”
Utilizing Coagents in the Electron Beam Cure of Elastomers

by:

William M. Boye
Sartomer Company, Inc.
502 Thomas Jones Way
Exton, PA 19341 USA
www.sartomer.com

Elastomer crosslinking (vulcanization) involves tying together loosely held molecular chains into a three-dimensional network structure of polymeric chains capable of supporting a sustained load (stress) or withstanding a constant deformation (strain). Physical properties imparted to an elastomeric polymer due to crosslinking involve high tensile strength, low compression set, recoverable elongation, high tear energy and improved dynamic performance.¹ Achieving optimum physical properties through vulcanization depends on the elastomer, chemical additives and vulcanization system. Chemical additives known as coagents are used in conjunction with radical cure systems such as organic peroxides and electron beam irradiation. Coagents are used in the cure of elastomers to promote crosslinking reactions and improve physical properties.

**Coagents.** Coagents can be grouped according to their influence on cure kinetics and ultimate physical properties. Type I coagents are highly reactive and increase both the rate and state of cure. Typically monomeric, such coagents contain acrylate, methacrylate or maleimide functionality. They are very polar structures with limited solubility in most elastomer grades. Type II coagents are based on allyl reactive sites and increase the state of cure only. Monomeric, such coagents contain acrylate, methacrylate or vinyl-containing cyanurates, isocyanurates and phtha-

**Electron Beam Cure.** Vulcanization by electron beam irradiation involves the interaction of high energy electrons and an elastomer. Ionizing radiation produces excitation of polymer molecules in the vicinity of the impinging radiation. The energies associated with this are dependent on the irradiation dosage and electron voltage (velocity). The interaction results in formation of free radicals formed by dissociation of molecules in the excited state or by interaction of molecular ions. The free radicals or molecular ions can react by recombination, association, or by dissociation to form larger molecules to irradiation affects the efficiency of grafting. It has been reported that acrylic and methacrylate esters, maleimides, thiol and halogenated compounds are highly sensitive to irradiation and are thus prone to form more radicals upon irradiation than high molecular weight polymers. Hence, a lower amount of radiation dose is required to achieve desired properties. Also demonstrated was the use of aromatic amines and quinones as anti-radiicals which hindered cure.⁷

In this study, the influence of electron beam radiation dosage on crosslinking in the presence of various coagents was investigated. The data was compared with a standard peroxide cured system also containing the same coagents. Further, peroxide cured samples were prepared on an equal crosslink density basis with that of the electron beam sample in order to isolate the gross effect of coagent contribution to both electron beam curing and peroxide curing systems.

**Table 1. EPDM Masterbatch Formulation.**

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>phr</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nordel™ IP 4640 (EPDM)</td>
<td>100</td>
</tr>
<tr>
<td>Carbon Black (N 660)</td>
<td>50</td>
</tr>
<tr>
<td>Sunpar 2280®</td>
<td>25</td>
</tr>
<tr>
<td>Antioxidant</td>
<td>1</td>
</tr>
<tr>
<td>Coagent</td>
<td>0, 2, 5, 10</td>
</tr>
<tr>
<td>Peroxide</td>
<td>7.5</td>
</tr>
</tbody>
</table>

**Table 2. Coagent List Showing Sartomer Codes & Product Descriptions.**

<table>
<thead>
<tr>
<th>Sartomer Code</th>
<th>Description</th>
<th>Ref. Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>SR206</td>
<td>Ethylene glycol dimethacrylate</td>
<td>EGDMA</td>
</tr>
<tr>
<td>CD262</td>
<td>1,12-Dodecanediol dimethacrylate</td>
<td>DDDMA</td>
</tr>
<tr>
<td>SR350</td>
<td>Trimethylolpropane trimethacrylate</td>
<td>TMTMA</td>
</tr>
<tr>
<td>SR214</td>
<td>1,4-Butanediol dimethacrylate</td>
<td>BDMA</td>
</tr>
<tr>
<td>Ricon 154</td>
<td>High vinyl polybutadiene</td>
<td>HVBD</td>
</tr>
<tr>
<td>SR507</td>
<td>Triallyl cyanurate</td>
<td>TAC</td>
</tr>
<tr>
<td>SR525</td>
<td>N,N' -m - Phenylenedimaleimide</td>
<td>PDM</td>
</tr>
<tr>
<td>SR708</td>
<td>Zinc dimethacrylate</td>
<td>ZDMA</td>
</tr>
</tbody>
</table>
ated in the study.

Sample Preparation and Irradiation. The masterbatch formulation described above was masticated on a two roll mill until a flux was achieved at the nip. To the masterbatch, antioxidant and coagents were added slowly until dispersed in a uniform band. The band was sheeted, folded and remilled until thoroughly mixed.

Electron Beam Cured Samples. Samples for electron beam irradiation were cut from the mixed compound, placed between Mylar sheets and warmed pressed at 100°C for 10 minutes to form 6" X 6" plaques with a thickness of 0.125".

Peroxide Cured Samples. To the masterbatch containing antioxidant and coagent, 7.5 phr dicumyl peroxide was added. The banded sheet was folded and remilled until thoroughly mixed. Samples were cured in a 160°C press for 35 minutes to form 6" X 6" plaques with a thickness of 0.125".

Cure Kinetics and Physical Testing. The determination of vulcanization behavior was performed on a Tech Pro MDR moving die rheometer (MDR) according to following ASTM D 412 and ASTM D 624 (Die C). Shore A hardness measurements were taken on a hand held durometer according to ASTM D 2240.

Electron Beam Irradiation. Sample irradiation was performed by EBeam Services Inc. Electron beam irradiation was carried out on a RDI Dynamitron—DCP2000 electron beam accelerator with parameters according to Table 3.

Table 3. Electron Beam Irradiation Parameters.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beam energy</td>
<td>4.5 MeV</td>
</tr>
<tr>
<td>Scanning range</td>
<td>86%</td>
</tr>
<tr>
<td>Total power consumption</td>
<td>150 kW</td>
</tr>
<tr>
<td>Delivered dose per pass</td>
<td>25 kGy (2.5 Mrads)</td>
</tr>
</tbody>
</table>

Determination of Crosslink Density. The Flory-Rehner equation was employed to calculate the crosslink density from swelling experiments. The samples were swollen in toluene at room temperature for 96 hours and then removed from the solvent, quickly blotted off with tissue paper and immediately weighed on an analytical balance to a tolerance of 1 mg. The volume fraction of rubber in the swollen gel, V_r, is calculated by Equation 1:

\[ V_r = \frac{m_{\text{rub}}(1 - \phi)}{m_{\text{rub}}(1 - \alpha) + (m_1 - m_2) / \rho_s} \]

Where \( m_{\text{rub}} \) is the sample mass before swelling, \( m_1 \) and \( m_2 \) are sample masses before and after drying, \( \phi \) is the mass fraction of rubber in the vulcanize, \( \alpha \) is the mass loss of the gum EPDM vulcanize during swelling and \( \rho_s \) and \( \rho_r \) are the rubber and solvent density, respectively.

The samples were air dried for 24 hours followed by drying in a vacuum oven for two hours at 80°C. The effective number of chains per unit volume, which is used to represent crosslink density, \( \nu_c \), is then calculated using Equation 2:

\[ \nu_c = \frac{\ln \left( \frac{1 - V_r}{1 - V_c} \right) + V_r + \chi V_r^2}{V_r \left( V_c \frac{V_s}{V_c} - V_c / 2 \right)} \]

Where \( V_s \) is the solvent molar volume (106.5 cm³/mol for toluene), \( \chi \) is the EPDM-toluene interaction parameter and is taken as 0.49.

Results & Discussion

Electron Beam Curing. EPDM masterbatch was compounded with five coagents at 2, 5, and 10 phr loading. Due to their reactivity and mechanism of cure, coagents are classified as either Type I or Type II. Most Type I coagents can homopolymerize and graft-to forming viable crosslinks through radical addition reactions. Type II coagents may participate in crosslink formation through grafting at the allyl groups, inter and intra-molecular propagation reactions or simply increasing the concentration of reactive pendant unsaturation. In the current formulation, Type I coagents represented are trimethylolpropane trimethacrylate (TMPTMA), zinc dimethacrylate (ZDMA), and N,N'-m-phenylene dimaleimide (PDM). High vinyl polybutadiene (90% vinyl-HVPBD) and trially cyanurate (TAC) represent Type II coagents in the study. Samples were then irradiated at 50, 100, and 150 kGy. A sample without coagent was also compounded and irradiated which serves as the control for the data.

Effect of Irradiation Dosage on Physical Properties. An increased concentration of molecules in the excited state leads to a higher percentage of crosslinking reactions, thus improving the physical properties. Enhancement in physical properties is related to electron beam intensity. Figure 2 highlights the trend of improving physical properties with increasing irradiation dosage. Because of the high sensitivity of TMPTMA to electron beam irradiation, a measurable improvement in modulus is observed.

![Fig. 2 — 100% modulus as a function of radiation dosage.](image)

At 100 kGy and 150 kGy, PDM and ZDMA show equal to higher modulus and tensile strength values when compared to the control samples. Similarly, the modulus of the compound increased with increasing irradiation dosage for each coagent type. Overall, consistent improvements in physical properties are seen at 100 kGy and above. Similar trends are observed for tensile strength and tear strength as well.

Effect of Coagent Loading on Physical Properties. Contribution of coagents to increasing crosslink density is determined by the reactivity of the coagent, the number of reactive groups (functionality), and the loading and solubility of the coagent in the elastomer. Figure 3 shows 100% modulus as a function of coagent loading.

While most coagents increase the crosslink density as a function of irradiation, the evidence from Figure 3 suggests that HVPBD and TAC show no significant improvement; and the trend is similar at 50 kGy and 150 kGy as well.

Effect of Irradiation on Crosslink Density. Contribution of coagents to network crosslink density can be measured via equilibrium swelling experiments. Figure 4 (next page) shows the crosslink density data. The addition of TMPTMA increases crosslink density significantly when compared with the control and other coagents similar to the 100% modulus values. The relationship between the crosslink density data and modulus data is in good agreement with the other physical property values.

In order to quantify the increase in crosslink density as a function of irradiation dosage, equilibrium swelling experiments were carried out on TMPTMA at the levels of irradiation studied. Figure 5 demonstrates that crosslink density for TMPTMA is found to be not only a function of coagent loading but also irradiation dosage.

![Fig. 3 — Effect of increasing coagent loading at 150 kGy.](image)
Utilizing Coagents

Measured increases in both physical properties and crosslink density data for TMPTMA indicates that the meth(acrylate) type monomers possess advantages in electron beam irradiation. The inherent assumption is that these monomers demonstrate a higher sensitivity towards electron beam irradiation. However, variables such as the reactivity rates of the methacrylates, the number of reactive groups (functionality) and molecular as well as methacrylate equivalence would have to be considered.

**Methacrylate Investigation.** As mentioned above, the results from the initial investigation established the methacryloner monomer (TMPTMA) as the coagent generating the highest crosslink density and physical properties. Also, irradiation at 150 kGy produces the highest crosslink density and positively affects physical properties. Therefore, as a follow-up to the initial work, four methacrylate coagents with different functionalities, molecular weights, and number of carbon atoms between functionality were selected for irradiation at 150 kGy. As in the initial study, coagents were loaded at 2, 5, and 10 phr. Table 4 lists the coagents evaluated in this study.

**Electron beam cured samples.** It is well established that increasing crosslink density increases compound modulus and hardness, while decreasing elongation and permanent set. Consequently, by increasing coagent loading, crosslink density and physical properties are significantly improved. Thus, the samples irradiated exhibited improvement in physical properties as a function of coagent loading. In the case of tensile strength, for example, improvements are seen for all coagents regardless of the functionality, the number of reactive groups, or molecular weight when compared with a control containing no coagent. As highlighted in Figure 6, increase in tensile strength is a function of coagent loading.

Similarly, the modulus increases indicating a good correlation with crosslink density. As shown in Figure 7, in each case, the coagents demonstrate improvement in 100% modulus.

The trends thus far are similar to those observed when increasing irradiation dosage from 50 kGy through 150 kGy. The resulting effects are summarized in Table 5.

**Methacrylate Equivalence.** In order to explore the impact of the number of functional groups, i.e., number of reactive groups per coagent monomer, methacrylates with various functionalities and molecular weights at the same phr loadings were compared. Table 6 shows the functionality and the methacrylate equivalence for these coagents.

Networks formed from coagents with similar molecular weights but different number of functional groups results in subtle differences in physical properties. When functional groups are compared, it is observed that trifunctional coagents increase crosslink density and physical properties to a larger extent than difunctional coagents. The resulting disparity in the methacrylate equivalence, i.e., the number of functional groups per molecular weight, results in measurable higher crosslink density and physical properties. Figure 8 highlights the differences in modulus between difunctional (DMDMA) and trifunctional (TMPTMA).

The second crucial parameter is the structural differences resulting from the number of carbon atoms between functionality. Again the lower molecular weight coagents produce higher methacrylate equivalences as compared with higher molecular weight analogous. Networks formed when coagents of similar functionality but different number of carbon atoms between functionality results in an increase in crosslink density and improvement in physical properties (Figure 9).

It is also observed from Figure 9 that the higher molecular weight coagents appear to increase properties less efficiently than the lower molecular weight coagents. The apparent increase in the number of carbon atoms between functionality (higher alkyl bridging groups) will decrease the reactivity of the coagent. Therefore, effective crosslink formation relies on understanding the relationship between the reactivity of the coagent and its solubility. Optimized performance of the vulcanizate can be obtained if both reactivity and solubility are appropriately controlled.

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Table 4. Methacrylate Coagents.

<table>
<thead>
<tr>
<th>Sartomer Code</th>
<th>Code Description</th>
<th>Ref. Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>SR206</td>
<td>Ethylene glycol dimethacrylate</td>
<td>EGDMA</td>
</tr>
<tr>
<td>CD262</td>
<td>1,12-Dodecanediol dimethacrylate</td>
<td>DDMMA</td>
</tr>
<tr>
<td>SR350</td>
<td>Trimethylolpropane trimethacrylate</td>
<td>TMPTMA</td>
</tr>
<tr>
<td>SR214</td>
<td>1,4-Butanediol dimethacrylate</td>
<td>BDDMA</td>
</tr>
</tbody>
</table>

Table 5. Similarity in Trends of Increasing Coagent and Irradiation Dosage.

<table>
<thead>
<tr>
<th>Physical Property</th>
<th>Increasing Coagent</th>
<th>Increasing Irradiation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tensile Strength</td>
<td>↑</td>
<td>↑</td>
</tr>
<tr>
<td>Modulus</td>
<td>↑</td>
<td>↑</td>
</tr>
<tr>
<td>Elongation</td>
<td>↓</td>
<td>↓</td>
</tr>
<tr>
<td>Tear Strength</td>
<td>↑</td>
<td>↑</td>
</tr>
<tr>
<td>Hardness</td>
<td>↑</td>
<td>↓</td>
</tr>
</tbody>
</table>
Table 6. Coagents Showing Methacrylate Equivalence.

<table>
<thead>
<tr>
<th>Coagent</th>
<th>Molecular Wt. (Mn)</th>
<th>Functionality</th>
<th>Methacrylate equivalence</th>
</tr>
</thead>
<tbody>
<tr>
<td>EGDMA</td>
<td>198</td>
<td>2</td>
<td>$1.0 \times 10^{-2}$</td>
</tr>
<tr>
<td>DDMMA</td>
<td>338</td>
<td>2</td>
<td>$5.9 \times 10^{-3}$</td>
</tr>
<tr>
<td>TMPTMA</td>
<td>338</td>
<td>3</td>
<td>$8.9 \times 10^{-3}$</td>
</tr>
<tr>
<td>BDDMA</td>
<td>226</td>
<td>2</td>
<td>$8.8 \times 10^{-3}$</td>
</tr>
</tbody>
</table>

Comparing Curing Systems

Electron Beam Cured Samples Compared to Peroxide Cured Samples. From our initial study, the same coagents were studied in a standard peroxide cured EPDM formulation containing 7.5 phr of 40% active dicumyl peroxide. Although the formulations were identical except for the chemistry and process, the physical property data from the peroxide cured samples were higher than the electron beam cured samples as observed in Figure 10.

It is also seen in Figure 10 that while PDM achieved the highest crosslink density in peroxide cure, it did not perform similarly in the electron beam cure. Therefore, relative efficiency of coagents does not translate directly from electron beam cure into peroxide cure.

However, when the peroxide cured sample is formulated to comparable crosslink density as the electron beam cured samples, coagent activities become relatively similar (at 2.5 phr dicumyl peroxide) as seen in Figure 11.

Regardless of the coagents used, crosslink density and physical properties improve relative to the control in both curing systems. Therefore, the correct application of coagent technology can contribute to higher crosslink density and improved physical properties of an electron beam cured system.

Conclusion

The study demonstrated that crosslink density and physical properties such as tensile strength, modulus, and tear, improved as a function of increased irradiation dosage. At low coagent level (2 phr) and low irradiation dose (50 kGy) there was little differentiation among the coagents evaluated. Physical property values were practically equal when compared to the sample without coagent. The data suggests that the effect of coagents at low coagent levels and low irradiation dosages generates insufficient crosslinking to confer advantages in the electron beam curing of EPDM unless marginal crosslinking is the desired effect.

At 100 kGy and 150 kGy irradiation dose levels, differentiation among coagents is observed; coagents with high sensitivity to electron beam irradiation produced appreciable levels of crosslinking and physical property at these levels. The dose level generating such improved physical properties is related to the intensity of the electron beam (voltage), speed (dose), and number of passes under the beam.

The number of functional groups (i.e., di or tri-functional) as well as the coagent type (Type I or II) influences the extent of crosslinking. When compared to a standard peroxide formulation of equivalent crosslink density, samples cured by electron beam irradiation show evidence of similar physical properties. Therefore, with the judicious selection of coagents, taking into account the reactivity, the number of reactive groups (functionality), and solubility of the coagent in the elastomer, crosslink density can be tuned to achieve targeted physical properties. www.sartomer.com

Acknowledgments:
The author would like to thank the Sartomer Company, Inc. for the permission to make the information contained in this paper available. Many thanks to Steve Henning for his suggestions, reviews and insightful remarks. The current study was conceived in collaboration with E-BEAM Services, Inc., with all irradiation performed at their Cranbury, NJ facility.

References:
Marking & Printing Roundup
compiled by the Editors at Wire & Cable Technology International

Suppliers have responded to our call for the state-of-the-art in marking and printing technology

Cable Inspection, High-Quality Cable Marking & Length Measurement

Samuel Kwok of Taymer International Inc.,Markham, Ontario,Canada, says, “Taymer International has been designing and building marking equipment for the wire and cable industry for over 40 years. Our product range includes surface inspection and print verification systems, hot foil printers, indent printers, aerospace inkjet and laser printing solutions and cable measurement devices.

“Taymer has newly developed a surface inspection system for the wire and cable industry designed to pick up defects less than 1 mm. With a multiple-camera setup and advance vision software, defects such as jacket holes, bulges and surface blemishes will be detected. This will prevent defective products from reaching your customers.

For print verification, the Print View 1400 will freeze an image of your product as it is being printed and display the image on a remote monitor, enabling your operators to easily verify print quality. The Print View can optionally include OCR software to proactively tell you when the printer is producing scrap.

“Taymer has also been producing hot foil printers for our customers to solve common printing challenges:

• Very durable marking on PE, HDPE, XLPE, Nylon and Teflon.
• Bright, high contrast white printing on dark cable jackets.
• Highly accurate length measurement and sequential numbering.
• Simple operation and easy to change printing colors.

• Low maintenance costs.

“If you are a wire harness manufacturer, please ask about our Stamp Marker 1000, the Continuous Marker 6000 and our Laser Printer to improve productivity in your plant. Come visit us and learn about our products.” www.taymer.com

Spiral Striping System

Jim Miller, Sales Engineer at Tulsa Power, Inc., Tulsa, OK, USA, says, “Tulsa Power’s Model WST-200 ‘Code-O-Color’ Spiral Striping System is a practical approach to your wire identification requirements. Engineered to be the ultimate in high production wire coding systems, the WST-200 series equipment can be configured with a variety of auxiliary attachments to accommodate today’s wire coding requirements. The unique spiral striping head allows for 100% helical striping coverage with three individual striping wheels. The system can apply one to three colors to the wire simultaneously with adjustable striping wheel angles ranging from 0° to 30°.

“Single, dual and triple cintering ovens are available for the WST-200 Series equipment allowing the system to process a variety of conductor jackets. Precise temperature of the ovens is accomplished via SCR temperature controls for each oven assembly.

“Tulsa Power, Inc. is a leading manufacturer of wire and cable handling equipment producing a broad offering of shafted and shaftless payoffs and take-ups,
capstans, accumulators, respoolers, coilers, eccentric and concentric tape wrapping systems and measuring systems. We specialize in custom design equipment to meet our customer’s exact requirements. www.tulsapower.com

Fiber Laser Coders Provide High Versatility & Maximum Uptime

Theresa DiCanio, of Videojet Technologies Inc., Wood Dale, IL, USA, says, “The Videojet® 7210 and 7310 fiber laser coders from Videojet Technologies are compact, fast and highly reliable for applications such as direct parts marking and unique identification coding on a variety of metal, plastic and other hard-to-mark materials. Available in 10 W and 20 W of output power, respectively, the Videojet 7210 and 7310 fiber laser coders provide a compact mechanical design with a small marking head and straight-out or 90° beam options for increased versatility in tight spaces. Less-frequent maintenance intervals maximize uptime and reduce costs. Both coders can quickly apply complex variable data such as high-quality identification matrix codes, bar codes, logos and serial numbers, both on moving and static products.

“Videojet Technologies is a world-leading manufacturer of coding, printing and laser marking products, fluids and accessories for the product identification industry. As an expert in continuous ink jet (CIJ), drop-on-demand (DOD), thermal transfer overprinting (TTO), array and laser technologies, Videojet has over 275,000 units installed worldwide. Sales, service, training, administrative and application support is provided by direct operations worldwide.

“To receive additional information about the Videojet 7210 and 7310 fiber laser marking systems, visit the Videojet Technologies website shown below. www.videojet.com

Fiber Laser Coders Provide High Versatility & Maximum Uptime

Theresa DiCanio, of Videojet Technologies Inc., Wood Dale, IL, USA, says, “The Videojet® 7210 and 7310 fiber laser coders from Videojet Technologies are compact, fast and highly reliable for applications such as direct parts marking and unique identification coding on a variety of metal, plastic and other hard-to-mark materials. Available in 10 W and 20 W of output power, respectively, the Videojet 7210 and 7310 fiber laser coders provide a compact mechanical design with a small marking head and straight-out or 90° beam options for increased versatility in tight spaces. Less-frequent maintenance intervals maximize uptime and reduce costs. Both coders can quickly apply complex variable data such as high-quality identification matrix codes, bar codes, logos and serial numbers, both on moving and static products.
Digital Printer for Hot Marking of Electrical Wires & Cables

John G. Hickey, Director, Sales & Marketing for Matthews Marking, Pittsburgh, PA, USA, says, “The Coditherm4.Wire printer from Matthews is a ‘hot transfer digital printer’ developed for printing onto electrical wires and cables with plastic insulation. Its special design allows for printing onto round objects. The Coditherm makes it possible to mark products with variable data and texts (including logos and small barcodes) to guarantee extreme flexibility and high quality printing. Fitted with a 5.7” color touchscreen display, this easy-to-use printer allows the image in memory to be shown as well as makes the setting of parameters and the loading of label files simpler and more intuitive.

“The powerful internal microprocessor makes it possible to reprocess the variable and automatic data that can also be updated on each cycle, without slowing down the application rate. The Coditherm can be connected both in Ethernet and wireless networks. For more information, or to learn about our complete range of marking and coding solutions for wire and cable applications, please visit the website below.”

www.matthewsmarking.com

New Inkjet Printer Models Offer More Print Designs

Information from Paul Leibinger GmbH & Co. KG, Tuttlingen, Germany, says, “The JET3 and JET3pi with 70 µ nozzle enhance the manufacturer’s wide range of inkjet units resulting in a nearly unlimited application spectrum for this units. These new printing system versions of the JET3 and JET3pi are mainly suited for inkjet printing on big letters with high contrast between product and print. By the 70 µ nozzle and a special geometry of deflection plates and printhead of the JET3 and JET3pi, a bigger deflection of the ink drops can be achieved, and therefore font sizes up to 15 mm can be printed.

“The application area of the JET3 and JET3pi with 70 µ nozzle include now also porous and highly sucking products, where an increased amount of ink is necessary. The thicker drops resulting from the 70 µ nozzle as well as the use of pigmented inks by the JET3pi guarantee a strong contrast between product surface and print.

“Additionally, the manufacturer’s automatic nozzle seal guarantees an immediate print start without the need for flushing processes and cleaning procedures. When the printing machine is shut-down, the gutter tube closes the nozzle airtight and establishes a closed ink circuit. This technique also keeps the ink from drying after long-term shut-downs.”

www.leibinger-group.com

Marking of Cables & Coating of Optical Fibers

Information from Medek & Schörner GmbH, located in Vienna, Austria, says, “This year the family company of Medek & Schörner, which is one of the market leaders in cable printing machines and optical fibre processing lines, celebrates the 80th anniversary of its founding. As the only company operating in this market segment, Medek & Schörner covers virtually the entire spectrum of machines for marking cables and coding optical fibers; in particular for power, telecom, data cables.

“Cable marking machines include high quality gravure printers (LAN cables, control cables, etc.) for speeds up to 1200 mpm; embossing meter markers/hot foil sequential meter markers for highest accuracy of length measurement (power cables, telecommunication cables, optical fibre cables, etc.); high-performance ring markers for speeds up to 2500 mpm (telephone wires, switchboard wires, automotive cables, LAN cables); and video monitoring system for fast-running cable printing machines.

“The capacity of any system can be significantly increased quickly and easily simply by exchanging individual components. New components from Medek & Schörner are always compatible, even if a system has already been in operation for many years. Cable marking machines from Medek & Schörner are also particularly serviceable, as a result of which operating staff is
generally able to carry out maintenance and reliable operation of the machines without the need for service engineers from the manufacturer of the machines.

“Top-speed optical fiber coating systems include optical fiber color coding up to 3000 mpm; ring marking of optical fibers; tight buffering up to 1300 mpm; and fiber ribbon production with excellent ribbon planarity and for speeds up to 1000 mpm.

“Years of experience in the coating of optical fibers with UV curable inks and resins have enabled Medek & Schörner to develop a completely new line of products including copper wire insulation with UV varnishes for the economic production of high quality enamelling wires and a new manufacturing concept for precision micro flexible flat cables. Medek & Schörner has now developed a new unpressurized cold process for the production of FFCs using UV cured resins, thus ensuring the perfect geometrical accuracy of the cable at high production speeds.” www.medek.at

Industrial Marking Machines & Accessories
Information from Amaral Automation Associates, Cumberland, RI, USA, says, “Amaral Automation Associates provides process controls and equipment to the wire, cable and plastics industries representing various equipment manufacturers including W. Gil- lies Technologies, LLC, Worcester, MA, USA, and Tulsa Power, Tulsa, OK, USA.

Continued ...
“W. Gillies Technologies, LLC is an expert supplier of industrial marking equipment. The company specializes in print wheels, contact printers, inkjet marking systems, inks and extenders for application in the wire, cable, hose and tubing industries. The company’s engraved print wheel include indent/embossing and spiral striping. Printers include standard types as well as offset, mid-speed models and high-speed models. Also supplied by W. Gillies Technologies are inkjet guidance and measurement including length counting systems and accessories.

“Amalar Automation Associates also supplies the Model WST-200 ‘Code-O-Color’ Spiral Stripping System available from Tulsa Power. The Model WST-200 ‘Code-O-Color’ Spiral Stripping System has been engineered to be the ultimate in high production wire coding systems.

“Amaral also offers its customers various technical services including technical consulting, equipment and systems engineering, process engineering consulting, installation and start-up services, preventive maintenance programs, corrective maintenance and troubleshooting services, training and application assistance, technical project management services and circuit board repair.

“To learn more about the industrial marking machines and equipment offered by Amaral Automation Associates, contact Joe Snee, Sales Manager.”

www.amaralautomation.com

Print wheels manufactured by W. Gillies Technologies and available from Amaral Automation Associates.

“Zanasi has introduced the new Z5000Pi printer to its CIJ series. The Z5000Pi is the ultimate, easy-to-use and superior CIJ printing system, specifically designed for printing onto dark uneven surfaces like cables, tubes, extruded plastics, automotive components and electronics. The Z5000Pi produces exceptional print quality and high visibility in almost any industrial environment where dark surfaces need to be coded or identified. The new white pigmented ink offers outstanding brightness and high contrast on dark and small areas and components.

The new Z5000Pi prining system provides excellent code quality as well as dependable performance thanks to a new automatic ink mixing capability. By means of this unique system, the Z5000Pi printer tests and maintains the ink’s viscosity in order to ensure perfect coding both when it is being used and when it is idle.

“Additionally, through an advanced hydraulic system which doesn’t require factory air, today the Z5000Pi printing system is able to considerably improve the consumptions, thanks also to the innovative vapors circuit with complete solvent recovery.

“Zanasi also offers a wide range of first-class robust DOD (Drop On Demand) coders used for similar sectors with large character technology and print quality.”

www.zanasi.it

Simple, Reliable & Easy-to-Maintain Printers

Information from Gem Gravure Co., Inc., located in West Hanover, MA, USA, says, “Gem Gravure Co.,
Inc., provides wire and cable manufacturers with the simplest, the most reliable and the easiest-to-maintain printers.

“The company’s A Series Ink Jet Printer has been designed and engineered for simple operation as well as easy maintenance. Its large backlit LCD screen and keyboard provide a powerful yet easy-to-use interface that controls all printer operations. The electronics package ensure reliability. The A-Series 400 Ink Jet Printer features a rugged, compact, splash and dust-proof cabinet that allows installation in small areas. This system is capable of printing four lines with a variety of print formats including logos, bar codes, automatic serial numbers and real-time clocks.

“The ink system design uses a large internal reservoir and a nozzle seal allows automatic print head cleaning. Also offered is the A-Series Opaque Ink Jet Printer that features a ‘wake-up mode’ that automatically maintains the viscosity of the ink. The system’s completely automatic flush cycle assures a ‘sure start/stop’.

“Also offered by Gem Gravure are wire and cable printing inks, print wheels and other traditional marking equipment.” www.gemgravure.com

Industrial Marking Systems

Information from Pannier Corporation, Pittsburgh, PA, USA, says, “Pannier Corporation has been serving manufacturers with reliable solutions for product marking and identification since 1899. We offer a wide range of equipment and supplies designed for use in the harshest industrial environments, ensuring accurate product identification at every stage of manufacture. With a legacy of high-quality products, helpful and responsive service and a dedication to developing solutions to our customers’ problems, we are proud to be a partner to thousands of industrial companies around the globe.

“Pannier’s Rubber Printing System is the marking system of choice for tire manufacturers. Also offered are printed and embossed metal tags to help steel manufacturers achieve 100% product tracking. Pannier’s dot peen markers are designed for direct part marking and tag engraving applications.

“The company’s website provides a product selection tool that helps in deciding which system is right for the application. Also at the site is a contact section to facilitate communications and a services section to help visitors learn about Pannier’s manufacturing and service capabilities.” www.pannier.com
EBA Copolymer Grade

Reduces foam shrinkage in extrusion

New EBA PA1715 (IF 1.5 g/10’ and 17% butyl acrylate) targets general extrusion applications, offering very good performance in the manufacture of microcellular foams for both compression and injection molding. EBA PA1715 can be foamed under the same conditions as an EVA of similar basic characteristics, using the same type of components in the formulation and keeping machine parameters constant.

Foams produced with EBA PA1715 present 60% less shrinkage, 40% higher elongation and 30% less loss due to abrasion than those made with conventional polymers. Similarly, the density of EBA PA1715 provides a 1% saving in material compared to that of an EVA of similar characteristics.

The new EBA PA1715 copolymer grade for extrusion applications provides users with new alternatives to complement the company’s established EVA and EBA range. Repsol Chemicals, Madrid Spain.

www.chemicals.repsol.com

New Technology for Solar Panel Cables

LSFOH compounds for solar cells

ECCOH™ Low Smoke and Fume, Zero Halogen (LSFOH) compounds are for cables used in photovoltaic solar cells. To produce solar energy, these cells are assembled into panels that convert sunlight directly into electricity.

According to the manufacturer of these new compounds, solar photovoltaic technology requires specific cabling systems with zero halogen, flame-retardant insulation and sheathing layers. The outer jacket must also be resistant to moisture, sunlight, heat, chemicals and abrasion. While specifications for these cables vary by region, the company’s ECCOH 5943 complies with TÜV 2 Prf 1169/08.2007 in Europe, and ECCOH 5944 meets UL4703 compliance standards in North America and Asia.

With these new compounds, cable producers can overcome several drawbacks common with previous products while offering a fully compliant solution. ECCOH materials, unlike TPU and TPV-based cable compounds, can be used for both internal (insulation) and external (sheathing) layers in cable applications, allowing solar cable producers to choose a single material. In addition, ECCOH 5943 and 5944 offer a choice of cross-linking, either by dry silane or e-beam. This creates an economical alternative for producers that find e-beam costs to be prohibitive. PolyOne Corporation, Cleveland, OH, USA.

New cable compounds for solar panel cables are available from PolyOne Corporation.

Wire Plating System

High quality copper/alloy surfaces

In response to the need for modern galvanic wire plating lines to satisfy the requirements for continuity of coating (free from pores), homogeneity, concentricity and adhesion of the plating, company has developed the Niehoff-Steuler wire plating technology (WPT). WPT 400 lines are designed for tin, silver, nickel and zinc plating of wires made of copper and copper alloys with diameters of 1.0 to 2.6 mm (18 to 10 AWG).

Automatic dosing of chemicals and supply of water together with a high current density result in stable operating conditions, constant high surface quality and low manpower requirements. Multiple cascade units reduce accumulation of rinse water and consumption of chemicals/water. The use of a vacuum evaporator enables waste waterfree operation to minimize production costs. Other features include synchronization of all the components; minimized consumption of energy, water and chemicals; full usage of anode materials; and high reliability. A modular concept with quick module changing enables flexible production planning and allows maximum flexibility for changing market situations. Easy accessibility minimizes service and maintenance requirements. Company offers all equipment needed for producing plated wires.

Maschinenfabrik Niehoff GmbH & Co. KG, Schwabach, Germany or Niehoff Endex North America Inc., Swedesboro, NJ, USA.

www.niehoff.de / www.niehoff-usa.com

Extruder Control System

Now with expanded features

More temp-control features and an option for historical data collection have been added to the DS-eTPC touch-panel control system. The improved system, which offers processors coordinated line control, supports more customers across all product lines while maintaining pricing comparable to discrete controls.

Temperature control has been augmented to allow control of up to eight barrel heating and cooling zones per extruder. This augmented system is widely used on the manufacturer’s own 4-1/2” (114 mm), 100 mm and Super Blue® extruders. It offers coordinated drive control to a one-line drive for the same base price as other discrete devices. Davis-Standard LLC, Pawcatuck, CT, USA.

www.davis-standard.com

WPT 400 galvanic wire plating line for copper and copper alloy wires.
In-Line Atmospheric Bright Annealing Systems

High-quality surface finishes/strength

Annealing system manufacturer advises that normal annealing can damage wire by allowing impurities to oxidize the surface, leaving it brittle and lacking shine. The company manufactures in-line atmospheric bright annealing systems that are designed to maintain the highest quality surface finish and interior strength for the specific material. This technology eliminates traces of alkali, minimizes carbon deposition and stress relieves stainless steel, copper, titanium and tungsten.

According to the company, energy efficient, clean induction technologies will reduce overhead costs and ultimately increase productivity. The company serves the thermal processing industry by manufacturing and marketing a diverse range of products and services featuring high quality and leading-edge technology. Radynie Corp., Milwaukee, WI, USA, a company of the Inductotherm Group.

www.radynie.com

Coiling & Spooling Line
Double-head, multi-functional system

The new Quadromatik 400 is a double-head, multi-functional coiling and spooling line. With a wide coiling capacity, the machine can process from 1.5 mm² (0.59 in²) cross section single core to 4 x 2.5 mm² (0.98 in²) multi-core cables with coil dimensions from 200 to 400 mm (78.74 in²) for diameter and from 100 to 200 mm height of coil. The same cable cross sections can be wound onto spools with inner diameter from 70 to 100 mm, maximum spool height of 200 mm and diameter up to 350 mm. All coiling and spooling settings are adjustable from an easy-to-use touch screen control panel.

The Quadromatik is specially developed for coiling and spooling in the same line without the need to change any mechanical parts, when passing from coiling operation to spooling mode. Due to these features the Quadromatik 400 works with capacity of three to four spools with 100 m cable length or three to four coils at 100 mpm. According to its manufacturer, this high-productivity cable packing line is an ideal choice for highly productive cable manufactures. Domeks Makine Ltd., Istanbul, Turkey.

www.domeksmakine.com

Induction Heating Systems
With output power to 10 kW

EASYHEAT induction heating systems are versatile and rugged units that are available with an output power rating up to 10 kW. Meeting the demands of worldwide markets, EASYHEAT LI is powered by 208/240 or 400/480 AC line voltages and with output frequencies from 150 to 400 kHz. All 400 V models are CE marked.

Target heat temperatures are achieved quickly with adaptive frequency tuning technology in challenging applications where metal is heated through the Curie temperature (temperature at which the material loses its permanent magnetism).

The EASYHEAT LI systems are field-convertible between 208 and 240VAC or from 400 and 480 AC line voltages. This provides efficiencies to users who verify applications in one country and then deploy the equipment to another. The user-friendly control interface—supported in five languages (English, Spanish, French, German, Italian)—streamlines operator interactions and provides valuable heating cycle data. Ameritherm Inc., Scottsdale, NY, USA, an Ambrell Company.

www.ameritherm.com

Automatic Spool Winder
New double-head system

The PS 1000/22-B fully automatic double-head spooling machine can spool cables with diameters ranging from 6 to 22 mm (0.23" to 0.86"). The system can be used with several spool sizes from 450 to 1000 mm (17.73" to 39.40"). The maximum system speed is 400 mpm (1312 fpm).

As both solid and delicate cables should be wound in spools, the manufacturer recommends the use of two dancers (one of solid and one for delicate), so the pull on the cable can be ideally controlled. PS Costruzioni Meccaniche Srl, Agrate Brianza (MI), Italy.

www.pascostruzioni.com

Showcase MACHINERY

May 2009/Wire & Cable Technology International 83
Fine Wire Extrusion Crosshead
In single layer with skin layer option
The Unitek USCC V F 1/7 fine wire extrusion crosshead is suitable for the production of fine wires in single layer with skin layer option, and is capable of processing most high-temperature materials.

Products produced on the new crosshead include 0.03 mm (0.0018") seven-wire 0.09 mm (0.00354") OD conductors with 0.38 mm (0.00965") diameter over insulation foam skin FEP as well as a 0.04 mm (0.00157") wire 0.04 mm (0.00157") OD conductor along with 0.09 mm (0.0035") diameter over insulation PFA.

The Unitek USCC V F 1/7 crosshead consists of a compact head casing with a conical cartridge along with an incorporated sleeve for skin distribution.

The new USCC V F 1/7 crosshead unit is manufactured from UNALLOY®, having a hardness of 38 hrc (Hastalloy–18 hrc), providing high wear and corrosion resistance.

The complete setup of the crosshead at the final operation in-line, consists of the crosshead and by-pass valves for easy start-up and tool changes without having to stop the extrusion machine. Howar Equipment Inc., Concord, Ontario, Canada.

www.howarequipment.com
www.Unitek-NA.com

Wire Guide With Single Piece Mounting Bracket
Easier to install, less expensive
Uihing has re-engineered the mounting bracket for its GS material guide, which is used to guide fiber, wire and cable onto reels in winding applications. A one-piece bracket replaces the old design, which required the purchase and assembly of two separate parts. The new one-piece bracket saves on assembly/installation time and reduces the cost of the guide.

The Uihing GS guide assembly helps improve winding accuracy by keeping the material being spooled in line with the spool core. The Uihing GS guide is available for Uihing linear drives sizes 15, 20 and 30 mm. Ten sizes of guide wheels are available accommodating wire with OD of 2 to 8 mm (0.079" to 0.315").

If a size that is outside of this range is needed, guide wheels not manufactured by Uihing may also be used on the GS guide assembly. Three different lengths of guide wheel arms, which are 4.25", 6.875" and 9.25", are available for set up flexibility.

The Uihing GS guide is assembled before shipping and lists for US$150 to US$250 depending on which GS guide size is ordered. All parts of the Uihing GS guide are also sold separately. Amacoil, Aston, PA, USA.

www.amacoil.com

Cold Pressure Welders
Tough & economical units
Micro-Weld SCH Series cold pressure welders come with the manufacturer’s dependable service and warranty package. Rugged, easy-to-use and economical, these welders are available as hand-held or bench-type models.

Hand-held models are compact, sturdy and ideal for on-site welding. Three models offer capacities from 0.004" to 0.039" for copper and 0.004" to 0.047" for aluminum. Seven bench models offer capacities from 0.009" to 0.177" for copper and 0.011" to 0.248" for aluminum. Larger models coming soon. Micro Products Co., Bensenville, IL, USA.

www.micro-weld.com

Industrial Process Controller
Offers many features
The DataPro 3100 offers a touch screen interface, color-coded tolerance checking, built-in power for laser and ultrasonic gauges and bi-directional Ethernet communication. It is offered in configurations supporting the wire/cable and pipe/tube manufacturing industries.

Laser diameter and ultrasonic gauges can be combined in a number of powerful system configurations using the DataPro 3100. These allow for monitoring and control of any two laser diameter gauges to provide the required (core, hot and cold) control of an extrusion process. Beta LaserMike Inc., Dayton, OH, USA.

www.betalasermike.com
Device for Feeding Colorants into Extruders
Cuts costs/helps electrical properties
The Maguire® MGF Series gravimetric device for feeding color masterbatch into extruders processing wire and cable compounds has a new modular design that raises production uptime while continuing to be more accurate and no more costly than conventional volumetric feeders.

Inventory Control System
Plant-wide management/monitoring
New plant-wide materials management and monitoring system provides alarm monitoring, recipe control and overall plant visibility of all TSM blenders in a customer’s plant, whether by building, department, extrusion line or molding machine. Each blender can be monitored and controlled from one central location including current and historical production data, recipes, etc.

The inventory control system measures and monitors consumption of materials as well as monitors total cost of materials being used. It gives a supervisor exactly the information desired from the system in a format that can be opened in any spreadsheet application or ERP system.

Plant-wide alarm and reporting is a standard feature, ensuring production issues that occur at any time of day or night are available for later analysis. A full materials management system allows a supervisor to define materials including costs per unit, codes, descriptions, etc. Recipes can then be built using the materials database.

The capability for multi-threaded data logging from all machines in the plant to the SQL database is also possible with this system. TSM Control Systems, Louth, Ireland.

www.tsmcontrols.com

Tip Removal Wrench
Reduces changeover times & risk
New tip removal wrench for use with the manufacturer’s in-line spider dies is custom-engineered for precise fit between the tip and the wedge ring. It is designed to reduce the time, effort and risk involved with changeovers, and to lengthen tool service life.

Precision Dimensional Measurement Instrument
With modular laser gauges
The complete line of modular, single axis ODAC® laser gauges is available either mounted on a rail or as components, i.e., with separate sender and receiver units for flexible installation facilitating custom configurations. Depending on the application, multiple sender/receiver pairs can be arranged in any position offering a multi-axis measurement for large configurable product clearance through the use of high precision, telecentric optics.

With unlimited installation and configuration possibilities, these gauges can be used in all manufacturing processes including extrusion of cables, hoses, profiles, etc.; steel and metal industries such as drawing, grinding, cold and hot rolling of rods, tubes, etc.; NDT lines for any product; the food industry for packaging, sausage skins and more; and large pipe and conduit extrusions.

Advantages offered by this system include a high scan rate of up to 2000 scans per second; high accuracy and repeatability; compact and rugged design; a variety of measurement modes for diameter, gap width, depth penetration, multiple products etc.; special beam geometries available (depending on model) including contour measurements, profiles and similar; and models with integrated processor (RS, Ethernet, Profieldus DP) or connection to a wide range of remote processors for process control SPC and SQC data collection.

ZUMBAECH Electronics, Mount Kisco, NY, USA.

www.zumbach.com
This year, the family firm of Medek & Schörner GmbH, Vienna, Austria, one of the market leaders in cable printing machines and optical fiber processing lines, celebrates the 80th anniversary of its founding.

Three Generations of Leadership

Founded by Josef Medek and Gustav Schörner I in 1929 as a precision engineering workshop, the company supplied a variety of precision engineering products before it started focusing on the manufacture of machines for the marking of cables, wires, pipes, profiles and similar continuously extruded products in the 1950s.

The second generation of management (Gustav Schörner II, the founder’s son, and Fritz Descovich I, Josef Medek’s son-in-law) opened up the company for the world market, building up an international distribution network and giving the company a significant economic boost. Although the company continued to carry out precision engineering on the technical front it introduced electronics, enabling it to construct complex control equipment and propelling Medek & Schörner to the cutting-edge of technology.

Today’s third generation of management (Fritz Descovich II and Kurt Lichtscheidl, grandson of founder Josef Medek, and Werner Lichtscheidl, son-in-law of Gustav Schörner II) has continued the established traditions of its forebears. The high quality of the products is ensured by advanced technological expertise coupled with a well-trained staff and the latest production technology. The company continues to enjoy the loyalty of satisfied customers the world over thanks to a special emphasis on customer service and fast, competent assistance in response to problems.

Focus on Electronic Controls

The building of a production facility with the very latest machine tools in Grossebersdorf near Vienna in 1989 went hand-in-hand with a focus on research and development, with a special emphasis on complex electronic controls. This made it possible to continue producing conventional products of exceptional quality, while keeping up with the latest developments in modern technology. This was particularly beneficial with respect to highly technical and sophisticated equipment for the coloring and coating of optical fibers for glass fiber cables, a field in which Medek & Schörner has been involved since the beginning of 1980, and which has seen a tremendous technological and economic upswing worldwide.

Expertise to Offer a Full Array of Equipment

Today, Medek & Schörner is the only company offering the entire spectrum of machines for the printing of cables and coding of optical fibers.

The company has a team of exceptionally well trained employees who represent the company’s real capital. Most of the firm’s precision engineers were taken on as apprentices and master the production of high-precision mechanical components on modern CNC machine tools. Conventional SPS controls and drive components are used in electronic and control engineering as well as high-speed processor controls developed in house that are employed wherever the standard components available on the market reach their technical limits.

The engineers involved in research, development and design are the same people who are also confronted with the wide range of problems encountered by customers in everyday on-site operation. This ensures that Medek & Schörner technology stays true to its maxim: Support the company’s customers in every way and meet their requirements in the best possible manner.

www.medek.at
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H2Max Partnership
Hitachi Cable Manchester (HCM), Manchester, NH, USA, and HellermannTyton, Milwaukee, WI, USA, have partnered to form H2Max, a new end-to-end solution offering high-performance network infrastructure solutions. H2Max solutions include the connective devices of HellermannTyton and communications cables of HCM. Both copper and fiber optic-based solutions are available.

Copper solutions include Category 6A, Category 6+, Category 6, Category 5e+ and fiber optic solutions including a 10 Gigabit fiber optic solution.

The H2Max program offers a performance guarantee, third party verification, lifetime warranty and end-to-end support featuring knowledgeable, personalized assistance. A contractor certification program is offered and tailored to the needs of each contracting company. In addition, contractors can qualify for an H2Max rewards program, based on purchases of products from HCM and HellermannTyton.

The H2Max family of network cabling solutions has been designed to offer its users exceptional performance with the value that is increasingly important in today’s economic times.

With H2Max end-to-end solution, selecting, installing and guaranteeing the performance of a network infrastructure is an easy task. HellermannTyton and Hitachi Cable Manchester have stated that together they provide a level of customer service that is personal, on the spot and committed to the success of each customer.

www.h2maxsolutions.com
www.hcm.hitachi.com
www.hellermann.tyton.com

HellermannTyton & HCM Introduce H2Max Partnership

Jersey Strand and Cable Announces New Sales Manager
Jersey Strand and Cable Inc., located in Phillipsburg, NJ, USA, recently announced a significant addition to its sales management staff. Jerry Lowry has come to the company with more than 20 years of Executive Sales Management experience in the industrial market place.

As Vice President and General Manager in his previous position, Lowry’s background highlights a keen awareness and dedication to customer excellence. Jersey Strand and Cable Inc. says that Lowry’s attention to detail and focus on customer needs follows the path of the company’s continuous approach to “Creating partnerships through advanced products and services”.

www.jerseystrandandcable.com

Bodie Spangler

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Hayata Hires New National Sales Manager

Hayata, Ltd., located in Dallas, TX, USA, a manufacturer of high-quality, stainless steel cable ties and banding, has announced the appointment of Bodie Spangler as its new National Sales Manager. In this role, Spangler will be charged with leading all facets of USA business development including strategic planning, new market segments and the management of existing clients.

Hayata, Ltd. Founder and President, Tom Crouch, commented, “Spangler’s depth of experience, dynamic character and Naval background will be an enormous asset in guiding Hayata, Ltd. towards achieving its future growth goals.”

Spangler brings to Hayata 15 years of executive sales and marketing experience.

www.hayata.com

Zierick Wins PMA Design & Engineering Award

Zierick Manufacturing Corporation, Mt. Kisco, NY, USA, has been named the 2009 recipient of the Higgins-Caditz Award presented by the Precision Metalforming Association in its annual “Awards of Excellence in Metalforming” competition. The honor provides global recognition of Zierick's new metal-stamping-based system that connects wires to surface mount printed circuit boards.

The Higgins-Caditz Award is well-known as the metalforming industry’s highest recognition of design and engineering excellence. Creative and effective product design, originality and appreciable cost savings are other parameters used to choose the award’s recipient.

The Worcester Pressed Steel Co., Worcester, MA, USA, created the Higgins award in 1955 in memory of founder John Woodman Higgins and former PMA Chairman, Carter C. Higgins. The award now is sponsored by The Quarterly Club, in memory of its founder and past PMA chairman, Clem Caditz.

Zierick metal-stamping-based system connects wires to surface mount PC boards.

Zierick, now celebrating its 90th year in business, was honored for its new Surface Mount Insulation Piercing Crimp Terminal and the tools that quickly and easily terminate a wire to Surface Mount printed circuit boards. This new terminal and tool system features many advantages including reduced production costs, improved reliability and faster processing speeds. Zierick's solution combines the advantages of crimping, insulation piercing and surface mount technology into a highly reliable and economical way to terminate wires.

www.zierick.com

Allied Wire & Cable Adds Four New Sales Reps

According to Allied Wire & Cable, Collegeville, PA, USA, for most Americans, the recession today more closely resembles stories read in a textbook than moments actually lived. Companies are slashing jobs to make their profit statements look good. A family owned and operated business, Allied understands the importance of keeping more in mind than just the bottom line. Allied Wire and Cable believes that during times of great need, it should reach out and help those around it.

With this in mind, the company has announced the hiring of four new sales representatives to be located in the USA states of Pennsylvania, Alabama and New Hampshire. The company introduces Mike Autry, Chuck Crane, David Smith and Ben Ficken as the newest additions to the Allied family.

Autry has been in the wire and cable industry for over eight years, working exclusively with SEA Wire and Cable. While with SEA, he was the salesmen of the year in 2005 and 2007, during which he broke a 38 year-old sales record. Based in Madison, AL, USA, Autry’s added presence will increase the support available to Allied’s customers in the southern region of the country.

Crate has been in the connectors and accessories side of the electrical and electronics industry for 21 years, all of which he spent with Molex. He most recently held the title of District Sales Manager for the mid-Atlantic and northeast region as well as them position of Distribution Corporate Accounts Manager.

Crate’s experience in the industry will broaden Allied’s ability to serve our customers’ termination requirements.

Smith will be joining his sister Ashley in the Pennsylvania office to form the first sibling sales team since the Flynn brothers first founded Allied. Although he is new to the wire and cable industry, he has worked in sales for several years, most recently in the food service and apparel industries.

Ficken will be joining the Merrimack, NH, USA office. He is new to the wire and cable industry, but has over five years of sales experience in the IT industry, having sold business-to-business software and hardware.

Today, Allied Wire & Cable is among the largest privately owned value-added manufacturers and distributors of electrical wire and cable products and accessories in the USA.

www.awcwire.com
Attend the
NATION’S LARGEST
Dedicated Wire Processing Event!

Network with the Industry in Milwaukee in May!

Use any of these for manufacturing?

- Cutting & Stripping Machines
- Crimping Machines
- Cable Assemblies
- Connectors & Accessories
- Wire Soldering Equipment
- Electronics

This show is for you!

May 20 & 21, 2009
Midwest Airlines Center
Milwaukee, Wisconsin

FREE ADMISSION! 800-367-5520 www.electricalwireshow.com
When faced with global competition, there is a greater need for manufacturing professionals to consult experts and network with their peers to learn about new solutions and efficient new products. In 2009 and beyond, the wire processing industry will have to compete more intensely than ever before to keep companies operating efficiently and profitably.

The National Electrical Wire Processing Technology Expo, being held from May 20 to 21, 2009, at the Midwest Airlines Center in Milwaukee, WI, USA, will conduct technical seminars that run concurrently with show hours, providing attendees with focused information that can positively impact their competitive edge.

Celebrating nine years as the nation’s largest dedicated wire processing event, the National Electrical Wire Processing Technology Expo features new products and services for electronic cable assemblies, cord sets, wiring harnesses and other products within the wire processing industry.

Expo attendees consist of key buyers from manufacturing industry including:
- Aeronautical & Aerospace
- Automotive
- Computer & Related Equipment
- Household Appliances
- Telecommunications
- Industrial Equipment
- Medical Equipment
- Motors & Generators
- Scientific & Other Instruments

Expo attendees will have the opportunity to meet more than 100 world-class suppliers and service companies in the wire and cable processing industry as well as discover best practice applications to solve wire-processing problems.

Seminars of Interest to Wire Processing Professionals

The seminars that will be presented at the National Electrical Wire Processing Technology Expo have been developed by top industry experts to address the pressing issues faced by manufacturing today. Whereas other shows charge for seminars of this quality, the seminars being offered at the National Electrical Wire Processing Technology Expo are free after admission to the Expo and are presented by authorities that are experts in their field. Nearly a year of research and planning has gone into the development of the seminar schedule to ensure that the topics are timely and of benefit to Expo attendees.

Additionally, certificates will be awarded to participants that complete a seminar. These Certificates of Completion are appropriate for sending to societies or associations that grant continuing education credits for their membership.

Seminar Schedule

Wednesday, May 20, 2009
8:30 AM – 9:30 AM
Understanding Automotive Terminal Technology
by Jim Pasquale of TTI Inc.

10:30 AM – 11:30 AM
Continuity Testing Solutions – Ensure Reliable Wire Assemblies
by Wayne Hunter of Hale Manufacturing

12:30 PM – 1:30 PM
Using Color-Changing Smart Materials to Detect Wire, Cable & Connector Hazards
by Walt Ogrodnik of HazardGuard Safety Wire

Thursday, May 21, 2009
8:30 AM – 9:30 AM
Why OEMs Now Ask the Cabling Industry for RoHS Verification
by Joe Langton of Intertek-CMS

Continued...
10:30 AM – 11:30 AM  
**Cost & Quality Advantages of Splice Crimping vs Hand Soldering**  
by John Szczepanski of KM USA

12:30 PM – 1:30 PM  
**Lean Ideas for Wire Harness Companies**  
by Ray Sweeney of Unlimited Services of Wisconsin  
*(schedule subject to change without notice)*

### Exhibits & Registration

Exhibits at the National Electrical Wire Processing Technology Expo will be open to the public on Wednesday, May 20 from 9:00 AM until 4:00 PM, and on Thursday, May 21, from 9:00 AM until 3:00 PM at the Midwest Airlines Center.

Registration at the door will be US$15.00, which is good for both days of the Expo. Admission is free with an advertisement clipped from a trade magazine or newspaper, or with a pre-registration ticket provided by any one of the Expo exhibitors.

Free registration is also provided on-line by visiting the National Electrical Wire Processing Technology Expo website listed below. The website also provides detailed information on the seminars and workshops.  
www.electricalwireshow.com

### While at the Expo...

Additional attractions that can be found in Milwaukee during the National Electrical Wire Processing Technology Expo include the following attractions and entertainment venues:

- **The Potawatomi Bingo Casino** just minutes from downtown.
- **Harley-Davidson Motor Co.** in Wauwatosa, WI, USA.
- **Milwaukee Public Museum** with walk-through exhibits.
- **Milwaukee Art Museum** art, dramatic architecture and landscape design.
- **Milwaukee Brewers Baseball** at Miller Park.
- **MillerCoors™** Miller Brewery Tours.  
  *(Source: Show Management)*

### National Electrical Wire Processing Technology Expo  
Exhibitor Listings & Descriptions as of April 6, 2009:

- **3M** Booth 1713  
  Exhibited: 3M Premium vinyl electrical tapes, wire connectors, heat shrink tubing, cable ties, wiremarking, terminals, static control products, electronic cables and connectors and safety products.

- **Advanced Cable Ties Inc.** Booth 1249  
  Exhibited: Cable ties and accessories, wire management products, cable tie installation and removal tools.

- **AmTech International** Booth 1703  
  Exhibited: Supplier of transmission gears, shafts, machined parts and assemblies to many of the leading OEM companies around the world.

- **AmTech/Branson Ultrasonics Corp.** Booth 1132  
  AmTech Ultrasonic metal welding and wire splicing.

- **AMTI - Division of Maxant Inc.** Booth 1119  

- **Anixter** Booth 1604  
  Wire, cable, connectors, tubing, supply chain services. Vendors include Belden, Alpha, Lapp, Copperfield, Southwire, Coleman. Anixter also stocks fasteners, security products and network infrastructure.

- **Apollo Seiko USA** Booth 1715  
  Selective soldering robot, Laser wire stripper, Portage electric thermostats and Autom splice splicing machines.

- **Application Tooling Solutions** Booth n/a  
  Application tooling for crimping, stripping and processing wire and terminals includes mini applicators, bench terminating machine, cutting and stripping machines and automatic machines.

- **Applitek Technologies Corp.** Booth 1303  
  Part of Tri-Tech Kodera Sales, company offers wire processing equipment.

- **Artos Engineering** Booth 1103  
  Wire processing equipment for bench top strippers, crimpers and cutters to complete full process equipment including termination. Artos also provides many specialized process equipment items.

- **Assembly Resources** Booth 1300  
  Solder tips, benches, chairs, assembly equipment, and solder stations.

- **Brady Corporation** Booth 1409  
  Portable printers, high-performance labels, benchtop printers, printable sleeves and automated wire labeler.

- **Breyden Products Inc.** Booth 1737  
  A leading manufacturer of lacing tapes and cords used in the electric motor industry.

- **C Davis Systems** Booth 1440  
  Crimping machines, automated feed crimpers, seal plug, inserting machines and wire processing machines.
Carpenter Mfg. Co. Inc.  
Booth 1413  
Benchtop automatic/semi-automatic processors for wire, flat cable, coaxial, magnet wire, multi-conductor and tubing. Pneumatic equipment designed for discrete wire crimping and wire strippers for hook-up and large diameter cables.

Cembre Inc.  
Booth 1507  
Cembre crimping and cutting tools, identification and labeling products and associated electrical connectors.

Chad Industries  
Booth 1616  
Portable machine that significantly improves wire harness assembly. The HarnessMate uses laser light to guide wire placement, increasing accuracy and speeding production. Functions on benchtop, layout board and more.

Cirris Systems Corp.  
Booth 1627  
Cable and harness testers. Signature 1100 Rt, Ht, Touch/easy-wire Cr, Ch.

CK Technologies Inc.  
Booth 1344  
Systems for cable testing, harness testing, backplane testing and printed wiring device testing.

Clinton Instrument Co.  
Booth 1506  
Clinton Instrument Co., offers park test equipment for wire and cable.

Model HF-15AC/BD-12 with X3A from Clinton Instrument.

Commission Brokers Inc.  
Booth 1727  
Photos and brochures of currently available used machinery as well as information pertaining to liquidation and appraisal capabilities. Over 40 years experience in the wire and cable industry.

Composite & Wire Machinery Inc.  
Booth 1719  
Composite & Wire braiding machines and parts.

Connector Microtooling Sys. Inc.  
Booth 1442  
Specializes in connector assembly and service tooling. Stocking and distributing Astro, Ideal, Steinel, Tyco, Raychem and many others.

Control Micro Systems Inc.  Booth 1441  Laser wire cutting systems.

Control Systemation / Control Laser  Booth 1100  WireMaster laser wire stripper.

Crimping & Stamping Technologies  Booth 1403  Crimp force monitors, crimp cross sectioning, pull testers and press analyzer.

Daniels Manufacturing Corp. (DMC)  Booth 1515  DMC crimp tools, DMC pneumatic crimp tools, DMC battery crimp tools, beta backshell assembly tools and alphatron wire crimp pull testers.

Diamond Die & Mold Co.  Booth 1304  Terminating equipment for the wire industry including diamond presses, applicators and perishable tooling.

DIT-MCO International  Booth 1128  Special Products Group (SPG), a division of DIT-MCO International, produces specialized, high-quality cable and harness assemblies and special adaptation fixtures.

DSG-Canusa  Booth 1200  Heat shrink products.

Dunbar / LG Cable  Booth 1126  LG heat shrinkable tubing, Dunbar APS (advanced printing system).

DuPage Tying Solutions  Booth 1613  ACE dereelers, payoffs, prefeeders, respooler and coil winder Bedford Technology, Plast-Ties and Tach-It twist tie machines, Felins string tying machines and banders and Start and Tach-It tape dispensers.

Dynalab Test Systems  Booth 1541  NX wire harness testers, low voltage and hipot.

ECC  Booth 1731  Continuity test fixtures for any connector, locking fixtures, push test fixtures, wire routing products to facilitate harness build and test.

Electric Motion Company Inc.  Booth 1705  Producer of bonding and grounding hardware for utilities.

Electro Insulation Corp.  Booth 1407  Electrical/electronic insulating materials. Services include tubing, cutting and printing, kitting, spooling, bundling, custom tape sitting, custom packaging, bar code printing and medical grate packaging.

Eraser Company Inc., The  Booth 1241  Wide range of industrial products including wire, cable and tubing cutters, wire and cable strippers, twisters, wire brush wheels, infrared heating equipment and measuring tools.

ETCO Inc.  Booth 1217  Wire processing equipment & machinery from benchtop presses, mini applicators to turn key automated systems.

Eubanks / Cablescan  Booth 1116  Wire strippers, markers, prefeeds and blades. Cablescan harness testers, high-voltage/low-voltage cable testers.

Global Automation Inc.  Booth 1607  Soldering robots, welding station and welding systems.

Grayline Inc.  Booth 1618  Flexible polymer tubing used in wiring harness and electrical equipment including heat shrinkable tubing.

Grayline has made flexible tubing for electrical wiring harnesses for over 40 years. Products include heat shrinkable PVC and Polyolefin, and nonheat shrinkable PVC, Polyurethane and many other polymeric materials. Grayline has also developed both Phthalate-free and Halogen-free PVC product lines.

Hale Manufacturing Inc.  Booth 1346  Custom designed continuity testing fixtures.

HazardGuard Safety Wire Inc.  Booth 1101  Color-changing electrical safety products like spiral tubing, wire/cable clips, cable ties, hook-up wires, plugs, labels.


Heyco Products Inc.  Booth 1546  Heyco quick disconnect terminals, ring/space terminals, blades and ground pins.
Heyco’s new self-locking Ratchet Strain Relief is designed for multiple wire strain relief applications.

Ideal Industries Inc.  Booth 1709
Wire stripping products (hand and bench).

Imprex Inc.  Booth 1547
Plastic resin impregnation sealing services using Seal Flex or Seal Flex 2.

Industrial Electric Wire & Cable  Booth 1502
Wire, cable and wire management products.

ITW / Ark-Les  Booth 1306
ITW / Ark-Les Corp. - Connector business unit. Terminals solderless-crimpable, splice terminal wire. IDC bullet-style, custom connectors system, custom stamping.

Joyal, A Division of AWE Inc.  Booth 1504
Commutator fusing and brazing systems, magnet wire and lead wire fusing systems, thermal crimp fusing systems.

Kingsley Machine Co.  Booth 1316
Specializing in hot stamp, laser, ink jet and thermal transfer wire and sleeve marking systems.

KM USA / SM Contact  Booth 1417
Complete line of wire processing equipment including applicators, presses cut and strip machines, automated termaining machines, hose cutters, battery cable cutters and coax cable cut and strip.

Komax Corp.  Booth 1127
Wire processing equipment: cut, cut-and-strip, crimping, marking, automatic crimp and automation machines.

Lakes Precision Inc.  Booth 1302
Wire processing blades and accessories, crimp tooling, PVD coating services, EDM Grinding machine center sub contract and manufacturing.

Lapp Tannehill  Booth 1612
Lapp Tannehill is a wire and cable distributor. Catalogs, wire, cable, tubing and cord sets. Brand Names: Raychem/ Tyco Electronics, Lapp, Panduit, Alpha Wire, Dearborn/...
Exhibits & Seminars Present New Wire Processing Products & Solutions ...Continued

CDT, Harbour Industries.
Lininus Technologies GmbH  Booth 1501
CAD-software for wire harness design.
Lone Star Industrial  Booth 1205
Spring test probes.
Marsh Electronics Inc.  Booth 1603
Distributor of electromechanical components and value added services.
Master Appliance Corp.  Booth 1503
Mecal by Starn  Booth 1144
Mecal wire dies and components made by Starn Tool.
Mechtrix Corporation  Booth 1313
Stripping blades, benchstrippers, prefeeders, center-stripping equipment and applicators.
Mello Company, The  Booth 1114
Wire twisting machines (Stormtronics), wire spool racks (Multi-Rack).
Mentor Graphics  Booth 1317
Wire harness design and engineer software.
Milwaukee SPE  Booth 1343
The Milwaukee Society of Plastics Engineers (Milwaukee SPE) is a nonprofit organization. Its goals are education for its members, colleges and universities as well as public and private schools K–12. The Milwaukee SPE provides relationships and fun for its members and all schools.

Minnesota Wire  Booth 1505
Vertically integrated custom manufacturing and development house for wire, cable and interconnect assemblies to the medical, defense and commercial industries.
Multi/Cable Corp.  Booth 1341
Custom manufactured wire and cable.
National Plastics & Seals Inc.  Booth 1608
Heat-shrink tubing, marked heat-shrink tubing, heat guns, insulation sleeving, convoluted tubing, solder termination sleeves, rubber O-rings and plastic machined parts.
New England Wire Technologies  Booth 1708
Specialty wire and cable manufacturer.
Odyssey Tool LLC  Booth 1130
Applicator dies, custom dies, heavy-duty crimping dies, custom tooling, perisable tooling, custom hand tools, custom applications for automated or offline applications.
OES Inc.  Booth 1207
In-process monitoring and inspection systems for wire processing quality assurance: CFM4000, CFM2000, LPA56-B and PBT Sensor.
Phoenix Contact  Booth 1602
Electrical/electronic terminal blocks.
Premier Metals Recycling Inc.  Booth 1729
Nonferrous scrap metal purchasing. Insulated copper and aluminum wire chopping.
Pressmaster  Booth 1711
Crimping, stripping and cutting hand tools.
Quality Systems Integrated  Booth 1646
Circuit boards.
Quick Cable Corp.  Booth 1543
Offered are battery cable crimping and processing tools, hex crimp, quick strips, Quickcutter, Quick Strip Pro and battery cable assemblies.
Radix Wire Co.  Booth 1106
Radix Wire is a manufacturer of high-temperature wire and cable. On display will be Duraflex 550c and Durablend silicone wire.
Rennsteig Tools Inc.  Booth 1347
Cutting, stripping and crimping tools.
Schafer Megomat USA Inc.  Booth 1111
Schafer Megomat offers wire processing machines and accessory equipment.
Schleuniger Inc.  Booth 1633
Schleuniger wire processing and sealing equipment.
ShinMaywa (America) Ltd.  Booth 1121
ShinMaywa fully automated wire processing machines, tinning and seals applications.
SLE Electronics USA Inc.  Booth 1213
Crimp force monitors, electrical testing table, SBL3000 microab, SLE presses and Ondal tapping machines.
Sonics & Materials Inc.  Booth 1723
Ultrasonic metal, wire & plastics welding systems.
Sonobond Ultrasonics  Booth 1513
Ultrasonic welding/wire splicing.
Southwire Company - OEM Div.  Booth 1120
Past - wire and cable: McCable - building wire, Romex Simpull - cord - OEM applications.

Our goals are education for our members, local k-12 schools, colleges, and universities... relationships and fun.

www.milwaukeespe.org

Multicrimp tool from Rennsteig Tools Inc.
Sonic's 20 kHz Ultrasonic Metal Welding System.

**Spectrum Technologies**  
Booth 1340  
Capris 50-100 laser wire marker and Sienna laser wire strippers.

**Spirig Advanced Technologies Inc.**  
Booth 1110  
High-speed microflame wire processing and soldering.

**Stapla Ultrasonic Corp.**  
Booth 1640  
Wire splicing, spot and terminating welders.

**Start International**  
Booth 1540  
Tape dispensers and label dispensers. TheTapeDispenser, TheLabelDispenser, Cyli-Size.

**Steinel**  
Booth 1209  
Steinel heat tools (heat blowers, heat guns, soldering irons, glue gun and torches).

**Sterling Wire & Cable**  
Booth 1739  
Stocking distributor of wire, cable and harness management products.

**Stranco Products**  
Booth 1508  
Stocking distributor of electrical insulation, adhesives, heat shrink tubing, fiberglass sleeving, harness supplies, wire, cable, Tyco/Rachem, ASI, Grayline, Sofanou, Avery-Dennison, Zipertubing and Federal-Mogal. Services include cutting, marking, kitting and JIT capabilities.

**Taymer International Inc.**  
Booth 1247  
Hot stamp wire marker, continuous wire marker, length measurement, laser wire marker, ink jet marking systems and hot foil wire markers.

**Techflex Inc**  
Booth 1447  
Sleevng.

**Tri-Tech/Kodera Machine Sales Ltd.**  
Booth 1303  
Machines to measure, cut, strip, crimp, hot stamp and ink jet print on electric wire. Brand names will be Kodera, Kingsley & VideoJet.

**TSR**  
Booth 1141  
Makfil line of cut, strip and terminate machines along with company's heavy wire cut and strip machines, Mecal by Starn miniapplicators presses and stripper attachments, Cobra braiding machines, Feintechnik Coax stripping machines & benchtop strippers.

**TTI Inc.**  
Booth 1136  
Connectors, harnesses and literature from Delphi connect system.

**Tyco Electronics**  
Booth 1619  
Wire processing equipment will include applicators, bench terminators and lead markers.

**Unified Wire & Cable Inc.**  
Booth 1721  
Electrical lead wire and hook-up wire.

**US Tech**  
Booth 1142  
Publication.

**Wardell Braiding Machine Co.**  
Booth 1706  
Wardell horizontal harness braider.

**WEETECH Inc.**  
Booth 1600  
Weetech cable test equipment, harness test equipment, backplane test equipment and functional test equipment.

**Weag Tools Inc.**  
Booth 1102  
Product range from service hand tools to professional tools for wire processing industry; hand crimp tools, insertion/removal tools, tools for IDC termination, cable cutting and wire stripping tools, battery and bench top electric machines.

**WHMA**  
Booth 1445  
The Wire Harness Manufacturers Association (WHMA) provides a variety of services and products for the wiring harness industry.

**Wire & Cable Technology International**  
Booth 1545  
Wire & Cable Connector editorial section of Wire & Cable Technology International magazine. Magazine published six times per year offers coverage of wire and cable manufacturing, processing and use. Annual Wire & Cable Technology International Buyers’ Guide will also be available.

**Wiring Harness News**  
Booth 1322  
Wiring Harness News, which serves the wire, cable, and fiber optic processors.

**Z&F USA Inc.**  
Booth 1122  
Z&F USA Inc. provides wire ferrules, stripping and crimping machines and tools.
Ultrasonic Welding of Wire Bundles up to 100 mm$^2$

Sonobond Ultrasonics, located in West Chester, PA, USA, a company that has been a leader in ultrasonic metal welding technology since 1960, is introducing its Dual Head SpliceRite™ Ultrasonic Wire Splicer at the National Electrical Wire Processing Technology Expo in Milwaukee, WI, USA, May 20 to 21, 2009. This new machine represents a significant breakthrough in ultrasonic wire splicing technology. Like the current SpliceRite™ Ultrasonic Wire Splicer, this unit accommodates tinned or heavily oxidized wires that can otherwise stall the welding process. However, the breakthrough is the ability of the Dual Head SpliceRite Ultrasonic Splicer to weld wire bundles that have cross-sectional areas of up to 100 mm$^2$.

No other ultrasonic bonder can equal this capacity in a single hit. This makes the Dual Head SpliceRite suitable for applications involving heavy-duty cables for cars, trucks and industrial machinery. The dual-headed welder from Sonobond Ultrasonics, with appropriate tooling, has also extended the capacity of ultrasonic welding to weld multiple layers of foils for batteries.

**Dual Head Technology**

As the name suggests, the new Sonobond wire splicer has two welding heads, one on each side of the weld area. This increases the welding capacity, enabling larger wire bundles to be spliced quickly and in one step. The resulting welds have low voltage drop.

The ultrasonic welding process creates solid-state metallurgical bonds without producing arcs, sparks or fumes and without melting wires. Ultrasonic technology eliminates any need for filler metal materials or for clipping, soldering, crimping or dipping.

The new Dual Head SpliceRite Ultrasonic Wire Splicer has a microprocessor controller with the ability to store and recall up to 250 jobs. It can control welds by height, by energy or by time. The unit comes with a 3500-W power supply.

**Uses the Patented Wedge-Reed System**

The Dual Head SpliceRite Ultrasonic Wire Splicer—like other Sonobond metal welders—utilizes the patented Wedge-Reed system. This system combines high vibratory force with low amplitude coupling. It enables the unit to direct high-frequency ultrasonic energy via welding tips to the wires to be welded. The vibratory energy disperses the oxides and surface films between the wires. A true metallurgical bond is then created without melting the materials. This process is environmentally friendly, produces no waste and consumes a minimum of energy.
All Sonobond Ultrasonics’ metal welding machines feature heat-treated, tool steel taper lock tips. These tips are designed to last for as many as 100,000 welds. These tips also permit quick tooling changes as well as fail-proof placement.

Sonobond Ultrasonic welding units also provide the additional benefit of being easy to operate with only minimal training.

**Expo Attendees Can See the New Machine**
The attendees at the National Electrical Wire Processing Technology Expo are encouraged to pay a visit to Sonobond Ultrasonics in Booth 1513 in order to discuss the merits of the Dual Head SpliceRite Ultrasonic Wire Splicer.

This new technology is another example of Sonobond Ultrasonic’s continuing commitment to the wiring industry. The Dual Head SpliceRite successfully accommodates wire bundles much larger than other ultrasonic bonders can handle, and can be used even when wires are tinned or heavily oxidized. Visitors to the Sonobond Ultrasonics Booth will find that Sonobond is second to none in providing customized solutions that are backed by truly exceptional customer support.

**A Record of Pioneering Accomplishment**
Sonobond Ultrasonics is a worldwide leader in the application of ultrasonic welding and bonding technology. In 1960, Sonobond Ultrasonics—then known as Aeroprojects—received the first patent ever awarded for ultrasonic metal welding.

During the intervening 49 years, Sonobond Ultrasonics has earned an outstanding reputation for its pioneering work and quality-engineered products.

Today Sonobond Ultrasonics manufactures a complete line of ultrasonic bonding and welding equipment for a wide variety of customers in the electrical, automotive, appliance, HVAC, aerospace, filtration, medical and apparel industries.

To learn more about the Dual Head SpliceRite, visit Booth 1513 at the Expo or visit the company’s website at www.SonobondUltrasonics.com.
The Reality of Crimp Force Monitoring — Part 2

Rob Boyd, Crimping Product Manager
Schleuniger Inc.
www.schleuniger.com

Part 1 of this article reviewed the basic construction, concepts and method of use of crimp force monitors (CFMs). In Part 2, we explore the complete CFM system including materials, aspects of crimp head room, applicators, presses, machines and operator considerations.

The Complete System

Before any CFM system can be used, the process or system has to be stable. By “the system”, I mean all factors that come into play when using CFMs. When there is a challenging situation involving a CFM, most will only consider the wire, the terminal and the resulting crimp. The crimp might appear to be fine but the CFM has identified it as defective. Many other quality metrics (e.g., crimp height, crimp width, brush length, etc.) only involve one parameter. But there are many more factors to consider including the terminals, wire, application head room, the applicator, the press and the operator or machine and finally the CFM’s tolerance parameters. Each of these can affect the resulting crimp curve and all play a part in the resulting forces that the CFM inevitably “sees”. Unfortunately, the CFM cannot isolate specific variable(s) to analyze. In other words, it can’t pay attention to some and ignore others and sees them all as a whole. Therefore, the entire system must yield consistent forces for the CFM to work properly.

Materials: Wire & Terminals

Sometimes paying less for materials can cost more on the production floor. Material quality must be consistent. Terminals. There are a number of factors that contribute to terminal quality. For instance, variations in material stock thickness will cause variations that the CFMs might detect. Variations in material stock thickness are to be expected to a degree and are usually not the main culprit. But it is easy to imagine how these variations, if extreme, will adversely affect the ability for the CFM to do its job correctly.

I have also witnessed cases where a customer used a lower cost terminal that did not perform well in the applicator. The applicator was working as it should be, but the positioning of the terminals over the anvil was inconsistent because of the terminal quality. A similar terminal from a different manufacturer, although slightly more expensive, proved much more consistent and solved the problem.

Terminal material may also play a role in how much variation the CFM sees. Gold contacts typically show more variation than the same contact in another material. Gold is softer and softer materials will exhibit greater variation in forces. This is also the reason why CFMs cannot be used on most applications involving pre-insulated terminals. The plastic insulation is too soft and exhibits too much variation.

Using oil on contacts also adds a variable. Although oil doesn’t cause too many problems when production is running at a normal pace, operators might see a higher rate of errors immediately after returning from a break. This is because the oil on the terminals between the anvil and the oiler has dried slightly so the forces will be different.

Improper care of terminals on the spools is another culprit of problems. The way in which the terminals are stored on the spool will affect the way in which the terminals are presented to the applicator. If terminals enter the applicator at odd angles, the crimp forces can be affected. In the example in Figure 9, the terminals have not been well cared for. The different angle will cause variations in forces. Terminals entering the applicator properly can improve positioning over the anvil and terminal feed.

Similarly, light side-feed terminals may also get angled slightly during the feeding process if the track is not adjusted properly. Once again, you might be in a situation where the crimp looks fine, but the way in which it was put on the wire (i.e., straight vs. angled terminal) was different. So the CFM may identify it incorrectly.

Wire. Nonconcentric wire, as most of us know, will lead to stripping issues. Also, some insulation materials will adhere to the strands and cause stripping problems. If the insulation concentricity or adhesion is not consistent, a problem may be even harder to isolate. However, the CFM can detect variations in the force curve when strands have been nicked or cut easier than we will see the problem with the naked eye. These errors frequently can’t be seen after the crimp has occurred.

The number of strands in a wire also points to the question of whether or not the CFM can detect one strand out. One strand in a seven-strand wire will have...
a much larger impact on the force of a crimp than one strand of a 41-strand wire. So if the CFM can see one strand out of a seven-strand wire, two or three strands may need to be out for a 41-strand wire.

**Wire & Terminal Combination.** We all know this is not a perfect world. We know that there are cases where your customer has specified a terminal that is a little too large for the wire. For instance, it will be more difficult to monitor a 24 AWG wire crimped into a terminal that is rated for 24 AWG to 20 AWG, than it is to monitor the same wire crimped into a similar terminal rated for 24 AWG to 28 AWG.

However, when the wire is small in relation to the terminal wire placement can be a critical issue. The operator may only see that the terminal is crimped on the end of the wire, but the CFM may be seeing significantly different forces. **Figure 10** shows cross-sectional pictures of two consecutive crimps in which the wire is undersized for the terminal. The strands of the wire end up in different areas of the crimped terminal which may result in different forces. This is a case where it might be difficult to use a CFM.

In general, traditional CFMs are most affective for applications of 24 AWG and larger. Smaller applications can be difficult. Many of the factors I will discuss in the coming sections play a part, but the primary reason is that the forces related to just crimping the terminal onto the wire are too low compared to the other forces involved. In some cases, it is possible to detect 26 AWG applications, but the smaller the application the more important it is to have a good head room and an applicator that is in good condition.

**Head Room.** The head room of a crimp is the difference in crimping forces when the wire is present and when the wire is not present. This concept plays a large part in answering the question, “Can the CFM detect one strand out?” **Figure 11** shows a 16 AWG wire application. The difference in force with and without the wire is approximately 47%. So roughly speaking, each strand of a seven-strand wire is will contribute about 6.7% of the force. If it were a 19-strand wire, each strand would contribute roughly 2.5%. It is not exactly like this, but it is a decent approximation. However, if you are using tolerance parameters of ±4%, you should pick up one strand out on a seven-strand wire, but not on a 19-strand wire.

In the example in **Figure 12**, the peak force of the curve drops by only 26% so the affect of the wire on the overall force of the crimp is not nearly as much. In this case, each strand of a seven-strand wire will affect the force by roughly 3.7%; only 1.4% for a 19-strand wire. It is easy to see that if we use the same tolerances of ±4%, the CFM will probably not see a crimp with one strand out as a defect. Some applications have a head room of 8% or 10%. These applications will be very difficult to work with because the majority of the force is just to crimp the terminal.

**Applicators.** Applicator quality plays a very big role in CFM effectiveness. An applicator that is in bad condition can introduce variation that the CFM will see. For example, I ran tests using two different applicators for the same wire and terminal on the same automatic machine. The wire was a 16 AWG bare copper and the terminal was a rear-feed, brass quick-disconnect; crimp heights and widths were identical. **Figure 13** and **Figure 14** (on next page) show that the resulting crimps from the two applicators are very similar. But the older applicator yielded a Cpk value of 0.65 and the newer applicator yielded a Cpk of 1.20. Although both values are not good, there is clearly a difference considering the same wire and terminals were used. **Figure 13** (next page) shows crimp results from the new applicator that yielded a Cpk of 1.20. **Figure 14** shows crimp results from the older applicator that yielded 0.65 Cpk. There is more consistency in the crimp in **Figure 13**. The CFM will be able to detect more of what is happening in the crimp itself because the applicator is not introducing additional variation.

Although the crimp may look fine from the outside the CFM can see defects because the forces are varying. The biggest contributors to this problem are applicator age and lack of proper maintenance. Over time, applicators will wear out. Noise on the crimp curve can
be introduced by any of the following: a ram that does not slide smoothly, worn tooling, inconsistent feed or inconsistent bell-mouth position. These issues might not be perceptible by a quick glance at the resulting crimp, but the CFM will see variation.

Sometimes an applicator has to “settle” after an adjustment or after new tooling has been installed. After the teach-in process, the forces may continue to drop. Therefore, the CFM quickly starts to register bad parts when they seem good. The reason is that the applicator needed to settle into the new adjustment. Once it settles in force measurements will be consistent but it can be frustrating to operators.

Additionally, CFMs can help in protecting your applicator investment. Sometimes it doesn’t take many missed crimps to crack a die or anvil. The first missed crimp that gets stuck in the die will not affect the tooling. However, on automatic machines without CFMs one missed crimp can quickly become five or six. CFMs will see these significant variations in force and might stop the machine before any tooling is damaged. Depending on the circumstances they might quickly pay for themselves in tooling cost savings.

The best solution for this is a regular maintenance plan for your applicators. I strongly recommend that anyone considering implementing CFMs should consider the age and quality of their tooling. This is especially true if purchasing a new piece of automatic equipment regardless of the brand. Putting old, worn-out applicators on a new machine is like putting old tires on a new Corvette. You simply won’t be able to get the optimal performance from the machine.

Presses. To use a CFM, the press has to have consistency in speed and shut height as well as be very rigid. The primary concern is with the older presses that many customers use. Many of the older presses are not rigid enough for use with a CFM. However, presses manufactured in the last five to 10 years are typically fine, provided they are in good condition.

Operator/Machine. In both cases, the key is wire placement. Inconsistent wire placement can cause problems with force curves in some applications. This is especially true of the depth of insertion. New operators or machines in poor condition may have issues with wire position.

Fig. 13 — Crimp results from the new applicator that yielded a Cpk of 1.20.

Fig. 14 — Crimp results from the older applicator that yielded a Cpk of 0.65.

Conclusion

When used properly, CFMs can be a tremendous asset on any production floor. They can save you considerable amounts of money in tooling and scrap costs. They might also allow you to use lower skilled labor on certain applications. CFMs will help you better understand the process and might even identify some problem areas. This might be seen as either a pro or a con depending on the situation. Because the CFMs look at the complete system, using them might require you to improve quality in other areas like applicator maintenance or material quality. Finally, it is something you can sell to your customers. Quality monitoring is always seen as a positive.

However the factors need to be considered. For new users, there can be a long learning curve. It’s important that there be at least one key person and that this person be thoroughly trained. Proper training is extremely important. They must also be willing to take the time to really understand the best way to utilize the CFMs. Users must understand that there are many components to the system and that the CFM can not analyze certain variables and ignore others. CFMs will look at variation of the entire process, which includes the wire, terminals, applicators, operators and machines. Because of this, not all applications are considered equal. Make sure that your equipment is well maintained and that you are getting consistent quality from your materials. Although there can be challenges, when used properly, there are many positive benefits of using CFMs for those who understand them thoroughly.

www.schleuniger.com

The author thanks Verena Behrmann, KMF Messtechnik GmbH, Michael Reeve, OES Inc.; Erich Moeri, Komax USA; and Enrique Duarte, SLE USA for help in writing this article.
**IWCS & IICIT Issue**

**2009 Call for Papers**

The International Wire and Cable Symposium (IWCS), Eatontown, NJ, USA, and the International Institute of Connector and Interconnection Technology (IICIT) have issued their first joint Call for Papers for the International Wire & Cable and Connectivity Symposium, scheduled for November 9 to 12, 2009, in Charlotte, NC, USA.

Visit www.iwcs.org to download details

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**Leading-Edge Potential Topics for 2009**

**Cable Systems**
- Product Certification and Quality Assurance
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- Factory Installed Terminations
- Intelligent Patching Systems
- RFID in Cable Systems

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- Connector Materials and Processes
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- High Bandwidth Copper Cable Designs
- Low Bend Diameter Optical Fibers
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- Abandoned Cable Removal
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Abstracts must be submitted through the IWCS website, www.iwcs.org.
All abstracts require the following: title, author(s) and description (up to 500 words).

- **Abstract deadline extended**
- Notification of accepted abstracts: June 12, 2009
- Completed paper due via online: July 31, 2009
Part 1: Staying in Step With Automotive Complexity

Transportation platforms such as automobiles, trucks and off-road vehicles have contained electrical systems for decades. But the last few years have seen a discontinuity in the nature of these electrical systems. Rapid growth in on-board electronic content and embedded software is putting huge demands on electrical design complexity. Put simply, the number of signals flowing around each vehicle is rising rapidly, and this has a profound effect on harness design and construction.

Adding to the explosion in signal count, continual market sub-segmentation is causing comparable growth in the number of vehicle configurations. For example, an automobile may be available with right or left hand drive, gasoline or diesel engines, automatic or manual transmission, automatic or manual climate control, adaptive or passive cruise control and any number of other options that impact the electrical design. Because it is not cost-effective or even physically possible to offer a single harness design that supports the superset of all configurations, a multitude of related designs must be developed, managed and built.

Worse, constant change is a fact of life in automotive electrical design, placing an even heavier burden on engineering teams.

And like virtually all other industries, the automotive industry faces continual pressure to reduce costs, improve product reliability and shorten time-to-market. Automotive electrical/electronic (E/E) systems are comparatively high-cost items within the overall bill of materials, and both electrical and electronic failures have become significant contributors to escalating warranty costs. In the final analysis, design complexity acts against reducing time-to-market. Taken together, increased electronic content, configuration complexity and design change plus the commonly known business drivers are causing a discontinuity.

Of course many technical advances are emerging to address the problem, including wider use of data bus multiplexing and modular componentry. This two-article series focuses on the electrical system/wire harness design process itself. It will examine the role of design automation; that is, the set of software applications collectively known as Electrical Computer Aided Design (ECAD) tools. Here in Part 1 of the series, we look at the history and hierarchy of ECAD tools.

Five Tiers of Tools

Although automobiles have contained electrical systems since the beginning, it has only been possible to apply computing to the problem of electrical design for
about 30 years. Before that, design drafting was done with pencil and paper. The electrical design process today remains largely graphics-based, due in part to this embedded psychological legacy. Five identifiable levels of ECAD software tools have evolved over the decades, emerging in essentially chronological order. Figure 1 illustrates these five levels.

The lowest (and earliest) tier in Figure 1 is Level 0, anchored by general-purpose drawing software. These nonspecialized tools essentially modernized the pencil and paper approach. The drawing packages improved design productivity, allowing engineers to document and change their designs comparatively quickly and neatly. The tools were also fairly cheap to purchase and inherently flexible. The same drawing package could design a company logo as readily as a wiring system. Some enterprises still rely on Level 0 tools today. Indeed, these may be the best choice where the electrical design complexity is very low, as in a lawnmower.

Level 0 tools by their nature contain no design intelligence and produce no design data. It is not possible to apply Ohm’s law to a line on a drawing in order to calculate the proper conductor cross section, or to select a wire terminal guaranteed to fit a particular connector. At Level 0, such activities must be accomplished offline using other methods.

To overcome this limitation, the first specialized ECAD applications emerged about 15 years ago. These Level 1 tools not only supported graphical schematic authoring, but also linked the schematic representations directly to engineering design data via an explicit electrical object model. At Level 1, a line on a drawing represents a true electrical connection between pins on components. The electrical connection can be associated with attributes such as length and cross section, allowing true design engineering to be accomplished within the ECAD environment. Level 1 applications typically contain component and symbol libraries or link to them, and can even swap data such as wire length with other domains including 3D Mechanical Computer Aided Design (MCAD).

Most Level 1 ECAD tools can be traced back to the related discipline of printed circuit board (PCB) design. But vehicle harness design has attributes that don’t appear in PCBs such as multicore cables, clips and grommets, configuration-dependent geometries and more. Therefore, Level 1 tools typically deal with a rather small portion of the overall electrical design process and are considered “point tools.” Building a complete design tool chain requires multiple integrated point tools. Not surprisingly this is a challenging IT task. It involves integrating multiple tools sourced from different (often competing) vendors and employing dissimilar data structures. Though Level 1 solutions are common today in many large organizations, they typically carry high IT maintenance costs and tend to perpetuate historical (often obsolete) design processes.

This situation can be improved by moving to Level 2 ECAD tools, which encompass a larger portion of the design process and reduce integration problems. They may inherently support electrical design, simulation, harness engineering and manufacturing (e.g., production of formboards) within a single design environment. Modern Level 2 packages use file-based design data storage mechanisms, and hence have a modest IT footprint. Level 2 ECAD applications can prove very cost-effective when the electrical design task is moderately complex, such for off-road vehicles.

Level 3 ECAD tools take another step forward, incorporating newer, more powerful software technologies. Chief among these is the concept of data-centricity. In a data-centric toolset all relevant data, from user privileges to device connectivity to component relationships, resides within a relational database (RDB in Figure 1) rather than in flat files. This form of data storage is key to solving some of the problems of modern electrical design complexity, particularly in the areas of configuration complexity and design change management. For example, relational database storage inherently supports functionality such as “where used?” queries, conditional replacement (“replace this component if that is true”) and design version comparison. Other modern software technologies available at Level 3 include web-based integration and computing platform independence, both of which substantially reduce ongoing IT costs.

The ECAD tools in Level 4 build on the advances gained by moving through Levels 0, 1, 2 and 3 to deliver truly advanced design automation. Level 4 tools are the most advanced ECAD solutions commercially available today. These packages support genuine advances in design process methodology, and hence have the potential to make significant contributions to solving tough electrical and wire harness design problems. Level 4 takes direct aim at today’s complexity issues. Part 2 of this article will explain how Level 4 tools solve today’s E/E and harness design problems with the aid of powerful features such as generative design, failure analysis and data management. www.mentor.com
Small, Family Business Still Providing Quality Equipment and Service To Wire Processors

A leader in wire processing equipment and a family-owned company with a reputation for providing superior customer service, Carpenter Manufacturing Co., Inc., celebrates over 50 years in business.

Ever since the company was founded in 1955 by father and son team, Hubert and Louis Carpenter, in Manlius, NY, USA, Carpenter Manufacturing has been committed to developing wire processing machines that combined durability, simplicity and reliability, along with reasonable prices. From the start, the company has also focused on maximizing the amount of in-house fabrication in order to maintain total control over all aspects of machine development and production.

This philosophy has continued through the years and now includes all machining, electronic panels, powder coating and castings. The Carpenter family also recognized early on that superior customer service and support were imperative. This practice has become a cornerstone of the company’s success.

Focus on the Small Shop Market

The target market for Carpenter machines historically has been smaller firms of 200 employees or less, as all the company’s equipment is designed for bench-top operation. This also makes Carpenter particularly attractive to start-up or incubator companies that need economical and rugged machines to achieve profitable operation very rapidly.

One example is Manufacturing Solutions Inc. (MSI) in Rochester, NY, USA. Initially, MSI approached Carpenter Manufacturing with a request to provide several wire processing machines to expand its cable harness business. One year later, because of increased business and the excellent performance of its Carpenter equipment, MSI has added additional machines to complement its existing production lines.

Vannasinh (Tu) Sieingmisal, the Manufacturing Manager at MSI, has indicated that if business growth maintains its current pace, the company intends to add even more Carpenter equipment.

Today, although Carpenter Manufacturing is still a small, family-owned business, the vision and reputation that its founders developed continues and is backed up by outstanding machines and excellent customer support.

A Comprehensive Machine Line

With over 95% of machine fabrication done in-house, Carpenter’s ability to respond rapidly to changing industrial needs has been maintained. Additionally, quality touches such as powder coat finishes, heavy-duty components and user-friendly operation have ensured that companies purchasing Carpenter equipment can look forward to many years of trouble-free operation.

The 23 separate machines that comprise Carpenter’s product line cover the vast majority of industrial needs for wire processing applications that include measure/cut/strip, crimping, hook-up wire stripping and material cutting (tubing, wire, etc.). Carpenter’s quality machines also are supported with available spare parts, no-cost training, and technical support.

To ensure that potential customers are matched to the right machine for their specific requirements, Carpenter Manufacturing has established a free Wire Evaluation Service. With this service, companies interested in purchasing a Carpenter machine can send a wire sample to the company (along with the strip specifications) for processing. Carpenter Manufacturing’s engineers will then evaluate the material and provide the customer with a written wire report, along with samples of the stripped wire and a quote for the right machine.

Additionally, Carpenter Manufacturing recently added videos of its machines in operation to its website. Carpenter points out that these videos do not replace the on-site demonstration if required, but they provide a way for the customer to visualize how the machine might improve their operation.

www.carpentermfg.com

Pneumatic Wire Stripper Introduced

Manlius, NY, USA-based wire machinery and equipment manufacturer, Carpenter Manufacturing Co., Inc., recently introduced the new Model 78 Pneumatic Wire Stripper, which provides its user with a fast and accurate method for stripping a broad range of wires and cables.

The compact Model 78 features calibrated adjustments for wire diameter, strip length and pull length. These calibrated adjustments make operation and changeovers simple and fast. The Model 78 can easily strip hookup wire ranging from AWG 10 to AWG 30, and multi-conductor cables up to 0.250” OD.

System features include full or partial wire strip, adjustable clamping pressure, Lexan safety guard, high-speed steel stripping blades, safety guard interlock switch and easy-to-use pneumatic operation. The system comes standard with a durable powder coat finish and a one-year limited warranty.

To learn more about Carpenter’s Model 78 Pneumatic Wire Stripper or for technical specifications, prices and pictures/videos of other equipment from Carpenter Manufacturing, visit the company’s website at: www.carpentermfg.com
Automatic Order Distribution Software for Crimping Machines

Schleuniger®, Inc., Manchester, NH, USA, offers new software for fully automatic crimping machines. Significant increases in efficiency can be achieved with new EASY ProductionServer software for CrimpCenter fully automatic crimping machines. The software can automatically sort and allocate orders to minimize changeovers and reduce production costs. With EASY ProductionServer software, Schleuniger now offers an alternative to manual order allocation for a very competitive price. From a central PC, production orders can be sent via network to one or more fully automatic crimping machines. Order sequence and allocation is optimized so machine downtime is minimized. The software also recognizes the current machine configuration so that orders are only sent to machines that can process the order. To remain flexible, manual interaction such as prioritizing individual orders or machines is still possible. Using standard Internet technology with TCP/IP protocol, the implementation of a network with EASY ProductionServer and CrimpCenter fully automatic crimping machines is quick and simple. Machine downtime typically associated with order entry is eliminated. All order management is done on a central PC in the office and not at the machine. Production data and machine configuration can also be viewed on the office PC in real time. EASY ProductionServer can also log production data for increased traceability and central analysis. www.schleuniger-na.com

Efficient & Powerful Automatic Coiling System

The modular AutoCoiling System (ACS) from Schleuniger®, Inc., Manchester, NH, USA, can automatically coil, bind and batch long wires, replacing lengthy conveyors and freeing up floor space. Due to the flexible and modular design, (separate power supply) the system can be retrofitted to CrimpCenter series machines in the field. The CoilingUnit 60 automatically coils long wires into a wire ring. Depending on wire size, it can handle wire lengths over 100’ (30 m). Optional CoilTaper 60 can be added to secure coils for handling. Taped coils can be collected with the optional CoilStacker 60 equipped with two horizontally rotatable collection arms. While coils are collected on one side, the coils from the previous batch can be manually unloaded from the other. Coils need little storage space and are easy to handle. After processing the leading wire ends on side one of the CrimpCenter, a linear gripper guides the wire from the cutting head and transfers it to the gripper of the coiling head. The subsequent feeding/coiling process is controlled by synchronized, high-performance servo motors. The CrimpCenter EASY software and touch screen make programming simple. It is possible to coil single-wire applications with or without seals or terminals on either end. Length accuracy is assured by continuous wire length measurement by a closed-loop system. www.schleuniger-na.com

Fully Automated Wire Harness Production

The new fully-automatic Block Loaders, Zeta 651 and Zeta 655, from Komax Corporation, Buffalo Grove, IL, USA, allow production of small batches, a very broad variety of harnesses and virtually no changeover time. The machine requires no application-specific parts to change from setup to setup. The operator simply switches between two carousel pallets. Software automatically calculates the order of loading for the complete assembly process. The base machine can carry 36 wire choices and several crimping stations, each with a programmable height adjustment for over 300 combinations of terminals and wire, all without need for changeover. Options exist for wire marking, more processing stations and other add-ons and accessories. Komax’s patented measuring system monitors the entire block loading operation. www.komaxusa.com
Cable Assembly Automation

Schleuniger®, Inc., Manchester, NH, USA, offers the TransferModule 6000 cable assembly automation system that makes cable assemblies for typical applications including coaxial, flat and round multi-conductor and zipcord cables. The base module made from modular components includes cable transport system, transfer shuttles, transfer chain, cable loading/unloading stations, control system and a PC-based user interface. Overall system length is determined by the quantity and size of the stations required to process the completed assembly. These processes can be performed on each cable end: stripping, tinning, sealing, shield flaring, micro-flame soldering, ultrasonic and resistance welding, connector housing insertion and electrical testing to name a few. Additional pre/post-processing accessories such as prefeeders, inkjet markers, coilers and stackers can be fully integrated.

www.schleuniger-na.com

Cut-and-Strip Machines

New sensor technology from Komax Corp., Buffalo Grove, IL, USA, provides the new Kappa line with easy cable setup and changeovers without tools. Even hard-to-process materials can be setup quickly for a wide range of applications. The same sensor continuously monitors processing during production. End-of-cable or stripping errors are detected early. The optical cable detector makes cut losses a thing of the past. These Kappa units use TopTouch software modeled after the Komax TopWin™ interface. User prompts make the Kappas easy to use. Also, each model may be optimized with a full array of add-ons. The Kappa 321 carries a patented swivel technique in the wire drive allowing different processing positions. The Kappa 320 has a powerful blade head to handle wire sizes from 0.05 to 10 mm². The Kappa 310 is an ultra-compact high-speed machine for wire sizes from 0.02 to 6 mm².

www.komaxusa.com

Cable & Guide Wires for Medical Applications

Jersey Strand and Cable Inc., Phillipsburg, NJ, USA, provides a unique manufacturing capability for small-diameter strand and cable for medical devices such as guide wires and snares for endoscopic tools. Miniature cables can be produced using type 304, 316 or other grades of stainless steel. The company says that its one-of-a-kind equipment can produce strand and cable using a wide variety of materials ranging from stainless steel to high-carbon steel to man-made materials. For more information on Jersey Strand and Cable’s capabilities visit the company’s website below.

www.jerseystrandandcable.com

Magnet Wire Stripper

Manlius, NY, USA-based Carpenter Manufacturing Co., Inc., a global leader in wire processing equipment, has introduced the new Model 88E Magnet Wire Stripper, which offers a fast and accurate way to efficiently strip miniature coils and fine magnet wire, using rotating cone shaped stripping wheels. These wheels come in two grit textures and have a stripping range from 26 to 48 AWG. Carpenter’s special Twincone® wheel design makes close stripping possible on all types of film insulations to within 1/8” of a component’s body. Additionally, the Twincone Stripping Wheels may be used on a range of competitive equipment and purchased at a much lower price.

www.carpentermfg.com

Ultrasonic Metal Welding System

The new MW20 Ultrasonic Welding system from Sonics & Materials, Inc., Newtown, CT, USA, offers precise, ergonomic controls and weld quality monitoring in time, energy and/or distance. Its GX-Series power supply provides microprocessor control and is available in 1200, 1700, 2200 and 3500 W. Designed for maximum precision and safety, the MW20 features ultrasonic horn/stack frequency display, a ground base with integrated safety switches, self-orienting horn and tips, patented one-piece horn/booster with dual nodal mounts, safety slide advance system and indicator signal lights for weld status, part quality and faults. Other features are power load meter and upper/lower weld limit settings.

www.sonics.com
Multi-Process Coaxial Cable Strippers

The Cosmic 42R and 48R from Komax Corporation, Buffalo Grove, IL, USA, are all-electric benchtop machines designed for quick cycle times whether stripping coaxial, multi-core or standard wires. Both store up to 1000 different sets of data. Each unit uses a triple stepping motor motion system to process cable in up to nine stages, and each has a 10-phase programmable adjustment for gripping pressure. The results are highly precise and repeatable. All the parameters required for coax stripping including stripping length, incision diameter, wayback, pull-back speed, etc., are displayed on a large LCD screen for speedier setups. The Cosmic 42R is equipped with a waste vacuum cleaning system and has a PC interface for data management. It strips diameters of 2 mm diameter maximum and lengths up to 40 mm. The Cosmic 48R handles diameters from 1.5 to 8.0 mm and lengths up to 40 mm. Both products will be demonstrated at the Electrical Wire Processing Technology Expo in Milwaukee, WI, USA.

Splicing Applicator

Mecal by Starn has released the patented MRFPS-Splicing Applicator. The MRFPS was designed to handle a continuous copper band which is fed, cut, formed and crimped around two side wires in one press stroke. Crimp quality and reliability is optimized. Besides wires, the MRFPS can be used to connect neon lamps, LEDs, switches, adaptors and many other applications. The copper band supplied by Mecal is available in three different widths (2, 4 and 6 mm) and can be used to crimp from 0.06 mm² up to 6.6 mm² wire section. Come see the debut of the MRFPS Splicing Applicator at the National Electrical Wire Processing Technology Expo. Spearheading the sales for Mecal/Starn will be 11-year-old T.S.R., Inc., of Eastport, MI, USA.

New Material Choices Added to Split Loom Line

To satisfy customer demand, Micro Plastics, Flippin, AR, USA, have added three new material choices to its Split Loom product line. Now, along with the standard polypropylene material, the company offers split loom in a flame-retardant polypropylene, nylon 6 and polyethylene materials. All Split Loom products are manufactured in black. Micro currently offers six standard sizes in 1/4”, 3/8”, 1/2”, 5/8, 3/4” and 1” diameters. Supplied in 100’ rolls, Split Loom is now available in several convenient new packaging options. Small quantities of 40’ to 200’ can be packaged in payout boxes for ease in dispensing. Mini gaylord boxes can accommodate loom in lengths of 500’ to 4000’. Bulk ordering is packaged in full gaylord boxes and depending on the size, can hold up to 25,000 feet of Split Loom. Other new custom order options for the company’s standard Split Loom products include grey and blue product identification striping. Micro Plastics’ Split Loom products can be extruded as corrugate tubing, without the slit opening in the side, for bulk orders.
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